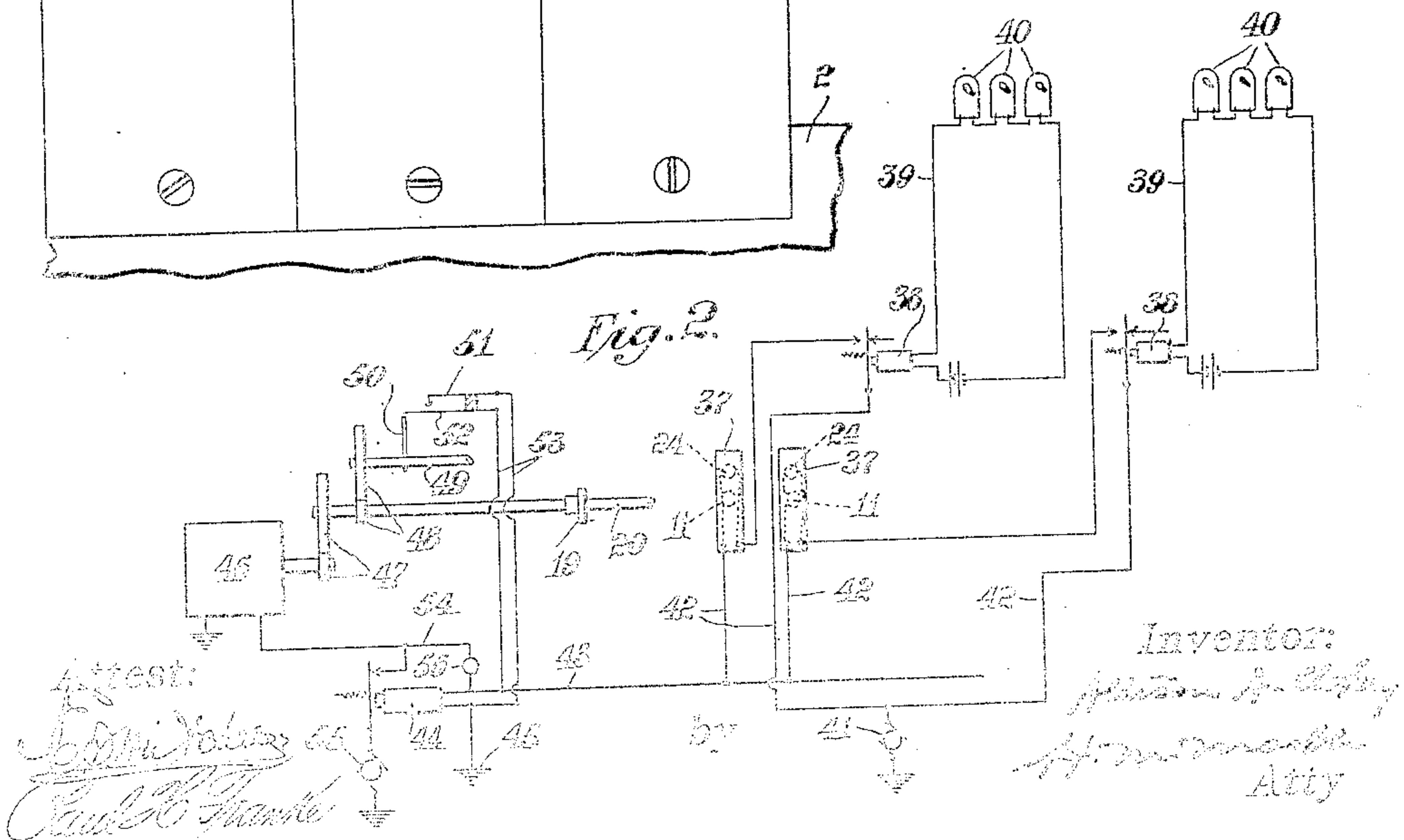
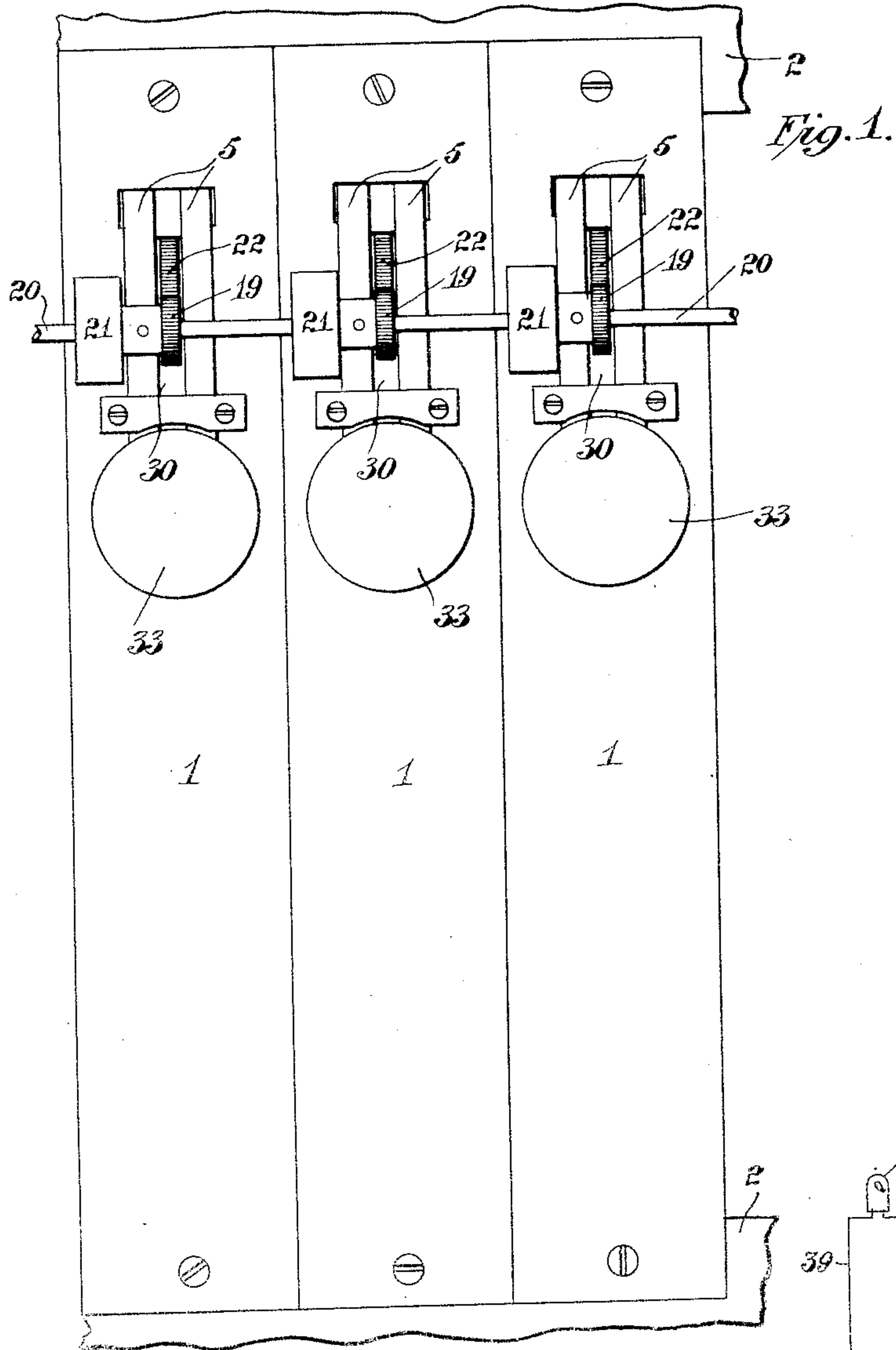


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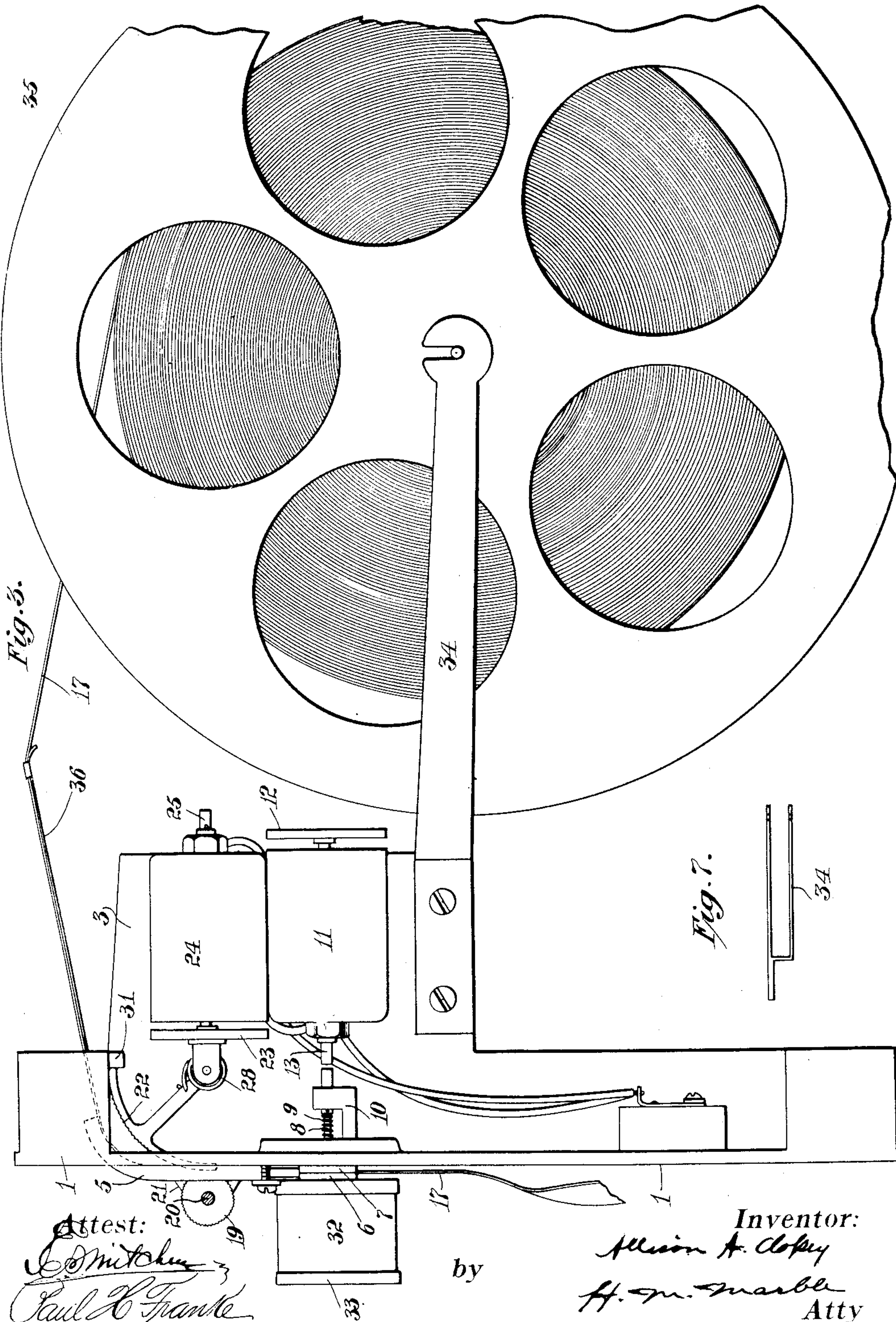


Attest:
John J. Vohs
Charles E. Hanks

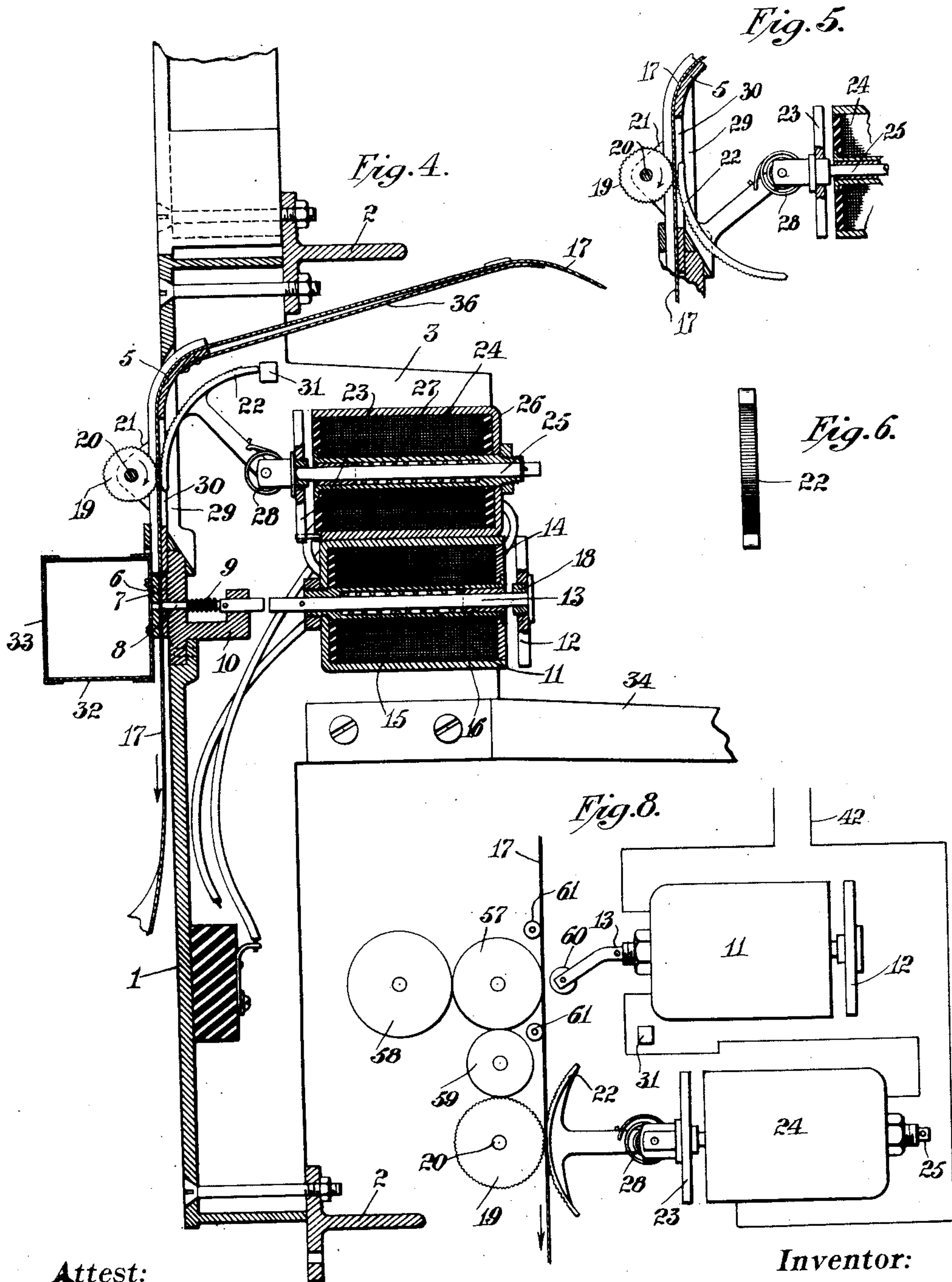
Inventor:
A. A. Clokey
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1,196,335.

Patented Aug. 29, 1916.
3 SHEETS—SHEET 2.



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Attest:
Paul H. Frank

by

Inventor:
Alison A. Clokey
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Atty

UNITED STATES PATENT OFFICE.

ALLISON A. CLOKEY, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

RECORDER.

1,196,335.

Specification of Letters Patent.

Patented Aug. 29, 1916.

Application filed February 2, 1915. Serial No. 5,657.

To all whom it may concern:

Be it known that I, ALLISON A. CLOKEY, a citizen of the United States of America, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Recorders, of which the following is a specification.

My invention relates to improvements in recorders, particularly recorders commonly termed "registers" such as are employed in telegraph service, fire alarm, burglar alarm, and like services, including so called district messenger service, etc. Specifically, the recorder herein described is of the "punch" type, *i. e.*, of the type which, for each signaling impulse, forms a perforation in a strip of paper or other suitable material; but in a broad sense the particular means employed in my register for marking the strip of tape is immaterial, though marking by punching the tape according to the signals to be recorded has specific advantages, not only for the various types of service for which my recorder is particularly intended, but also for the desired interaction of the various mechanisms of the recorder. One important difference between my recorder and other recorders heretofore used is that it is adapted to be set into a panel of a switch board with its operating mechanism located behind the switch board, the recorder as a whole being so compact, and, in particular, so narrow, that a large number of recorders may be located, side by side, in a single switch board, occupying very much less linear space than is possible in the aggregation of a similar number of recorders of any other type with which I am familiar. Furthermore, in my recorder the only motor driven member is a feed member, the arrangement and operation of which is such that the feed wheels of an entire row or rows of recorders may be driven by the same motor. The motor employed is, commonly, an electric motor, and in connection with such motor I commonly provide automatic stopping and starting means whereby when all of the recorders to which that motor is connected are idle the motor itself is idle; a signal coming to any one of the recorders, however, starting the motor. In a

broad sense the type of motor employed for driving the feed wheels is immaterial; the electric motor being, however, the most convenient motor for the purpose now known to me.

My invention consists in the novel construction and arrangement of the various parts of the recorder, whereby that recorder is made very compact, and is adapted for location in a panel of a switch board; in the novel feed mechanism employed; in the novel arrangement whereby the primary feeding members of the feed mechanism of a plurality of recorders may be driven by a single motor means; in means whereby when all of such recorders are idle the motor means is itself idle and whereby such motor means is started when any one of such recorders is started; in the novel coördination of strip marking means and feed mechanism, whereby the record strip is stationary at the instant of each marking action of the marking mechanism thereon, and is caused to advance only during the time when the marking mechanism is disengaged from such record strip; and in various other features all as hereinafter described and particularly pointed out in the appended claims.

The objects of my invention are to improve and simplify recorders; to render same more compact and simple; to adapt recorders for location in compact gangs or rows, and particularly to adapt recorders for location in switch boards; to avoid individual motors for recorders and to provide recorder mechanism of such nature that a single motor may serve a large number of recorders which are themselves entirely independent one of another except as they are all served by a common motor; to provide simple and reliable means for holding such motor idle when all of the recorders served thereby are idle and for starting that motor instantly when any one of such recorders is started; to improve and simplify recorder feed mechanism, and, in particular, to avoid necessity for the provision of feed-mechanism motor-means within each individual recorder; to provide simple means for limiting the length of record strip fed by the feed mechanism of any particular recorder,

after any one operation of the recording means on that strip and to provide improved means for coördinating the operation of the record-strip marking means and the record-strip feeding means, whereby the record strip is fed forward only at times when the marking means is not in engagement with that strip. Other objects of my invention will appear hereafter.

I will now proceed to describe my invention with reference to the accompanying drawings, and will then point out the novel features in claims.

In the drawings: Figure 1 shows a front view of a portion of a series of my recorders as set upon a switch board frame. Fig. 2 is a diagram showing the driving motor for the feed mechanisms of the recorders and the means employed for starting and stopping that motor automatically. Fig. 3 shows a side view of one of the recorders detached. Fig. 4 is a vertical section of the recorder on a plane parallel to that of Fig. 3, the view also showing the portion of the switch board in section. Fig. 5 is a fragmentary vertical section showing the position of the feed sector near the lower limit of its movement. Fig. 6 shows a front view of the feed sector. Fig. 7 shows a top view, on a reduced scale of the bracket carrying the paper reel. Fig. 8 indicates an arrangement of marking and feed devices which may be employed in my recorder when the same is to be used for recording signals as dots and dashes, instead of as numerals, as in the arrangement indicated in Figs. 3 and 4.

Referring to the drawings, and at first to Figs. 3—6 inclusive, 1 designates a frame member of general channel section adapted to be mounted upon the frame 2 of a switch board, said frame member 1 being provided with an integral rearwardly extending bracket 3 for the support of the feed-mechanism and punch-mechanism magnets, herein-after described. The side of the channel opposite that from which the extension 3 projects, is open opposite such extension 3, to provide access to the magnets, punch mechanism, and feed mechanism. The front of the frame member 1 supports a record-strip guide 5, slotted in front as indicated particularly in Fig. 1, and terminating at the top of the two punch-dies 6 and 7 located in front of frame member 1 and secured thereto. 8 designates the punch which coacts with said dies and 9 a retractile spring therefor. 10 designates a guide bracket for the punch 8, said bracket being set into a recess in the front of the frame member 1 and secured to said frame member. 11 designates a magnet for operating the punch 8, and 12 designates a disk armature for this magnet, mounted upon a sliding spindle 13 passing through the hollow core 14 of the magnet, the bore of which core is,

at the front of the magnet, of a suitable diameter to form a guide for the spindle 13, while back of such guiding portion the bore of the core is enlarged to receive a compression spring 15; a thrust sleeve 16 being provided around spindle 13 between armature 12 and the rear end of the spring 15. It is clear that the construction is such that when magnet 11 is energized, the armature 12 will be drawn forward and its spindle 13 will encounter the end of the punch 8, driving that punch through the record strip 17. When the magnet 11 is deenergized the spring 15 will force back the armature 12 and spindle 13, and the spring 9 will force back the punch 8. The action of the armature 12 and spindle 13 on punch 8 is, in effect, that of a hammer, being very sudden, and therefore, for well known reasons, it is not necessary or desirable that the spindle 13 shall follow the punch throughout the range of movement of the latter. The armature 12 is provided with a sleeve 18 of non-magnetic material surrounding the spindle 13 and abutting against the sleeve 16, and projecting slightly beyond the inner surface of the armature, and so serving to prevent contact of the armature itself with the pole of the magnet. 19 designates the feed wheel for record strip 17; such feed wheel being mounted upon a shaft 20, which shaft (see Fig. 1) extends across the faces of the row of recorders there shown, being mounted in bearings 21. The periphery of the feed wheel 19 is preferably milled or roughened, to provide good frictional engagement with the paper strip 17. In rear of the paper strip 17 and opposite the feed wheel 19, there is a presser 22, having the form of a sector, and pivoted to the armature 23 of a magnet 24 supported by bracket 3; this armature 23 having a guide spindle 25 located within the hollow core 26 of magnet 24, there being also a compression retractile spring 27 for armature 23. The construction of the magnet 24, armature 23, etc., is substantially the same as that of magnet 11, armature 12, etc., except that the armature 23 is at the front of its magnet 24, whereas the armature 12 is at the rear of its magnet 11. A fine coiled spring 28 tends to hold sector 22 in elevated position. It will be noted that sector 22 is opposite a slot 29 in the front of frame plate 1 and opposite a corresponding slot 30 in the back of paper strip guide 5 so that when armature 23 is pressed forward by spring 27 (magnet 24 being deenergized) sector 22 will press the record strip 17 rather tightly against the feed wheel 19, and if at such time the feed wheel be rotating, the record strip will be fed downward.

As appears from the diagram, Fig. 2, magnets 11 and 24 are connected in the same circuit; and for this reason, and because their armatures are set oppositely, sec-

tor 22 presses the record strip 17 against the feed wheel 19 when the punch magnet is deenergized and, therefore, when the punch 8 is not in engagement with the record strip. When both magnets are energized, the punch 8 is driven through the record strip, but simultaneously the sector 22 has been withdrawn from engagement with the record strip by the energization of magnet 24, and therefore, during the engagement of the punch 8 with the record strip that strip is not pressed against the feed wheel 19, and so is not fed forward. The instant magnet 11 is deenergized magnet 24 is also deenergized, and therefore its sector 22 is caused to press the record strip against feed wheel 19, causing the record strip to be advanced. Such advance continues (with consequent downward motion of sector 22) until, as a result of such downward movement of that sector, the latter ceases to press the record strip firmly against the feed wheel 19 (see Fig. 5). The record strip then comes to rest, even though the feed wheel 19 continues to rotate. The sector 22 may remain in this lower position for considerable time. When current impulses in the circuit controlling magnets 11 and 24 succeed each other rapidly (as they do while any one signal is being received and recorded) the sector 22 does not move downward very far after each such current impulse, since the next succeeding current impulse causes magnet 24 to withdraw the sector, whereupon the spring 28 returns it to topmost position, in readiness to move forward to engage the record strip again as soon as that current impulse has ceased. But after any one signal or group of signals is completed, unless another signal come in instantly, the sector 22 will be held in contact with the record strip long enough to move down to its lowermost position, where it practically ceases to engage the record strip or to press that record strip against the feed roll 19, and the sector 22 then remains in that lower position, the record strip remaining stationary, until the first current impulse of another signal causes the energization of the magnet 24 and retraction of the armature 23, whereupon spring 28 raises sector 22 to the position shown in Fig. 4.

The provision of the sector 22, controlled as described by magnet 24, in connection with the feed roll 19, therefore insures that only a limited length of feed strip 17 shall be fed forward after the conclusion of a signal and before the next signal comes in; the record strip then coming to rest, having been fed forward, however, a distance sufficient to adequately separate the record of one signal from the record of the next succeeding signal. A stop 31 is provided to arrest the sector 22 in its uppermost position.

In front of the punch die 6 a suitable box 32 is provided, to receive the punchings or chips punched out of the record strip by the punch 8; this box 32 having a removable cover 33 by the removal of which the box 70 may be emptied from time to time.

Projecting from the bracket 3 of the frame there is a forked bracket 34 having a bearing for a reel 35 to carry a roll of the record strip 17. A spring 36 is provided to keep the record strip under tension. The slight engagement of the heel or upper end of sector 22 with the record strip and with the feed roll 19 when that sector 22 is in its lowermost position, as shown in Fig. 5, is sufficient to prevent retraction of the record strip by the tension produced by spring 36; for any retraction of that record strip would also retract somewhat the sector 22, causing it to press the record strip against the roll 19, and therefore, either to hold the record strip against further retraction (if the feed roll 19 be stationary) or to advance the record strip again until the sector 22 is in its lowermost position (if feed roll 19 be in rotation). Preferably, and as indicated in Fig. 6, the greater portion of the face of sector 22 is milled or roughened so as to insure good engagement between that sector and the record strip; but the heel portion of the sector 22 is commonly left smooth, so that that sector may not cause wear of the record strip when that sector is in lowermost position, and when the record strip is stationary but close to the still rotating feed roll 19. Correspondingly the toe of the sector may also be smooth, as shown in Fig. 6.

Fig. 2 shows the circuits whereby the recorders are controlled and whereby the motor driving the feed rolls 19 of those recorders is started and stopped automatically. 37, 37 designates a series of such recorders each controlled by the usual call circuit relay 38 in a circuit 39 containing the instrument or instruments 40 for producing the signals to be recorded. In the particular circuits shown these instruments 40 may be understood to be ordinary messenger call boxes. A generator 41 supplies current for the energization of the magnets 11 and 24 of each recorder. The recorder circuits, 42, lead to a common return line 43 and thence to the magnet of a relay 44 and thence to ground at 45 (the generator 41 being shown as grounded). Branches from this return conductor 43 will be referred to hereafter. 46 designates an ordinary electric motor (I prefer a shunt wound motor, because of the quickness with which such a motor starts up) for driving the feed rolls of the several recorders. As the speed of such a motor is usually much in excess of the desired rotative speed for the feed roll shaft 20, I commonly connect

the motor to such shaft through reducing gearing 47. Shaft 20 is connected by further reducing gearing 48 to a shaft 49 carrying a striker 50 adapted, once in each revolution of that striker, to close contacts 51 and 52, which are in a branch circuit 53 leading from return conductor 43 to ground at 45. It will be seen that when this branch circuit 53 is closed, the magnet of relay 44 will be shunted and so deenergized. Another branch circuit 54 leads from conductor 43 to the motor 46 and thence to ground. A generator 55, grounded on one side, is connected on the other side to the armature of relay 44, the front contact of relay 44 being connected to circuit conductor 54. It will be seen that any break in the call circuit of any one of the call circuit relays will cause the energization of the magnets 11 and 24 of the corresponding recorder; and will also cause the energization of the magnet of relay 44 with consequent closing of circuit from generator 55 through the contacts of that relay to motor 46, and consequent starting of that motor. It will also be seen that relay 44, when it attracts its armature, completes another circuit from generator 55, through conductor 54 and the magnet of that relay 44 to ground at 45, so that the contacts of relay 44 will remain closed until, by the closing of contacts 51 and 52 in circuit 53, the magnet of relay 44 is shunted out; and when this occurs, the armature of relay 55 will be retracted, breaking the circuit from generator 55 to motor 46. The motor will then come to rest, unless the shunted contacts 51 and 52 have been closed while signals are still being received by some one of the recorders; but if signals are so being received, then the circuit of relay 44 will be completed again, as a result of another current impulse in conductor 43, causing the reattraction of the armature of that relay. Such reattraction will occur (if relay 44 opens the circuit of motor 46 while a signal is being received) so quickly that there will be no perceptible lessening of speed of the motor or of shaft 20. A resistance 56 (usually a resistance lamp) protects the magnet of relay 44, and also serves, in connection with the resistance of the magnets 11 and 24 of the various recorders, to prevent enough current being received from generator 41 to operate the motor 46.

It will be seen by this automatic stopping and starting mechanism just described the motor 46 and the driving shaft 20 of the various feed rolls 19, stop almost instantly after all of the recorders stop (in practice, the motor stops within about twenty seconds of the stopping of all of the recorders) but the motor will not stop while any one of the recorders is operating; also, if the motor has stopped, the first energization of

the magnets of any one of the recorders will cause the immediate starting of the motor, that motor starting so rapidly that by the time the magnets of that recorder have been deenergized at the end of the first recorded impulse, the motor will have reached practically full speed and the paper strip of that recorder will be fed forward at the normal rate of speed. It will be seen also that it is only the paper strip of that one recorder that is fed forward, unless indeed another recorder begins to operate. The feeding of the record strips of the several recorders is therefore entirely independent, although the feed rolls of the several registers are all driven by the same motor means, and no waste of record strips is involved by reason of the driving of the feed rolls of all of the recorders from the same motor means. Yet, by the employment of one motor means for driving the feed rolls of all of the recorders, the usual individual clock work driven paper feed mechanism for each individual recorder is obviated. This elimination of a separate clock work mechanism for each recorder greatly reduces the necessary size of the recorder and therefore permits a much larger number of recorders to be located, within given dimensions, than has been practicable heretofore; it also greatly simplifies the recorders themselves and greatly decreases the opportunities for derangement.

Obviously my improved recorder is not confined to the recording of numerical signals, although the particular structure shown in Fig. 3 is best adapted particularly for the recording of numerical signals. By various slight modifications a structure similar to that shown in Fig. 4, but adapted for the recording of signals according to duration (specifically, in dots and dashes), may be produced. Fig. 8 illustrates, more or less diagrammatically, one such modification. The two magnets, 11 and 24, are, in structure and relative arrangement, substantially the same as the corresponding magnets of Fig. 4, except that in Fig. 8 for convenience, the magnet 24 is shown below the magnet 11.

19 designates the feed roll, 22 the feed sector, 57 a marking roll, 58 an inking roll (such as is commonly employed in so-called "ink registers") and 59 designates an idler roll communicating motion from feed roll 19 to marking roll 57. Feed roll 19 may be understood to be driven in the same way as in Figs. 1 and 4.

Spindle 13 of magnet 11 instead of operating a punch as in the arrangement shown in Fig. 4, carries a small idler 60 adapted to press the tape 17 against the ink roll 57 when the armature 12 presses such idler against the tape. Guides 61 hold the tape just clear of the marking roll 57 except

when the idler 60 is holding that tape against the marking roll. This clearance is too small to be indicated in Fig. 8. The magnets 11 and 24 are connected in series in the same circuit 42. It will be seen that when magnet 11 is energized the tape will be fed forward through engagement of the tape with the marking roll 57, caused by the idler 60 pressing that tape against the marking roll; and at this time a line will be printed upon the tape, the length of the line depending upon the duration of contact of the tape with the marking roll. When the magnet 11 is deenergized, and the idler 60 retracted, the sector 22 will press the tape against the feed roll 19, and so the tape will be advanced, without being marked. It will thus be seen that by the arrangement shown in Fig. 8 the tape will be marked in dots, or dashes, or dots and dashes, according to the duration of the several current impulses which energize the magnet 11; and that such markings will be separated by spaces corresponding (within the limits of any one series of dots, dashes, or dots and dashes) to the duration in time of the intervals between the current impulses. As in the construction shown in Figs. 4 and 5, after the cessation of any particular series of current impulses, the sector 22 will reach the position shown in Fig. 5, in which the feeding of the tape ceases; and upon the beginning of the next series of current impulses the sector 22 will fly up until arrested by its stop 31, and then, at the end of the first of the current impulses of the new series, will press the tape against the feed roll 19 and so will begin its action in the feeding of the tape.

It will be understood from the drawings, and from the foregoing description, that in my recorders herein illustrated and described, the tape marking means and tape feeding means located in rear of front plate 1, and all other portions of the recorder located in rear of that front plate (except possibly the paper roll 35, which is readily removable from the other parts of the recorder) are so disposed and are of such size as to be included within the projected lateral and longitudinal dimensions of the front plate. Therefore, and also because of the location of the greater portion of the recorder mechanism in rear of the front plate, my recorder is particularly adapted for mounting on a switch board frame or other suitable frame, such for example as the frame 2 indicated in Figs. 1 and 4. As to any particular recorder of a series, the space included between the frame members 2 and the recorders on either side of that particular recorder, constitutes an aperture in the support through which the tape marking and tape feeding means of that particular recorder may be inserted or withdrawn. By

reason of the fact that each recorder is so constructed that its parts located in rear of its front plate, may be inserted through and withdrawn from such an aperture, it is possible to assemble a series of recorders in a row, one abutting against another, as indicated in Fig. 1, thereby permitting the location of a series or gang of recorders on a single support and with the utmost compactness.

It will be obvious that the tape feed or record strip feed mechanism herein described is adaptable for use in various instruments other than those which are technically termed registers or recorders; for example, it is well adapted for use in telegraph printers, including printers of the page printing type, and printers of the so-called "ticker" type. telegraph recorders, perforators, telegraph transmitters of the tape-controlled type, and other machines, (type setting machines for example) which are controlled by movable tape or record sheets, and cash registers. Therefore, I do not limit my invention to registers or recorders only. However, in the particular embodiments of my invention above illustrated and described, the structure is that particularly adapted for use in registers or recorders, and hence I have termed my invention an improvement in recorders, without intending thereby, however, to limit my invention to registers or recorders.

While the particular constructions illustrated and described are especially adapted for recorders to be mounted in groups on a switch board frame or the like, it is obvious that my invention is not restricted to recorders which are to be mounted on such a frame, or to recorders which are to operate in a vertical position.

In some cases recorders or registers are arranged to mark tapes by indenting or embossing such tapes instead of punching holes therethrough; the indenting or embossing mechanism being in general, similar to the punching mechanism which might be employed. In such of the following claims which mention punches or punching mechanism or punching, I intend that embossing or embossing means shall be included as a specific variety of punching or punch means.

What I claim is:—

1. A recorder unit for switch boards and the like comprising in combination a plate constructed for mounting on and removal from a switch board and provided with a tape guide, marking means adapted to act upon tape guided by such guide, and tape feeding means arranged to feed tape through such guide, the tape marking means and the tape feeding means supported from said plate.

2. A recorder unit for switch boards and the like comprising a plate constructed for

mounting on and removal from a switch board and having a tape guide, and tape marking means and tape feeding means, projecting from the rear of said plate and
 5 both positioned and proportioned to be included within the projected lateral and longitudinal dimensions of said plate.

3. A recorder unit for switch boards and the like comprising a plate constructed for
 10 mounting on and removal from a switch board and having a tape guide, and having projecting from its rear tape marking means and tape feeding means, and a tape reel support, all positioned and proportioned to
 15 be included within the projected lateral and longitudinal dimensions of said plate.

4. The combination with an apertured support for a recorder, of a recorder having a plate substantially covering and closing the aperture of such support, and tape
 20 marking and tape feeding means mounted on the rear of said plate and positioned and proportioned to be inserted through the said aperture.

5. A plurality of recorders arranged side by side and having axially-alined tape-feed wheels, in combination with a rotatable
 25 tape-feed-wheel shaft, common to all of said recorders, and upon which shaft the said
 30 wheels are mounted, and means for supporting said shaft.

6. In a recorder, the combination with tape guiding means, of tape punching means and tape feeding means, having separate
 35 actuating means adapted to be actuated in unison by a common source of energy, but to act in alternation upon tape carried by said tape guiding means.

7. In a recorder, the combination with
 40 tape guiding means, of tape punching means and tape feeding means, each comprising an operating electro-magnet, said tape feeding means and said tape punching means arranged to act in alternation on tape carried
 45 by said tape guiding means.

8. In a recorder, the combination with tape guiding means, of tape punching means and tape feeding means, each comprising
 50 an operating electro-magnet connected to a common circuit to be energized and deenergized together, said tape feeding means and said tape punching means arranged to act in alternation on tape carried by said tape guiding means.

9. In a recorder, the combination with
 55 tape guiding means, of electro-magnetically actuated tape marking means, and tape feeding means comprising a feed roll located on one side of the path of travel for the tape
 60 and adapted to contact with such tape, a presser movable in the direction of feed of the tape and also movable toward and from the tape, and means for moving such presser into and out of engagement with the tape.

65 10. In a recorder, the combination with

tape guiding means, of electro-magnetically actuated tape marking means, and tape feeding means comprising a feed roll located on
 one side of the path of travel for the tape and adapted to contact with such tape, a
 70 movable presser located on the other side of the path of travel of such tape and likewise adapted to contact with such tape, and an electro-magnet for moving such presser
 75 into and out of engagement with the tape.

11. In a recorder, the combination with
 tape guiding means, of electro-magnetically actuated tape marking means, and tape feeding
 means comprising a feed roll located on
 80 one side of the path of travel for the tape and adapted to contact with such tape, a movable presser located on the other side of the path of travel of such tape and likewise adapted to contact with such tape, and
 85 an electro-magnet for moving such presser into and out of engagement with the tape, said magnet and the magnet of the tape marking means arranged for operation in opposite senses relatively.

12. In a recorder, the combination with
 90 tape guiding means, of electro-magnetically actuated tape marking means, and tape feeding means comprising a feed roll located on one side of the path of travel for the tape
 95 and adapted to contact with such tape, a movable pivoted sector spring-actuated in one direction and located on the other side of the path of travel of such tape and likewise adapted to contact with such tape, and
 100 means for moving such sector into and out of engagement with the tape.

13. In a recorder, the combination with a
 frame plate, having a tape-guiding chute exposing the tape in front and in rear, of
 105 a movable feed roll for driving the tape adapted for engaging such tape on one side thereof, a presser movable in the direction of feed of the tape and also movable toward
 110 and from the tape and adapted to engage the same on the opposite side thereof and thereby to press said tape against said feed roll, tape marking means, operating means
 115 for such tape marking means, and operating means for such presser, arranged to retract the presser when the marking means is acting upon the tape and to advance the presser into contact with the tape when said marking means is disengaged from the tape.

14. In a recorder, the combination with
 120 a frame plate, having a tape-guiding chute exposing the tape in front and in rear, of a movable feed roll for driving the tape adapted for engaging such tape on one side
 125 thereof, a sector movable in the direction of feed of the tape and also movable toward and from the tape and adapted to engage the same on the opposite side thereof and thereby to press said tape against said feed
 130 roll, tape marking means, operating means for such tape marking means, and operat-

ing means for such sector, arranged to retract the sector when the marking means is acting upon the tape and to advance the sector into contact with the tape when said marking means is disengaged from the tape.

15. In a recorder, the combination with a frame plate, having a tape-guiding chute exposing the tape in front and in rear, of a movable feed roll for driving the tape adapted for engaging such tape on one side thereof, a presser movable in the direction of feed of the tape and also movable toward and from the tape and adapted to engage the same on the opposite side thereof and thereby to press said tape against said feed roll, tape marking means, operating means for such tape marking means, and operating means for such presser, arranged to retract the presser when the marking means is acting upon the tape and to advance the presser into contact with the tape when said marking means is disengaged from the tape, a source of tape supply and a spring bearing against the tape during its passage from said source of supply to said chute and arranged to hold the tape taut.

16. In a recorder, the combination with a frame plate, having a tape-guiding chute exposing the tape in front and in rear, of a movable feed roll for driving the tape adapted for engaging such tape on one side thereof, a sector movable in the direction of feed of the tape and also movable toward and from the tape and adapted to engage the same on the opposite side thereof and thereby to press said tape against said feed roll, tape marking means, operating means for such tape marking means, and operating means for such sector, arranged to retract the sector when the marking means is acting upon the tape and to advance the sector into contact with the tape when said marking means is disengaged from the tape, a source of tape supply and a spring bearing against the tape during its passage from said source of supply to said chute and arranged to hold the tape taut.

17. In a recorder, the combination with tape guide means, of tape marking means comprising an operating magnet, tape feed means comprising an operating magnet, and armatures for both said magnets, the feed magnet arranged when energized to move its armature in a direction opposite that in which the marking magnet moves its armature when energized.

18. In a recorder, the combination with tape guide means, of tape marking means comprising an operating solenoid magnet, a plunger armature therefor, and means for retracting such armature, and means adapted to be acted upon by said armature, when attracted, for causing marking of the tape, tape feed means comprising an operating magnet, an armature therefor, means

for retracting said armature, and means operated by retraction of such armature for causing feeding of the tape.

19. The combination with a recorder having an electric controlling circuit and comprising a movable tape-feed member, of a motor arranged to drive said feed member and to be controlled by an electric circuit, motor control means operated by operation of the controlling circuit of the recorder and itself controlling the controlling circuit of said motor, for starting said motor when the controlling circuit of the recorder is operated, and means operated by the motor after a definite period of operation of the motor, and controlling such motor control means, and arranged when operated to stop the motor.

20. The combination with a recorder having an electric controlling circuit and having tape feed means, of a motor arranged to operate said tape feed means and itself having an electric controlling circuit, a relay controlled by the controlling circuit of the recorder and controlling the controlling circuit of the motor and arranged when the controlling circuit of the recorder is operated to close the motor controlling circuit to start the motor, said relay comprising means for holding such motor control circuit closed, once the same has been closed by said relay, and means operated by the motor, also controlling said relay, and arranged when operated by the motor to cause said relay to break the motor controlling circuit.

21. The combination with a recorder having a controlling circuit arranged to cause operation of the recorder when current impulses are sent through such circuit, said recorder having a movable tape feed member, a motor arranged to operate said tape feed member and itself having a controlling circuit, a motor-control relay controlled by the controlling circuit of the recorder and arranged to close the controlling circuit of the motor when the controlling circuit of the recorder is closed, said relay comprising means which holds its magnet energized once said magnet has been energized by the recorder controlling circuit, and contact means arranged to be operated by said motor after a predetermined interval of operation by that motor, and arranged when operated to close a low resistance shunt around the magnet coils of said relay and thereby to deenergize said magnet and interrupt the controlling circuit of the motor.

22. The combination with a plurality of recorders each having a movable tape feed member, a motor arranged to drive all of said tape feed members, means operated when any one of said recorders is started for starting the motor, and means operated by the motor arranged to stop that motor

after a predetermined interval of operation and provided none of the recorders be then in operation.

23. The combination with a tape guide
5 exposing a portion of the tape in front and
also in rear, of movable tape driving means
adapted to engage on one side tape guided
by such guide, a presser movable in the di-
10 rection of feed of the tape, and also movable
toward and from the tape and arranged to
engage the opposite side of the tape and to
press same against said tape driving means,
and means for alternately retracting and
15 pressing forward said presser.
24. The combination with a tape guide
exposing a portion of the tape in front and
also in rear, of movable tape driving means
adapted to engage on one side tape guided
20 by such guide, a movable pivoted sector
spring-actuated in one direction and mov-
able in the direction of feed of the tape,
and also toward and from the tape, and ar-
ranged to engage the opposite side of the
tape and to press same against said tape
25 driving means, and means for alternately
retracting and pressing forward said sector.
25. The combination of a movable tape
driving member, means for guiding tape
past and in proximity to said member, and
30 a presser, adapted to press the tape against
said movable tape driving member, said
presser movable toward and from the tape,
and means for so moving said presser.
26. The combination of a movable tape
35 driving member, means for guiding tape
past and in proximity to said member, a
presser located on the opposite side of the
tape, and adapted to move toward and from
the tape, and when moved toward the tape
40 to press same against said tape driving mem-
ber, and means for alternately advancing
and retracting said presser.
27. The combination with a movable tape
driving member, and means for guiding tape
45 past and in proximity to said member, of a
pivoted sector located upon the opposite
side of the tape and movable toward and
from the tape, and also movable with the
tape when in contact therewith, means for
50 moving said sector toward the tape and
causing said sector to press the tape against
said movable tape driving member, means

for retracting said sector and means for re-
turning said sector in a direction opposite
to that of movement of the tape, when said 55
sector is retracted.

28. The combination with a tape driving
member movable in a curved path, and
means for guiding tape past and in proxim- 60
ity to said member, of a pivoted sector lo-
cated upon the opposite side of the tape
and movable toward and from the tape, and
also movable with the tape when in contact
therewith, means for moving said sector to-
ward the tape, and causing said sector to 65
press the tape against said movable tape
driving member, means for retracting said
sector and means for returning said sector
in a direction opposite to that of movement
of the tape, when said sector is retracted; 70
said sector adapted to cause cessation of
feeding of the tape when, during the feed-
ing motion, the rear end of the face of said
sector passes a position of approximate tan-
gency to said tape driving member. 75

29. The combination with a tape driving
member movable in a curved path, and
means for guiding tape past and in proxim-
ity to said member, of a pivoted sector lo-
cated upon the opposite side of the tape and 80
movable toward and from the tape, and also
movable with the tape when in contact
therewith, means for moving said sector to-
ward the tape, and causing said sector to
press the tape against said movable tape 85
driving member, means for retracting said
sector and means for returning said sector
in a direction opposite to that of movement
of the tape, when said sector is retracted;
said sector adapted to cause cessation of 90
feeding of the tape when, during the feed-
ing motion, the rear end of the face of said
sector passes a position of approximate tan-
gency to said tape driving member, the
major portion of said sector being rough but 95
the rear portion of said sector being smooth.

In testimony whereof I have signed this
specification in the presence of two subscrib-
ing witnesses.

ALLISON A. CLOKEY.

Witnesses:

H. KNIGHT BEASLEY,
PAUL H. FRANKE.