

No. 681,932.

Patented Sept. 3, 1901.

J. F. SKIRROW.

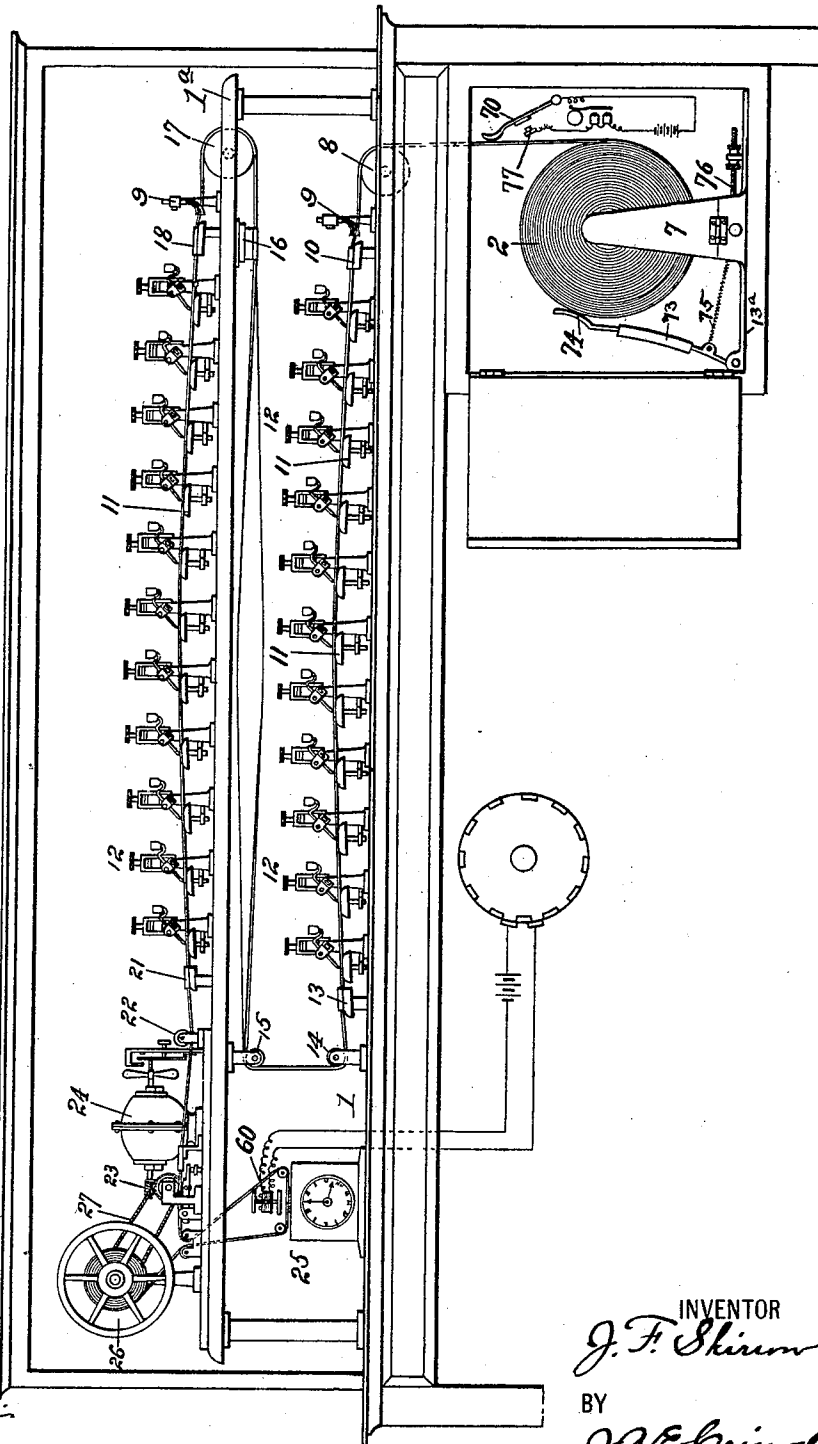
TELEGRAPHIC RECORDING APPARATUS.

(Application filed Jan. 25, 1901.)

(No Model.)

7 Sheets—Sheet 1.

Fig. 1.



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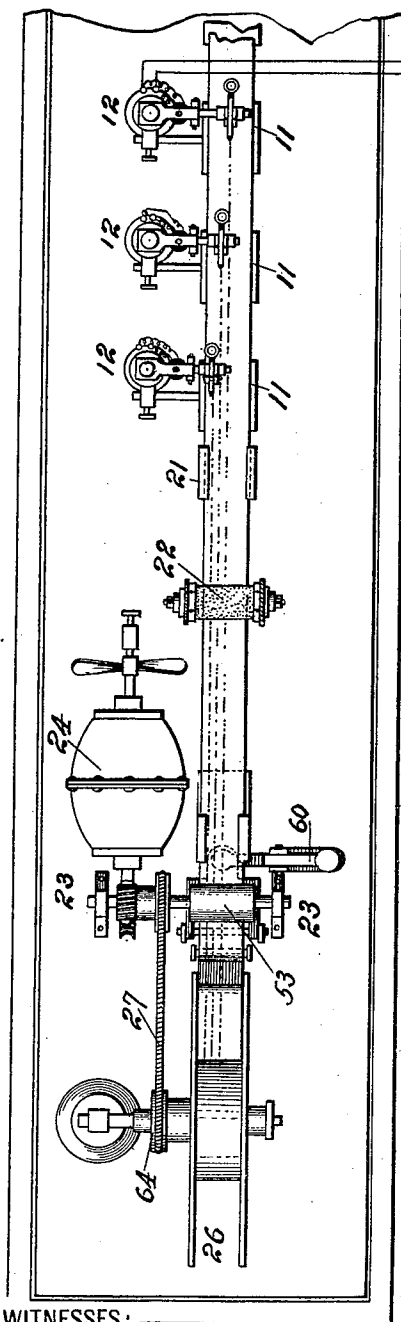
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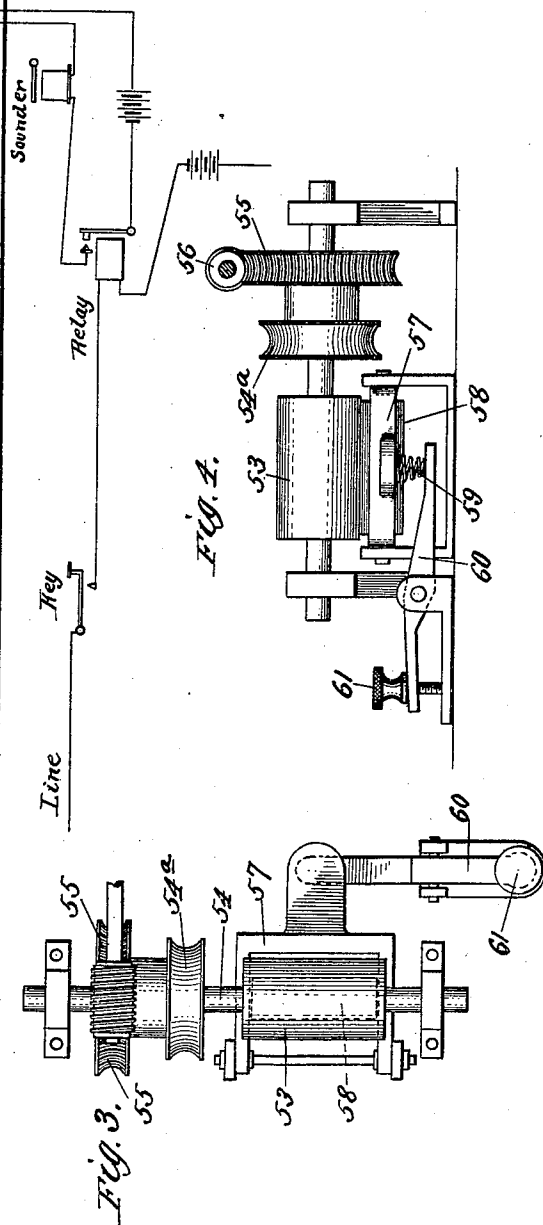
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Fig. 2.



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Fig. 5.

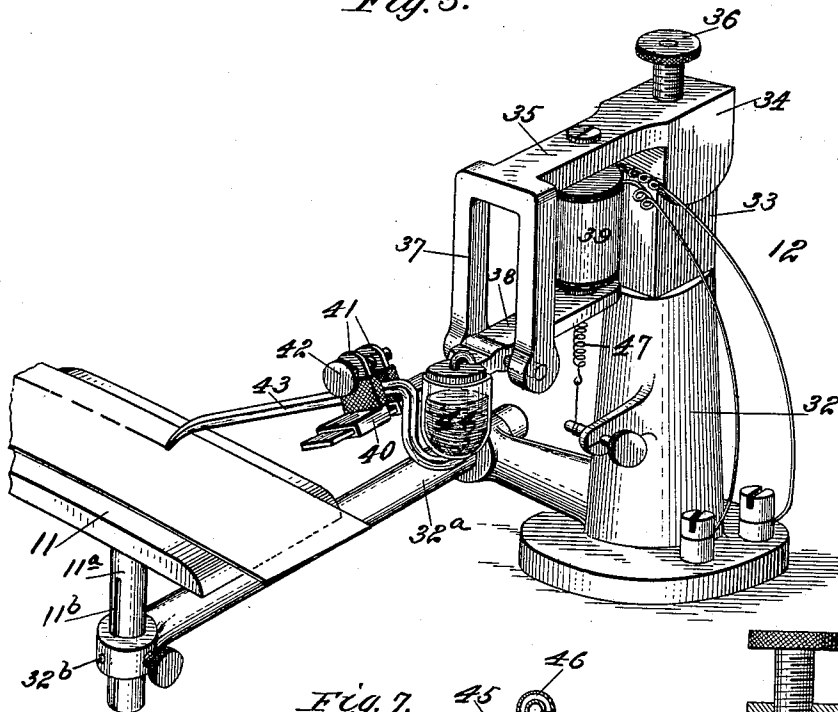


Fig. 7.

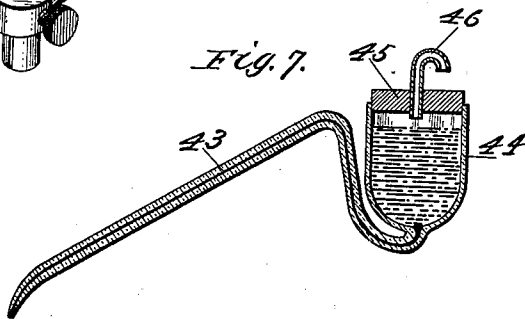


Fig. 8.

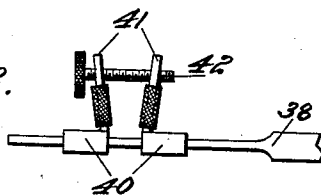
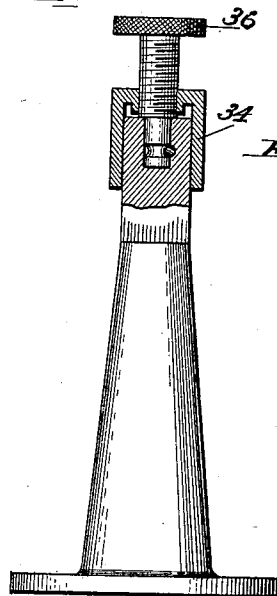


Fig. 6.



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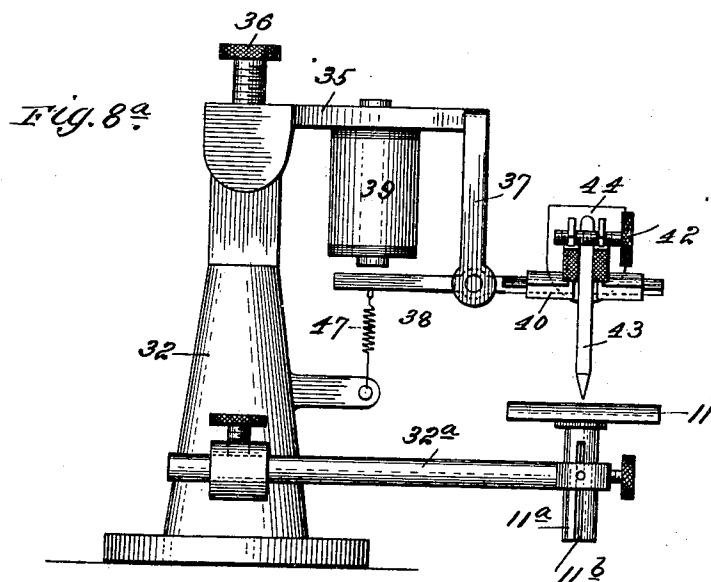
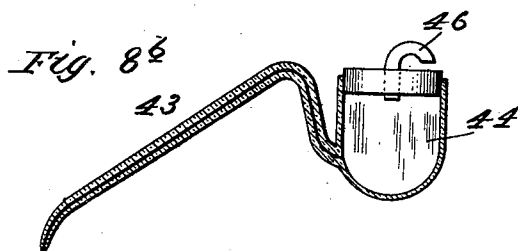
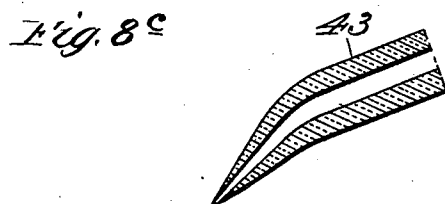
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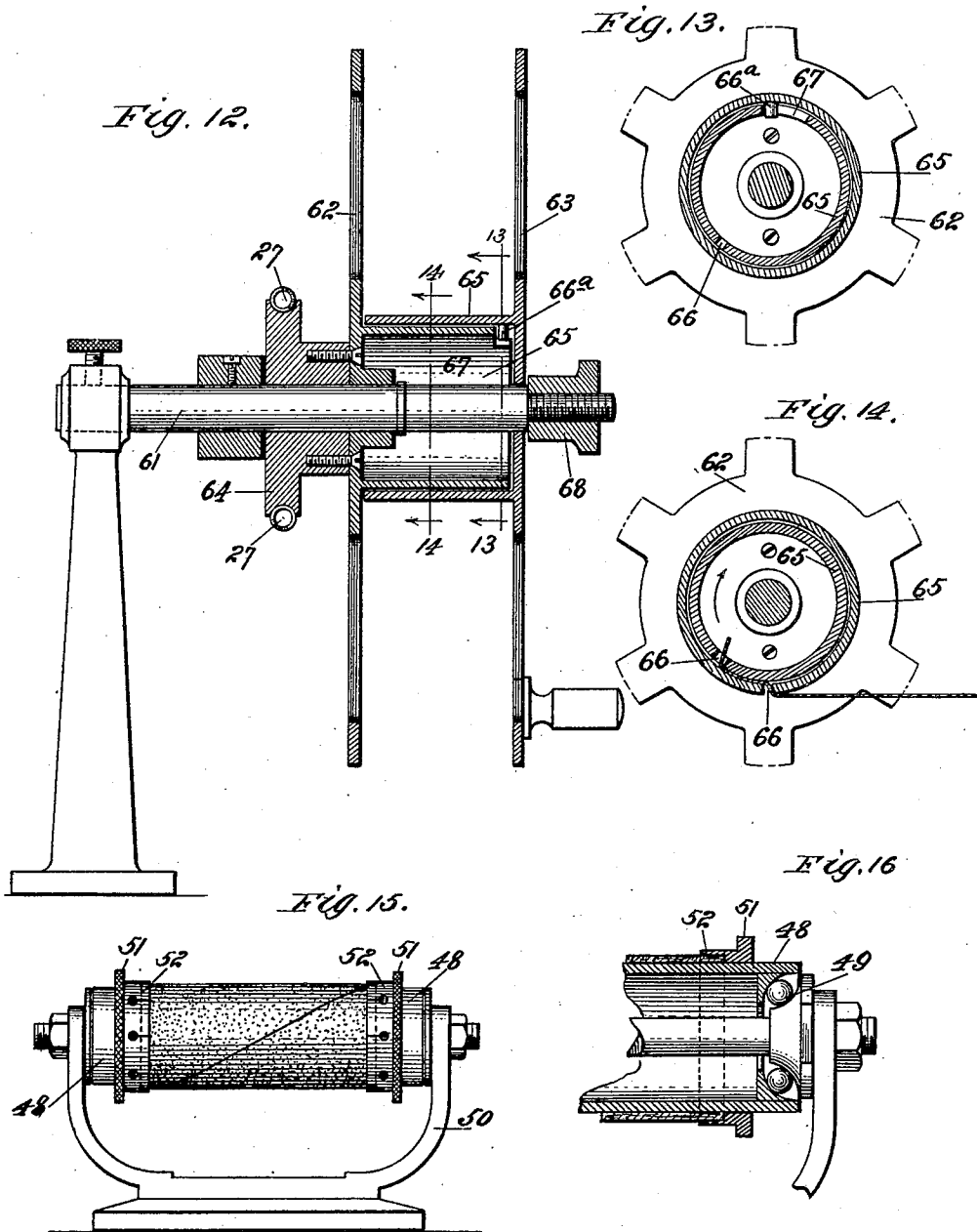
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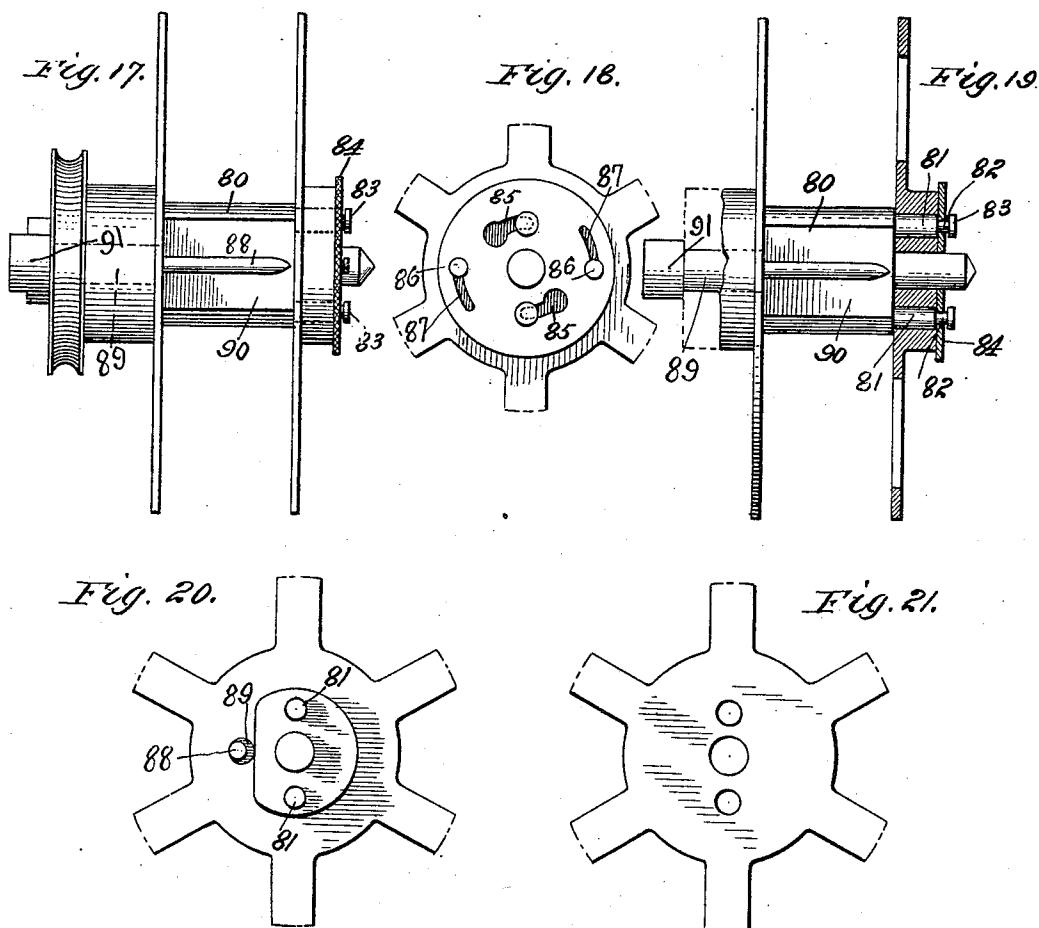
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7 Sheets—Sheet 7.



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UNITED STATES PATENT OFFICE.

JOHN F. SKIRROW, OF EAST ORANGE, NEW JERSEY.

TELEGRAPHIC RECORDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 681,932, dated September 3, 1901.

Application filed January 25, 1901. Serial No. 44,685. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. SKIRROW, a citizen of the United States, residing at East Orange, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Telegraphic Recording Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

10 Figure 1 is a side elevation of the apparatus; Fig. 2, a plan view of a portion thereof, showing the record-strip-drawing mechanism, the winding-reel, and a diagram of the connected telegraph instrument; Fig. 3, a plan
15 view of the record-strip-drawing mechanism; Fig. 4, a front elevation thereof; Fig. 5, a perspective view of one of the recorders; Fig. 6, a side elevation, partly in section, of the standard and attached frame of the recorder;
20 Fig. 7, a sectional view of one form of the siphon ink-well of the recorder; Fig. 8, a detail view of the clamp for holding the ink-well in position on the recorder; Fig. 8^a, a side elevation
25 of the recorder; Fig. 8^b, a vertical sectional view of another form of the siphon ink-well; Fig. 8^c, a detail view of the marking-point of the siphon; Fig. 9, a side elevation of the forward end of the apparatus, showing the paper-
30 roll and the lint-brushes; Fig. 10, a detail of one of the lint-brushes; Fig. 10^a, a detail sectional view of the paper-roll shaft; Fig. 11, a detail of the standard for holding the paper-roll; Fig. 12, a vertical longitudinal sectional
35 view of the winding-roll; Fig. 13, a sectional view on line 13 13 of Fig. 12; Fig. 14, a similar view taken on line 14 14 of Fig. 12; Fig. 15, a detail elevation of the rotary blotter; Fig. 16, a vertical sectional view of one end
40 thereof; Fig. 17, a front view of a modified form of the winding-reel; Fig. 18, a side elevation of the center thereof; Fig. 19, a front
45 view thereof, partly in section; Fig. 20, a detail side elevation showing the paper-clamping cam, and Fig. 21 a side elevation of the removable side of the reel.

The object of this invention is to provide an improved apparatus for recording telegraphic messages on a moving paper record strip or tape by means of a series of recording
50 instruments, each of which is in circuit with a telegraph instrument, and is adapted to work in unison therewith and to mark on

the paper strip or tape the symbols of the message.

Referring to the various parts by numerals, 55 1 designates the table or support on which the apparatus is mounted, and 2 the paper-roll, which is mounted in suitable supports below the table. From this roll the paper is carried up over a guide-wheel 8, journaled in
60 the table-top, then under a flexible lint and tension brush 9 adjacent the guide-wheel, then through a paper-guide 10, secured on a suitable support adjacent the lint and tension brush 9. From this guide the paper
65 passes to the series of recording instruments, each of which is provided with a vertically and rotatably adjustable marking bed or table 11. From the last of the series of recorders the paper passes rearward to the guide
70 13. The tables of the recorders may be arranged in any suitable way, and any desired tension means may be employed to hold the paper flat on them. It is preferred, however, to place them as shown in Fig. 1, wherein
75 they are disposed in an upward-curved arc, the highest table being at the center thereof and the lowest tables at the ends, the paper-guides at the ends of the series of tables being slightly below the lowest tables. By this
80 arrangement the paper will be held flat on all the tables of the series. The recorders are adapted to mark parallel lines of symbols on the paper. From the rear paper-guide 13 the paper is carried under a rotary blotter
85 and tension-roll 14, which is slightly below the said guide, and by depressing the paper at this point aids in holding it down closely on the marking-tables. From the blotter the paper is carried up and over a guide-
90 roll 15 and is then reversed and carried forward through a guide 16 and then up over a guide-wheel 17, which is mounted in a horizontal supplemental table or support 1^a, directly above the guide-wheel 8, and then
95 rearward under another lint and tension brush similar to brush 9, then through a guide 18 at the forward end of another series of recorders 12. From the guide 21 at the rear end of this second series of recorders the
100 paper passes under another blotter and tension-roll 22, then to the drawing mechanism 23, which is driven by an electric motor 24. From the drawing mechanism the paper strip

or tape passes to the time-stamping mechanism 25, and from there it passes up to the winding-reel 26, which is driven by an endless coil-spring slip-belt 27 from the drawing mechanism. The paper-roll is mounted on a two-part sleeve, one part 3 of which is rigidly secured to a shaft 4, which is mounted on ball-bearings carried by the spindle 5. The two parts of the sleeve are threaded together, and the part 6 thereof when disconnected from part 3 may be slid off the shaft 4. Each part of the sleeve is formed with an annular shoulder, and between these shoulders the paper-roll is clamped when the two parts are screwed together. The ends of the spindle are pointed and rest in bearings on the inner sides of a pair of vertical standards 7, which are secured to a base 3^a. This base fits closely in a case secured to the support 1, just below the guide-wheel 8. One of the standards is divided horizontally, and the two parts are hinged together, so that the upper part may be swung outward to release the adjacent end of the spindle 5 when it is desired to remove the spindle from between the standards. To retain the upper part of the standard in its vertical position, a spring-pressed clip 4^a is slidably mounted in the lower part of the standard and engages over a lug 5^a on the inner side of the hinged section, near the lower end thereof. To prevent the paper unwinding too rapidly from the roll, a brake is provided. This brake consists of an arm 73, pivoted at its lower end to the base 3^a, its upper end being bent to form a shoe 74, which bears on the roll. Connected at one of its ends to this lever is a coil-spring 75, whose other end is connected to an adjusting-screw 76, by means of which the pressure of the shoe on the roll may be nicely adjusted. It will be noted that as the roll of record-strip decreases in size the pressure of the brake-shoe thereon will decrease. To prevent vibration of the brake-lever, a deadening-block or covering of felt 77 or other suitable material is secured thereto. The tension-brushes are formed of long soft flexible bristles and are vertically adjustable in an arm 30, which is rotatably adjustable in a standard 31. These brushes are adjusted to bear on the upper side of the paper with a considerable pressure, the bristles thereof being bent rearward. The brushes are wide enough to extend entirely across the paper tape and are flexible enough to take up any ordinary slack which may occur therein, thus insuring a thorough cleaning of the upper surface of the paper of all lint and dust before it passes under the marking devices of the recorders and securing a steady and uniform movement of the paper over the beds. When a slack occurs in the paper strip, the brushes partially straighten, and thus maintain a tension on the paper without interfering with their brushing action. They may be adjusted rotatably and vertically to secure the proper pressure on the paper. The

recorders each consist of a standard or base 32, mounted on the table and formed with the square upper portion 33. Fitting over the top of the standard is a square cap 34, which is formed with the horizontal arm 35. Threaded through the center of the cap, its lower end being rotatably mounted in the standard, is a vertical adjusting-screw 36, by means of which the cap and attached arm may be raised or lowered. On the outer end of the arm 35 is formed a depending yoke 37, between the lower ends of which is pivoted a rocking bar 38, the inner end of which forms the armature of an electromagnet 39, which is secured to the arm 35, the outer end being inclined rearward and downward. On this outer end of the rocking bar is mounted a pair of slides 40, which are formed at their inner ends with upward-extending clamping-arms 41. These arms incline away from each other and are connected at their upper ends by a clamp-screw 42, said arms being covered with suitable cushioning material and clamping between them the long arm of a glass siphon 43. When the upper ends of the arms are drawn toward each other by the clamp-screw, the outer ends of the slides are raised slightly and bound against the bar, and thereby locked in their adjusted position. Integral with the lower end of the short arm of the siphon is formed an ink-well 44. The lower end of the long arm is drawn to a fine point and is curved downward to adapt it to deliver ink squarely on the paper. A suitable cover 45 is provided for the upper end of the ink-well, and this cover is fitted with a suitable vent 46, whose outer end is turned over to prevent dust settling therein. A suitable tension device 47 is connected to the lower side of the armature and is supported on the standard 32. By means of this tension device the weight of the siphon and ink-well and clamp may be counterbalanced and the armature normally held away from the magnet. The magnet is electrically connected to a telegraph instrument and works in unison therewith. By means of the screw 36 the entire recording mechanism may be vertically adjusted on the standard to secure the proper contact of the lower marking end of the siphon with the paper, and by means of the slides 40 the siphon may be caused to mark at the desired point in the width of the paper. When the armature is attracted by the magnet, the marking-point of the siphon is brought into contact with the moving paper and makes a dot or a dash, depending on the length of time the armature is held by the magnet. Any desired means for adjusting the arm on the standard may be employed. On each standard or base, near the bottom thereof, is formed a rearward-extending bracket in which is rotatably adjustable an outward-projecting rod 32^a, in the outer end of which is formed a socket in which is adjustably supported a vertical bar 11^a. This bar is formed with a vertical slot 11^b, into

which extends a pin 32^b to prevent the bar 11^a rotating. On the upper end of this bar is mounted the marking-table 11. This table is so placed that its center is approximately under the marking-point of the recorder. By means of this structure the table may be moved toward or from the standard 32. It may be raised or lowered, and by means of the rotatable rod 32^a it may be inclined forward or rearward to enable it to conform to the desired arc when the recorders are mounted in series, as in Fig. 1. Each table is slightly convex from its forward to its rear end to better enable it to conform to the arc of the line of tables. Instead of having the lower end of the short arm of the siphon open into the ink-well at the bottom thereof, as shown in Fig. 7, it may be arranged to open into the side of the well slightly above the bottom, as shown in Fig. 8^b. In this form the sediment will not clog the opening into the siphon. At the rear end of each of the series of tables 11 is mounted a rotary blotter, which is slightly below the adjacent paper-guide, so that the paper being carried under this blotting-roll is depressed at this point below the end table, and thereby held flat on the tables. Each of these rolls consists of a cylinder 48, which is longer than the width of the paper and is mounted on ball-bearings 49 and carried by the supports 50. Slidably mounted on the cylinder 48 is a pair of clamp-rings 51, one of said rings being near each end of the cylinder and each ring being formed with an annular clamping-flange 52, the flange on each ring extending inward toward the flange on the other ring. Under these clamping-flanges the edges of the blotter are engaged, as shown in Fig. 16. The object of mounting these tension blotting-rolls on ball-bearings is to reduce the friction on the paper and to permit it to run through the apparatus as easily as possible, while at the same time holding it taut and flat on the tables. The paper is drawn through the apparatus by the drawing mechanism 23, which consists of a main roll 53, mounted on a horizontal shaft 54, which is supported in suitable bearings and carries a grooved pulley 54^a, over which the endless coil-spring slip-belt passes, and the worm-gear 55. Meshing with this gear is a worm 56 on the armature-shaft of the electric motor, and this motor is provided with a very sensitive governor, whereby the rotation of its armature is controlled and a uniform speed maintained. Below the main roll is pivoted an open frame 57, in which, directly below the main roll and parallel therewith, is mounted a pressure-roll 58. This roll is yieldingly held against the lower side of the main roll by a spring 59, which bears up under the free end of the frame 57, its lower end resting on the inner end of a pivoted adjusting-lever 60, which is parallel with the shaft of the main roll, its outer end being out of the path of the paper and provided with an adjusting-screw 61, by means of which the pressure of the spring 59

up against the end of the frame 57 may be regulated. By means of this arrangement the drawing-rolls may be caused to grip the paper with sufficient pressure to steadily draw it through the apparatus. By placing the adjusting-lever parallel with the shaft of the main roll and having its outer end out of the path of the paper and mounting the adjusting-screw in said outer end, where it may be readily manipulated, the pressure of the drawing-rolls on the paper may be easily regulated without interfering with the operation of the apparatus. From the drawing mechanism the paper passes to the time-stamping mechanism, which consists of a suitable clock and the electrically-actuated stamping mechanism 60, which may be brought into operation by any suitable means for automatically closing and opening the circuit at regular intervals, preferably every minute. From the time-stamping mechanism the paper tape passes to the winding-reel. This reel is loosely mounted on a horizontal spindle 61, which is supported at one of its ends in a standard and consists of two separable members 62 and 63. The inner member 62 is not removable from the spindle and carries the grooved belt-wheel 64, over which passes the endless coil-spring slip-belt 27. This belt may be of any desired construction; but it is preferably so formed as to be longitudinally yieldable to prevent any sudden jars or pulls on the winding-reel. The object of this slip-belt is to permit the time-stamping mechanism to hold the paper tape during the stamping operation without the winding-reel exerting too great a pull on the paper, the tension of the belt being such that while the stamping mechanism is engaging the paper the belt will slip on its pulleys. As the roll of paper on the winding-reel is constantly increasing in size it is necessary to impart an irregular motion to the reel in order to prevent the breaking of the paper. By means of the slip-belt the reel winds up the paper as it leaves the stamping mechanism and maintains a strain on it sufficient to keep the paper wound tightly, the belt slipping before the strain is sufficient to injure the paper. Each member of the reel is formed with an inward-extending hollow hub 65, the hub on the outer or removable member 63 being open at its inner end and slightly larger than the hub on the inner member, whereby it may be slipped over said hub, as shown in Fig. 12. In each of these hubs is formed a longitudinal slot 66, which may be brought into register with each other. An inward-extending radial pin 66^a is carried by the hub of the removable member, and said pin enters a recess 67, formed in the end of the hub of the non-removable member and limits the independent rotation of the members. By means of this construction the slots in the hubs may be brought into register with each other to permit the end of the paper tape to be passed inward into the inner hub. By then giving the inner member a short

backward turn, as indicated by the arrow in Fig. 14, independently of the outer member the paper will be bound between the hubs, as shown in Fig. 14. A screw-cap 68 on the free end of the spindle secures the outer or removable member and its attached hub in place. As will be seen, the paper will be entirely carried by the outer hub, and when it is desired to remove the paper from the reel the cap 68 is removed and the outer member and its hub, carrying the paper, is slid off the inner hub and the spindle. The paper-roll may then be easily slipped off the outer hub. Bearing yieldingly on the paper tape, just above the paper-roll, is a movable contact-lever 70, which carries one terminal of an electric alarm-circuit, the other terminal of said circuit being connected to a contact 71 in the path of the movable lever 70. The lever is held out of engagement with this contact by the paper tape when said tape is under its normal tension, as shown clearly in Figs. 1 and 9. Should such slack occur in the paper which the flexible tension-brushes could not take up or should the paper become broken, the lever 70 would drop down and contact with the stop 71 and complete the alarm-circuit. A bell or other suitable alarm device is arranged in this circuit.

In Figs. 17 to 21 is shown a modified form of the winding-reel. In this construction the inner member is provided with a solid hub 80, from the outer end of which, at diametrically opposite points, project two pins 81, which are parallel with the spindle on which the reel is mounted. An annular groove 82 is formed in each of these pins, near the end thereof, to form the heads 83. The removable member fits closely against the outer end of the hub 80 and is provided with apertures through which the pins 81 extend. On the outer side of the removable member is mounted a locking-disk 84, provided with concentric slots 85, which register with the pins 81, each of said slots being enlarged at one end to permit the heads of the pins 81 to pass through. This locking-disk is held in position by means of two screws 86, which pass through concentric slots 87 and permit the locking-disk to have a partial rotation to take the enlarged ends of the slots 85 away from the pins 81 and to lock the disk in place by causing the walls of the contracted part of these slots to enter the grooves 82 in the pins. To clamp the end of the paper tape on the hub 80, a clamp-pin 88 is set eccentric on the end of a short shaft 89 (which shaft is mounted in the inner member) and lies close to and parallel with the flattened portion 90 of the hub, and under which the end of the paper strip is placed, said pin being adapted to bind the end of the paper against said flattened portion when the shaft 89 is partly rotated. On the outer end of the shaft 89 is an enlargement 91, which may be readily grasped and the shaft thereby rotated sufficiently to cause the clamp-pin to bind the end of the

paper on the hub. It will thus be seen that the paper is thoroughly cleaned of all lint and dust before it passes to the recording devices. It will also be seen that by means of the tension-brushes and the rotary tension-blotters and the series of tables arranged as described the paper will be held flat on the tables throughout the series. By reversing the paper and providing a second series of recorders and the lint-brush and the tension-blotter therefor both sides of the paper may be used. By providing each recorder with an independent marking-table and providing means for the substantially universal adjustment of said table it will be readily seen that practically any number of recorders may be arranged in a series and the tables thereof so adjusted that the paper will be held flat as it is drawn over them. It will also be seen that additional recorders may be readily placed in the series, it being only necessary to adjust the tables to secure the proper travel of the paper. It is of course obvious that other material than paper may be employed as the record-strip on which to mark the symbols of the message, and it is to be understood that the term "paper strip" is used in a broad sense and is intended to include a flexible record-strip of any suitable material.

It will be readily understood from Fig. 2 that each recorder is arranged to mark at a different point in the width of the paper from all the other recorders, so that there will be a line of symbols from each recorder and all the lines will be parallel. In this figure is also shown in diagram one of the recorders connected to the telegraph instruments, the recorder being in the local circuit with the sounder and arranged to record the messages received. The object of providing a winding-reel with one removable side or member is to facilitate the removal of the roll of record-strip from the reel. In practice it is found desirable to remove the record-strip from the reel every thirty minutes, so that the record-rolls are not too large for convenient examination and storage. It will thus be seen that it is very desirable that means be provided whereby the record-roll may be readily removed from the reel and the end of the record-strip again quickly secured to the reel-hub. By the means shown in the drawings the two members of the reel may be quickly separated and the record-roll removed bodily from the hub. When the roll is removed, the members may be quickly secured together and the end of the record-strip readily clamped to the reel-hub. When the record-roll is to be removed from the reel, the record-strip is severed near the reel by a clean transverse cut, so that the two ends of the strip may when desired be brought together and the lines of symbols on one end be brought to register with the corresponding lines of symbols on the other end and the messages easily read across the break in the strip. The siphon-arms are formed of thick glass to enable the

longer arm to be securely clamped by the arms on the slides 40 without breaking it and to enable the shorter arm thereof to safely carry the ink-well. At the lower end thereof the longer arm is tapered to a point, as shown in Fig. 8°. The channel through the siphon is larger than it is usual in practice to form it in siphons for recording instruments, but near the lower end of the longer arms it is gradually narrowed, so that at the marking-point it is very small. It will thus be seen that at the marking-point the wall of the long arm of the siphon is reduced to practically a knife-edge, the object of this being to prevent the accumulation of ink thereon and the consequent spreading of the ink over the outer side of the siphon. By forming the siphon-arms with the large channel, so that a large body of liquid will be contained in the long arm, the feed of the siphon will be more regular.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a recording apparatus the combination of means for supporting a record-strip, a series of marking-tables arranged in an upward-curved arc, means for moving the strip over the said tables, a recorder adjacent each table and adapted to mark on said strip, each of said recorders being in circuit with a telegraph instrument and working in unison therewith, and a tension device at each end of the series of tables to hold the strip flat on the tables.

2. In a recording apparatus the combination, of means for supporting a record-strip, a series of marking-tables, means for moving the record-strip over said tables, a recorder adjacent each table and adapted to mark on said strip, each of said recorders being in circuit with a telegraph instrument and working in unison therewith, a flexible lint and tension brush at the forward end of the series of tables and bearing on the upper side of the strip, and a tension device at the rear end of the series of tables and bearing on the strip.

3. A recorder consisting of a support, a magnet, a pivoted armature, a marker carried by said armature and consisting of a heavy glass siphon having a large channel therethrough, the lower end of its longer arm being drawn down to form a fine marking-point and to reduce the channel, the lower end of its shorter arm being connected to an ink-well, and means for securing said marker to the armature.

4. In a recording apparatus the combination, of a support for a record-strip, a recorder, a drawing mechanism consisting of a main roll, means for driving the main roll, a pivoted frame below the main roll, a pressure-roll in said frame, an adjusting-lever extending inward under said frame, a spring between the inner end of the lever and the

frame, and an adjusting-screw in the outer end of the lever, substantially as described.

5. In a recording apparatus, the combination of means for supporting a record-strip, a series of marking-tables arranged in an upward-curved arc, means for moving the strip over said tables, a recorder adjacent each table and adapted to mark on said strip each of said recorders being in circuit with a telegraph instrument and working in unison therewith, a flexible lint-brush at the forward end of the series of tables and bearing on the strip and depressing it below the forward end table, and a tension device at the rear end of the series adapted to depress the strip below the rear end table.

6. In a recording apparatus, the combination of means for supporting a record-strip, a recorder, a mechanism for drawing the strip past the recorder, a winding-reel, a slip-belt driving the winding-reel, and a time-stamping mechanism between the drawing mechanism and the winding-reel and adapted to operate on the record-strip.

7. In a recording apparatus, the combination of means for supporting a record-strip, a recording mechanism, means for drawing the strip past the recording mechanism, a winding-reel to receive the strip from the drawing mechanism, and a slip-belt driving the winding-reel from the drawing mechanism.

8. In a recording apparatus, the combination of means for supporting a record-strip, a recorder, a drawing mechanism, a winding-reel, and a longitudinally-yieldable slip-belt driving the winding-reel from the drawing mechanism.

9. In a recording apparatus, the combination of means for supporting a record-strip, a recorder, a drawing mechanism, a winding-reel, and an endless coil-spring slip-belt driving the winding-reel from the drawing mechanism.

10. In a telegraphic recording apparatus the combination, of a support for a record-strip, a series of recorders, each of said recorders being in electrical connection with a telegraph instrument, a tension device for the record-strip at each end of the series of recorders, a second series of recorders, means between the two series of recorders for reversing the record-strip, a tension device at each end of the second series of recorders, and a drawing mechanism whereby both sides of the record-strip will be marked upon.

11. A recorder consisting of a standard, a horizontal supporting-bar formed with a socket at its inner end adapted to receive the standard, an adjusting-screw carried by the said bar and engaging the standard, a magnet carried by said bar, an armature pivoted on said bar and carrying an adjustable marker, and a marking-table to support a record-strip adjacent the marker.

12. A recorder consisting of a standard, a

horizontal supporting-bar formed with a socket at its inner end adapted to receive the standard, means carried by the supporting-bar and engaging the standard to secure the bar in position, a magnet carried by the bar, an armature pivoted on the bar and carrying a marker-holding means at one of its ends, and a marker consisting of a siphon having the lower end of its longer arm drawn to a marking-point and the lower end of its shorter arm secured to and carrying an ink-reservoir.

13. In a recording apparatus, the combination of a pair of supports one of which is adapted to be moved outward away from the other, means for locking the movable support in its inner position, a spindle journaled in said supports, means on said spindle for clamping a roll of record-strip, a recorder, and means for drawing said strip past the recorder.

14. In a recording apparatus, the combination of a support for a record-strip, a recorder, a mechanism to draw the strip past the recorder, said drawing mechanism consisting of a main drawing-roll, means for rotating said roll, a pressure-roll below the main roll, means for yieldingly pressing said pressure-roll against the main roll, means for adjusting said pressure, a winding-reel, and means for driving said reel from the drawing mechanism.

15. In a recording apparatus, the combination of a support for a record-strip, a recorder, a drawing mechanism, said drawing mechanism consisting of a main roll, means for driving said roll, a pressure-roll below the main roll, means for yieldingly holding the pressure-roll against the main roll, a winding-reel, and a slip-belt driving the reel from the main drawing-roll.

16. In a recording apparatus, the combination of a support for a record-strip, a recorder, a drawing mechanism consisting of a main roll, means for positively driving the main roll, a pivoted frame below the main roll, a pressure-roll in said frame, an adjusting-lever extending inward under said frame, a spring between the inner end of the lever and the frame, an adjusting-screw in the outer end of the lever, a winding-reel, and a slip-belt driving the reel from the main drawing-roll.

17. A recorder consisting of a standard, a supporting-bar formed with a socket at its inner end adapted to receive the standard, an adjusting means securing the bar to the standard, a magnet carried by said bar, an armature pivoted on said bar and carrying an adjustable marker, and a marking-table to support the record-strip adjacent the marker.

18. A recorder consisting of, a standard, a supporting-frame vertically adjustable thereon, a magnet carried by said frame, a pivoted bar, one end of which forms an armature, a marker carried by the other end of the said pivoted bar, and an independently-adjustable marking-table for the record-strip to hold said strip adjacent the marker.

19. A recorder consisting of a support, a magnet carried thereby, a pivoted bar the inner end of which forms an armature, a pair of slides on the outer end of said bar, an arm on each slide, said arms inclining away from each other and connected at their ends by a clamp-screw, and a marking device adapted to be clamped between the arms on the slides.

20. A recorder consisting of, a support, a magnet carried thereby, a pivoted bar one end of which forms an armature, a slidable clamp on the other end of said bar, and a marking device adapted to be supported by said clamp and consisting of a siphon having the lower end of its longer arm formed into a marking-point, and the lower end of its shorter arm secured to and carrying an ink-well.

21. A recorder consisting of a standard, a supporting-frame vertically adjustable thereon, a magnet carried by said frame, a pivoted bar carried by the supporting-frame, one end of said pivoted bar forming an armature for the magnet, an adjustable marker on the other end of the pivoted bar, and a vertically and horizontally adjustable marking-table to hold the record-strip adjacent the marker.

22. A recorder consisting of a standard, a supporting-frame vertically adjustable thereon, a magnet carried by said frame, a pivoted bar carried by said supporting-frame, one end of said pivoted bar forming an armature for the magnet, a marker carried by the other end of the pivoted bar, a vertically-adjustable marking-table, and means for tilting said table forward or rearward.

23. A recorder consisting of a standard or base, a marking mechanism vertically adjustable thereon, a marking-table, means for tilting said table forward or rearward, and means for vertically adjusting said table.

24. A recorder consisting of a standard, a supporting-frame vertically adjustable thereon, a magnet carried by said frame, a pivoted bar carried by said supporting-frame, one end of said pivoted bar forming an armature for the magnet, a marker adjustable on the other end of said pivoted bar, a vertically and horizontally adjustable marking-table, and means for tilting said table forward or rearward.

25. In a telegraph recording apparatus, the combination of a support for a record-strip, a series of recorders, each recorder being electrically connected to a telegraph instrument and operating in unison therewith, and consisting of a marking apparatus and an independent marking-table to support the strip close to the marking apparatus, and means for drawing the strip over said tables.

26. In a telegraphic recording apparatus, the combination of a support for a record-strip, a plurality of recorders each recorder being electrically connected to a telegraph instrument and operating in unison therewith, and consisting of a marking apparatus, an independent marking-table to support the strip close to the marking apparatus, and

means for adjustably supporting each of said tables.

27. In a telegraphic recording apparatus, the combination of a support for a record-strip, a plurality of recorders, each recorder being electrically connected to a telegraph instrument and working in unison therewith and consisting of a marking apparatus, an independent marking-table for each recorder, means for tilting said table forward or rearward, and means for drawing said strip over the tables.

28. In a telegraphic recording apparatus, the combination of a support for a flexible record-strip, a plurality of recorders arranged in line, each recorder being electrically connected to a telegraph instrument and working in unison therewith, and consisting of a marking device, a vertically-adjustable marking-table therefor, a tension device at one end of said line of recorders and adapted to bear on the strip, a blotting device at the other end of the line of recorders, and a mechanism for drawing the record-strip over the line of marking-tables and the blotting device.

29. In a telegraphic recording apparatus, the combination of a support for a flexible strip, a plurality of recorders arranged in a line each recorder being electrically connected to a telegraph instrument, means for drawing the strip past the recorders, a flexible tension device at the forward end of the line of recorders and adapted to engage the flexible strip, and a rotary blotter at the rear end of the line of recorders and adapted to engage the flexible strip.

30. In a telegraphic recording apparatus, the combination of a support for a record-strip, a series of recorders, each of said recorders being in electrical connection with a telegraphic instrument, a tension device for the record-strip at one end of the series of recorders, a rotary blotter for said strip at the other end of said series of recorders, a second series of recorders, means between the two series of recorders for reversing the record-strip, a tension device and a blotting device for the second series of recorders, a drawing mechanism, a winding-reel, and means for operating them, whereby both sides of the record-strip will be marked upon.

31. In a telegraphic recording apparatus the combination, of a support for a record-strip, a series of recorders, each of said recorders being in electrical connection with a telegraphic instrument, a tension device for the record-strip at each end of the series of recorders, a second series of recorders, means between the two series of recorders for reversing the record-strip, a tension device at each end of the second series of recorders, a drawing mechanism, a winding-reel, and means for operating it from the drawing mechanism, whereby both sides of the record-strip will be marked upon.

32. In a telegraphic recording apparatus

the combination, of a support for a record-strip, a series of recorders, each of said recorders being in electrical connection with a telegraphic instrument, a flexible tension-brush at the forward end of the series of recorders, a rotary blotter for said strip at the other end of said series of recorders, a second series of recorders each of which is connected to a telegraphic instrument, means between the two series of recorders for reversing the record-strip, a flexible tension-brush at the forward end of the second series of recorders, a rotary blotter at the other end of the second series, a drawing mechanism, whereby both sides of the record-strip will be marked upon.

33. A marker for a recording apparatus, consisting of a glass siphon, having the lower end of its longer arm drawn to a marking-point, and a glass ink-reservoir formed integral with the lower end of the shorter arm of the siphon, and a closure device and a vent for said ink-reservoir.

34. In a telegraphic recording apparatus, the combination, of a support for a record-strip, a series of recorders, each recorder being electrically connected to a telegraph instrument and working in unison therewith, and consisting of a vertically-adjustable marking apparatus, and means for supporting the record-strip adjacent the marking apparatus of each recorder.

35. In a telegraphic recording apparatus, the combination of a support for a record-strip, a series of recorders, each recorder being electrically connected to a telegraph instrument and working in unison therewith, and consisting of a vertically-adjustable marking apparatus, and a vertically-adjustable marking-table for each marking apparatus.

36. In a recording apparatus, the combination of a recorder, a drawing mechanism, a winding-reel adapted to receive the record-strip from the drawing mechanism and consisting of a supporting-spindle, two separated rotatable members thereon, one of said members being removable, a hub carried by one of said members and extending across the space between the members, and an eccentric clamping device carried by one member and adapted to clamp the record-strip to the hub, means for holding the removable member in place, and means connected to the non-removable member and to the drawing mechanism for driving the winding-reel.

37. In a recording apparatus, the combination of a recorder, a drawing mechanism, a winding-reel adapted to receive the record-strip from the drawing mechanism and consisting of a supporting-spindle, two separated members thereon, one of said members being removable, a hub carried by one of said members and extending across the space between the members, headed pins carried by said hub and extending through the removable member, means carried by the removable member

to engage the headed pins and lock the removable member in place, and means for clamping the record-strip on the hub, and means connected to the non-removable member and to the drawing mechanism for driving the winding-reel.

38. In a recording apparatus, the combination of a recorder, a drawing mechanism, a winding-reel adapted to receive the record-strip from the drawing mechanism and consisting of a supporting-spindle, two separated members thereon, one of said members being removable, a hub carried by one of said members and extending across the space between the members, headed pins carried by said hub and extending through the removable member a slotted disk carried by the removable member and adapted to be partly rotated to engage the pins and hold the said member in place, means for clamping the record-strip to the hub, and means connected to the non-removable member and to the drawing mechanism for driving the winding-reel.

39. In a recording apparatus, the combination of a support for a record-strip, a series of recorders, connected to a series of telegraph instruments and operating in unison therewith, means for drawing the strip past the recorders, and a rotary blotter at the end of the series and adapted to bear on the record-strip.

40. In a recording apparatus, the combination of a support for a record-strip, a series of recorders connected to a series of telegraph instruments and operating in unison therewith, means for drawing the strip past the recorders, and a rotary blotter at the end of the series and adapted to bear on the record-strip, said blotter consisting of a spindle and a support therefor, a cylinder supported on said spindle, a pair or slidable rings on said cylinder and adapted to clamp a removable covering of blotting material between them.

41. In a recording apparatus, the combination of a support for a record-strip, a series of recorders connected to a series of telegraph instruments and operating in unison therewith,

means for drawing the strip past the recorders, and a rotary blotter at the end of the series and adapted to bear on the record-strip, said blotter consisting of a rotatable cylinder and a support therefor, a slidable ring on each end of the cylinder, a clamping-flange on each ring and adapted to engage the adjacent edge of a removable cylinder-covering of blotting material.

42. In a recording apparatus, the combination of a support for a record-strip, a series of recorders connected to a series of telegraph instruments and operating in unison therewith, means for drawing the strip past the recorders, and a rotary blotter at the end of the series and adapted to bear on the record-strip, said blotter consisting of a spindle and a support therefor, a cylinder, antifriction-bearings on the spindle and supporting the cylinder, a slidable ring on the cylinder at each end thereof, an inward-extending clamping-flange formed on each ring and adapted to engage the adjacent edge of a removable covering of blotting material.

43. In a recording apparatus, the combination of a series of recorders connected to a series of telegraph instruments and operating in unison therewith, a support for a roll of record-strip, said support consisting of a spindle, a support therefor, a hollow shaft surrounding said spindle, antifriction-bearings carried by the spindle and supporting the hollow shaft, a two-part sleeve on the shaft, and adapted to be secured together, one of said parts being removable, said sleeves when connected together being adapted to support the roll of record-strip, and means for drawing the strip past the recorders.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 22d day of January, 1901.

JOHN F. SKIRROW.

Witnesses:

JOHN G. PEARSE,
WM. R. DAVIS.