

May 17, 1932.

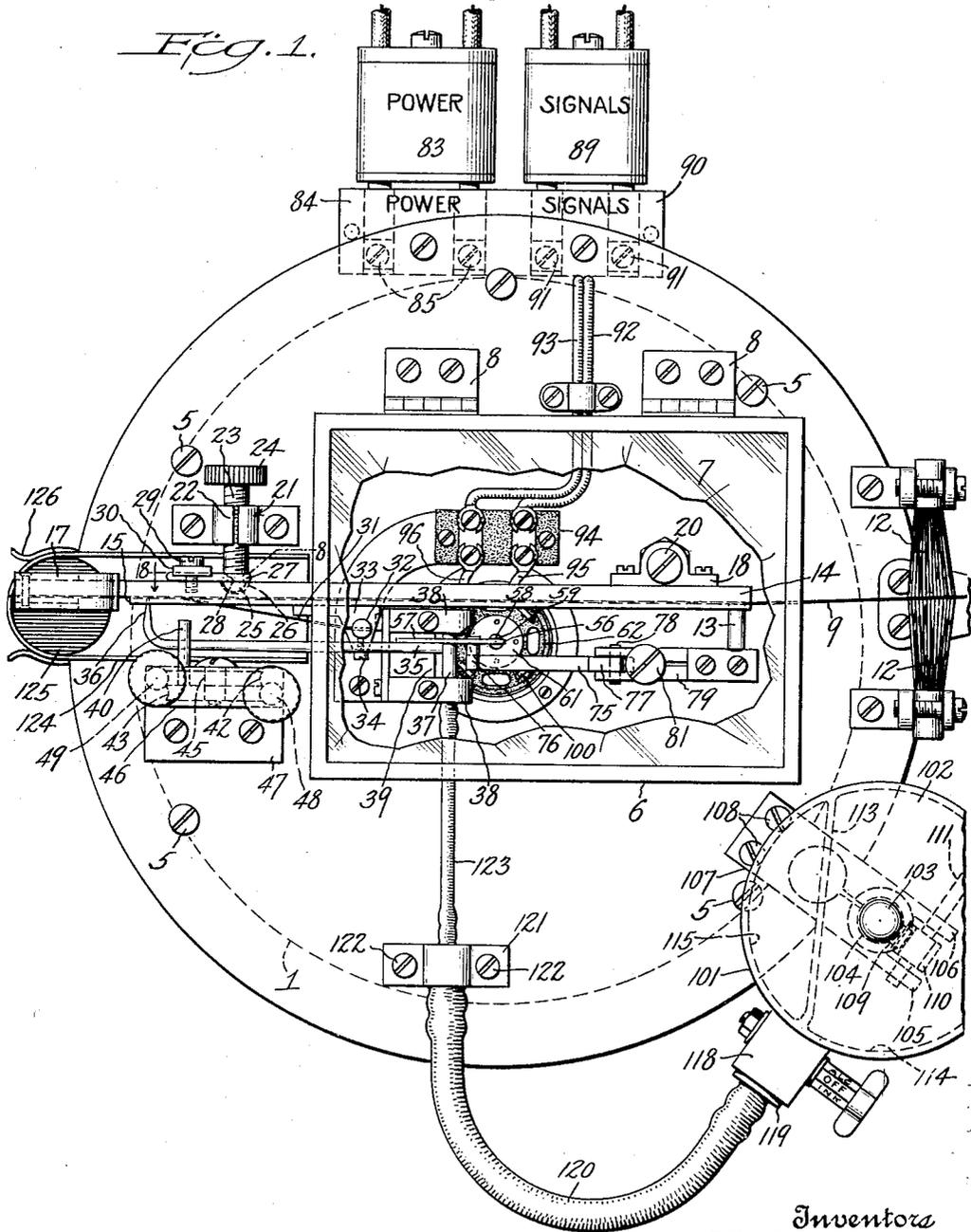
E. KNOPP ET AL

1,858,510

TELEGRAPHIC RECORDER

Filed March 25, 1931

4 Sheets-Sheet 1



WITNESS

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May 17, 1932.

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4 Sheets-Sheet 2

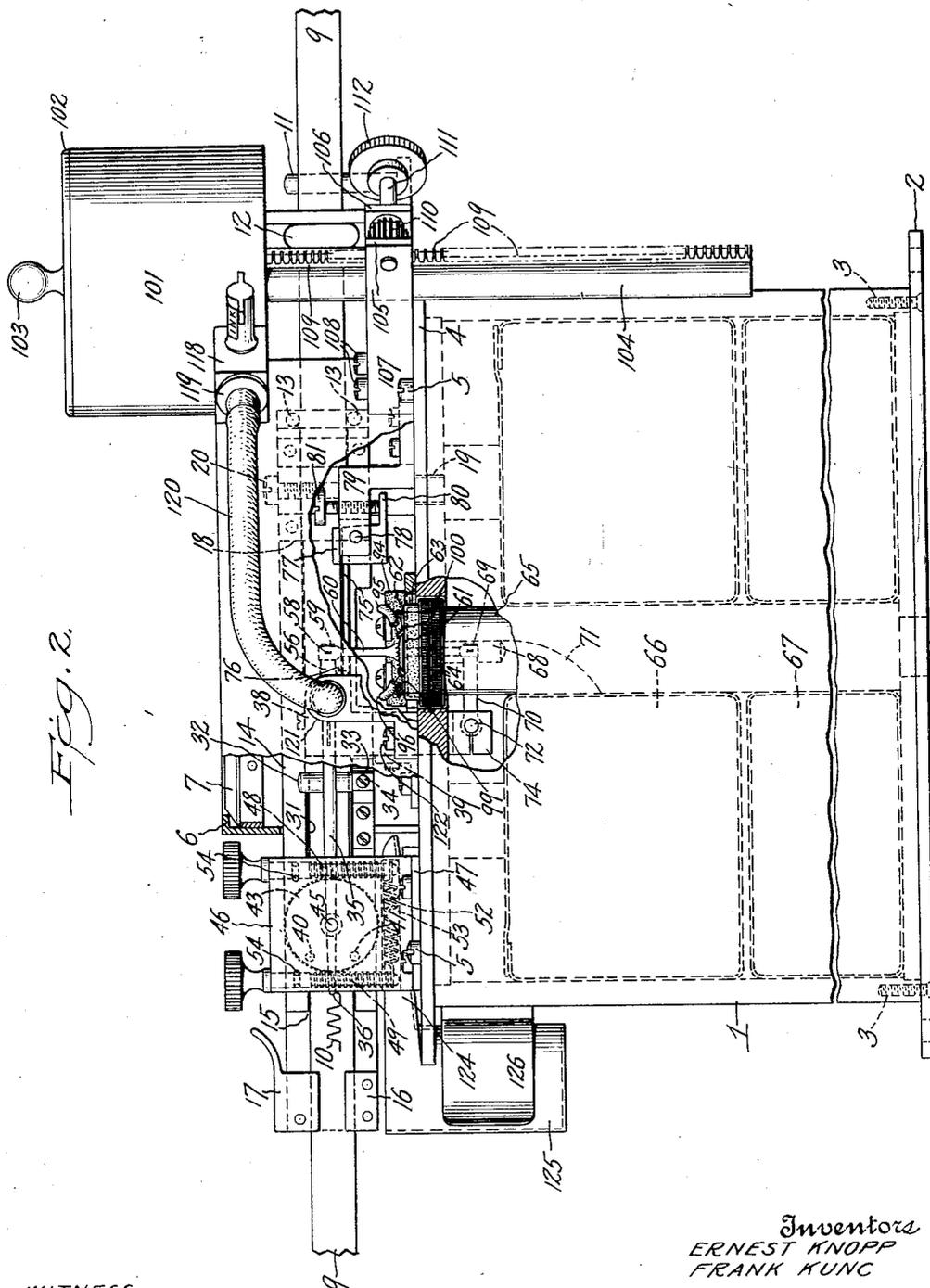


Fig. 2.

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4 Sheets-Sheet 3

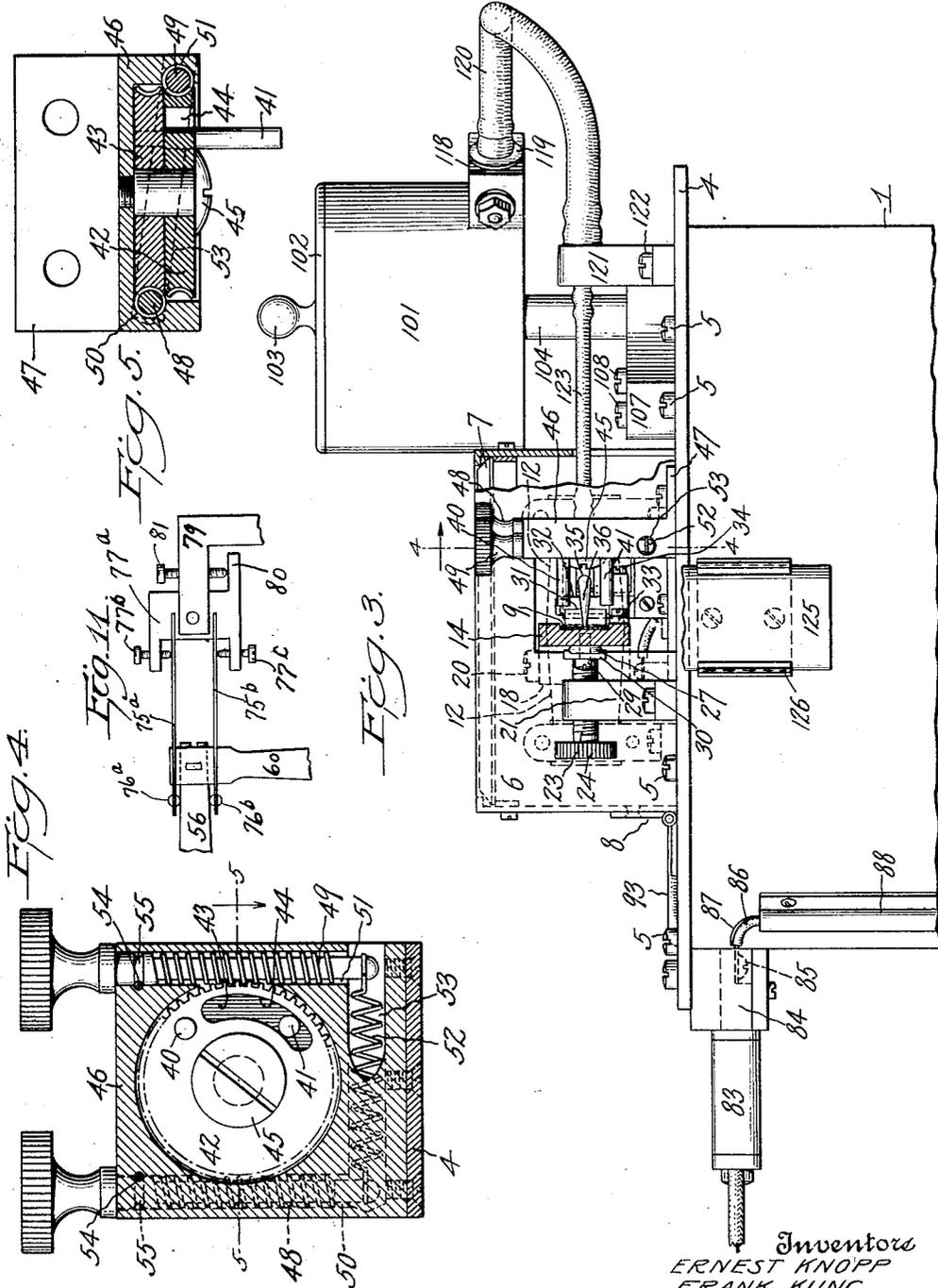


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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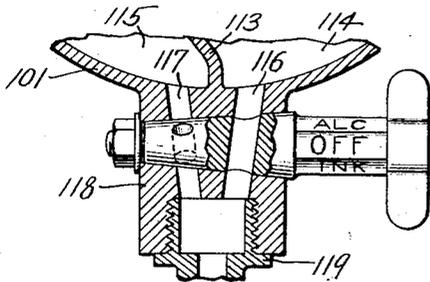
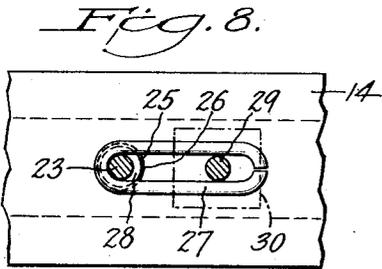
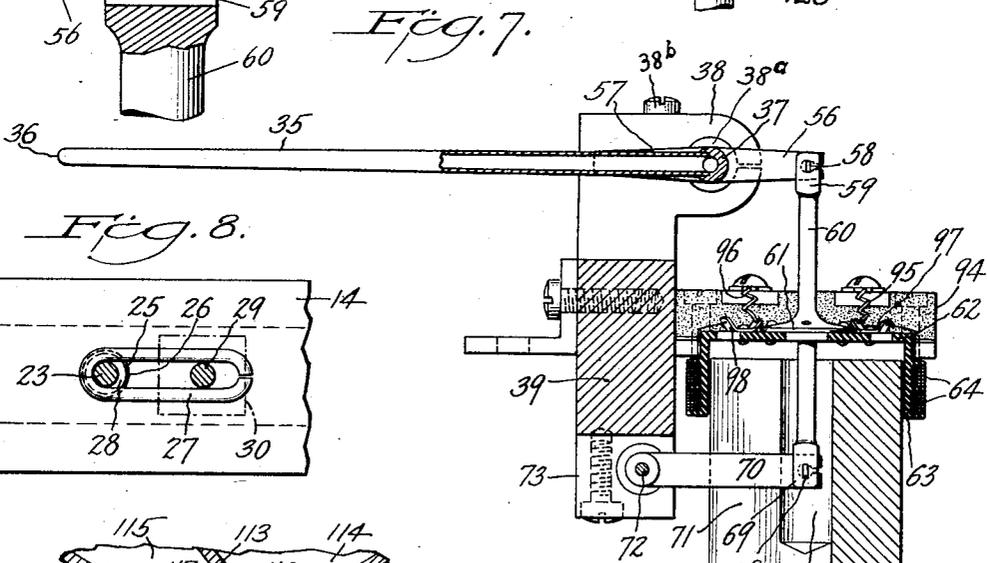
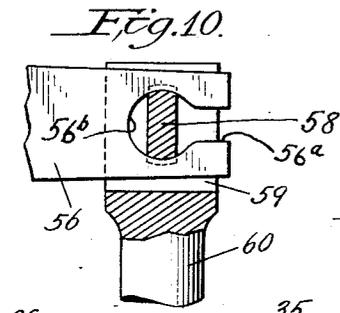
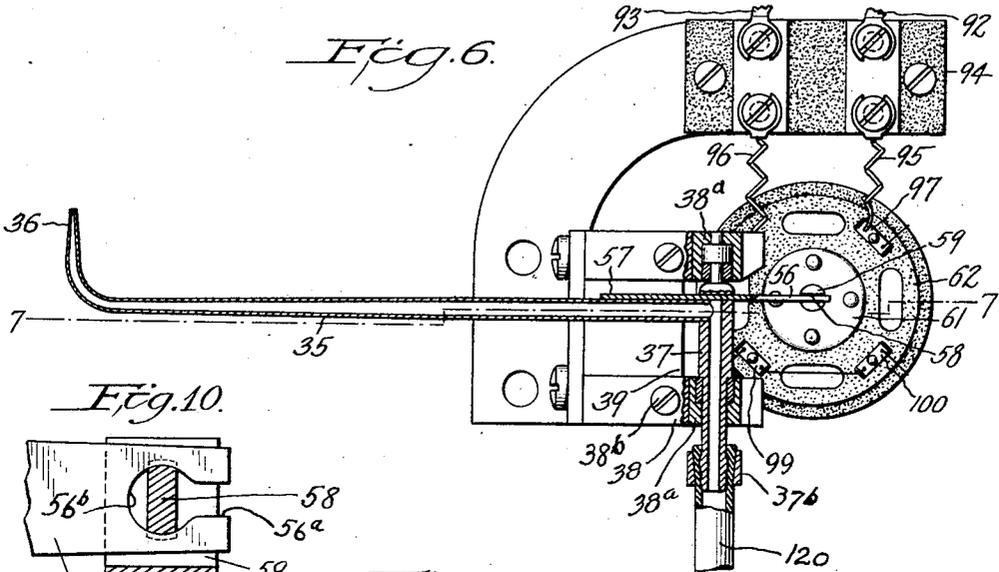
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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TELEGRAPHIC RECORDER

Application filed March 25, 1931. Serial No. 525,142.

This invention relates to telegraphic recorders, and has for its objects to increase the speed, precision, and reliability of recording, and at the same time to improve the characteristics of such instruments with respect to durability, simplicity, maintenance, and ease of assembling and disassembling.

With these objects in view, the invention resides in (1) means for supplying recording ink to the recording point of gravity as fast as the pen or stylus can apply it to a moving record tape; (2) an improved means for oscillating the pen or stylus in response to electromagnetic fluctuations induced by telegraphic signals; (3) the coordination of the ink-feeding means with the pen and its oscillating means; and (4) several adjusting devices and features of construction, herein after pointed out.

In the accompanying drawings of an illustrative embodiment of the invention—

Figure 1 is a plan view in which a glass cover plate is partly broken away;

Figure 2 is a front elevation with several parts broken away;

Figure 3 is a side elevation, partly in section, of the upper part of Figure 2 and at right angles thereto;

Figure 4 is an enlarged vertical section of a detail on line 4—4 of Figure 3;

Figure 5 is a horizontal section on line 5—5 of Figure 4;

Figure 6 is an enlarged view of the pen or stylus and associated parts in horizontal section;

Figure 7 is a broken vertical section of the parts shown in Figure 6;

Figure 8 is an enlarged vertical section of another detail;

Figure 9 is an enlarged detail in transverse section of a valve and associated parts;

Figure 10 is a vertical section of a portion of Figure 7 on a larger scale; and

Figure 11 is a side elevation, broken away, of a modified detail.

Referring in detail to the drawings, 1 is a cylindrical housing with bottom plate 2 secured by screws 3, 3 and cover 4 secured by screws 5, 5. A box 6 having a glass top 7 is

secured to cover 4 by hinges 8, 8, and acts as a dust cover for certain of the operating parts.

The record tape 9 (shown in elevation in Figure 2) bears a fragment of inscription at 10. The tape is fed, to the left, by any suitable means (not shown), and enters the recorder obliquely in contact with vertical guide pin 11, then passing between brushes 12, 12 and edge-guides 13, 13 to channeled guide strip or platen 14. The channel ends at 15, beyond which point the tape passes between a fixed lower guide 16 and a pivoted guide 17, which latter may be lifted to facilitate handling the tape. Platen 14 carries a boss 18 by means of which the platen is pivotally mounted upon a vertical stem. The vertical stem is tapped or driven into cover 4, as shown at 19 in Figure 2, and at its upper end has a threaded socket to receive retaining screw 20. Adjacent the other end of the platen a bracket 21, secured to cover 4, has at its upper end a split sleeve 22 which has threaded engagement with adjusting screw 23, provided with knurled head 24. The inner rounded end 25 of screw 23 is rotatably seated in a recess 26 on platen 14, and a wire keeper 27 (Figures 1 and 8) engages an annular groove 28 on screw 23. Keeper 27 is clamped to platen 14 by a screw 29 and washer 30. By turning head 24, platen 14 will be swung horizontally, turning on the axis of boss 18, and in this manner the position of the tape carried by the platen may be accurately adjusted with respect to the recording pen or stylus, hereinafter referred to. Adjacent the recording point, tape 9 is pressed against the platen by a spring 31 secured at its inner end to a split pin 32. Pin 32 is rotatably carried by a bracket 33, fastened to platen 14, and a set screw 34 engages the pin to lock it in position after the pin has been rotated to flex spring 31 to give the desired pressure on the tape.

The recording pen or stylus 35 is a tube having its outer end 36 bent at right angles towards the record tape, and its tapered extremity terminates immediately adjacent the record tape in a position to apply ink thereto. Preferably, the tip of the pen is a replaceable

insert lightly soldered to the main tube of the pen. At its inner end pen 35 is tapped into a hollow shaft 37, which is journaled in bearings 38^a, 38^a carried by slotted projections 38, 38 of a bracket 39. By means hereinafter described the pen 35 may be rocked with the shaft 37 to cause vertical oscillation of the outer end of the pen through a small vertical distance to produce a characteristic inscription upon the moving record tape in the manner known to the art. The vertical movements of the pen are limited by pins 40 and 41. These pins are independently adjustable to provide for varying the elevation of either or the interval between them. Referring to Figures 4 and 5, it will be seen that pin 40 projects from a disk 42, and pin 41 from a disk 43, disk 43 lies beneath disk 42 and the latter is provided with an arcuate slot 44 in which pin 41 travels when the disks are rotated relatively to one another. The disks, superimposed as shown, are rotatably held by a shouldered stud 45 in a recessed block 46 which is secured to cover 4 by means of flange 47. Each of the disks has gear teeth upon its periphery, which are engaged respectively by worm shafts 48 and 49, rotatably seated in bores 50, 51 in block 46. These bores are tangential to the circular recess containing the disks and merge therewith, permitting the worms to engage the gear teeth on the peripheries of the disk. The lower ends of the worm shafts are connected by a tension spring 52, which is seated in an oblique bore 53. Locking pins 54 are driven through the block to engage annular grooves 55 on the worm shafts, but leaving the latter free to rotate. It will be seen that by rotating either or both of the worm shafts in either direction, the elevation of either or both pins and the interval between them may be adjusted so as to center the recorded inscription upon the tape and regulate the transverse width of the inscription.

The means for oscillating the pen will now be described. Rocking lever 56, preferably integral with shaft 37, has a forwardly projecting arm 57 lying alongside of and soldered or otherwise rigidly affixed to pen 35. The rearward end of lever 56 has a slot 56^a communicating with a circular hole 56^b (Figure 10). A flat pin 58, having rounded lateral edges, is fixed between the arms of a yoke 59 on the upper end of bar 60. The pin 58 is of a thickness which permits it to pass freely through slot 56^a when lever 56 and bar 60 are put into alignment, as hereinafter described; and the width of pin 58 is slightly less than the diameter of hole 56^b, to permit close but free pivotal movement between the lever 56 and bar 60. The end portions of pin 58, which are seated in the arms of yoke 59, are enlarged to a width greater than the diameter of hole 56^b, so that when the parts are assembled, the pin will be locked

by lever 56 against longitudinal displacement in either direction.

Flange 61 on bar 60 carries a cup-shaped coil core 61, upon whose depending skirt 63 a coil 64 is wound in two sections. Skirt 63 loosely surrounds the upper end of a core 65 of an electromagnet, the field coils of which, numbered 66, 67, are shown in Figure 2. The lower end of bar 60 projects into a central bore 68 in core 65, and ends in a yoke 69 having a flat pin 69^a (like pin 58) which pivotally engages link 70 in the same manner that lever 56 engages pin 58. Link 70 is disposed in radial slot 71 and has an eye at its outer end which tightly engages shaft 72 journaled in lugs 73 (Figure 7) and 74 (Figure 2), which depend from bracket 39, previously mentioned. It will be seen that when screws 38^b are loosened, bearings 38^a may be removed from jaws 38 by shifting the bearings outwardly in the axial direction; shaft 37 may then be shifted to the right (Figure 6) and, when the shaft is free of the jaws, pen 35 may be swung upwardly into alignment with bar 60, in which position the pen 35, shaft 37 and lever 56 may be separated from bar 60. The latter may then be swung downwardly into alignment with link 70 and separated therefrom. All other parts of the instrument may be as readily disassembled (or assembled) as will be apparent from the description and illustration of their respective constructions and mountings.

It will be understood that, the field coils of the electromagnet being energized and a signal current being imposed upon coil 64, coil core 61 will be displaced axially. This movement, in the embodiment shown in Figures 1 and 2, is assumed to be downward and it will be transmitted through bar 60 and rocking lever 56 to pen 35, throwing its recording point into its upper or marking position. The movement is opposed by a spring 75 which carries at its outer end a pin 76 bearing against the under side of lever 56. Spring 75 projects from a pivoted carrier 77 mounted upon a pin 78 journaled in a bracket 79. Spring carrier 77 has a rearwardly projecting extension 80 against which bears an adjusting screw 81 by means of which the pressure of spring 75 may be varied.

For the operation just described, unidirectional intermittent signal impulses have been assumed. The device may be operated, however, with two-way or reversed signal currents, in which case the spring 75 would be removed or simply released by retracting screw 81. An alternative arrangement is shown in Figure 11, for use with reversed currents, the stylus moving alternately up or down from a central base line. In this modification there are two springs 75^a and 75^b respectively carrying pins 76^a and 76^b, one above the other below the stylus. The

5 springs project from a carrier 77^a provided with individual adjusting screws 77^b and 77^c for varying the tension of either spring at will. Adjusting screw 81 in this instance serves for positioning the springs as a pair with reference to the central position of the stylus.

The electrical connections are as follows—
 10 The field coils are in circuit with any suitable source of direct current through the plug 83, marked "Power" in Figure 1, corresponding socket 84 secured to the under side of cover 4 by screws 85, conductors 86, 87, which pass under an arched protective strip 88 and
 15 thence through a hole in cylinder 1 to the terminals (not shown) of coils 66 and 67. Coil 64 is in circuit with a source of intermittent or fluctuating signal impulses through plug 89 and its corresponding socket
 20 90 secured to the under side of cover 4 by screws 91, thence through conductors 92, 93 to an insulated connector block 94, thence through conductors 95, 96 to connector strips 97, 98 and thence to the terminals of coil 64.
 25 Additional connector strips 99, 100 are shown and may be employed when it is desired to employ the two sections of coil 64 as separate coils. As shown, however, the two sections of coil 64 are assumed to be connected
 30 in series and in circuit with either a unidirectional current or a reversing current.

The ink-feeding system will now be described. The ink is fed by gravity throughout, beginning at an elevated reservoir 101
 35 provided with a removable cover 102 having handle 103. The reservoir is supported upon a stem 104 which is loosely clamped between arms 105, 106 of a bracket 107 secured to cover 4 by screws 108. Stem 104 carries a rack 109 (preferably integral) which meshes with a pinion 110 on shaft 111. The shaft is journaled in arms 105, 106 and has at one end a knurled head 112. By turning the knurled head 112 the reservoir 101 may be raised or
 45 lowered to increase or decrease the head of ink in the system and thus vary the rate of flow to the record tape. The reservoir is divided by a partition 113 into a larger ink compartment 114 and a smaller compartment 115
 50 which may contain a cleansing fluid such as alcohol. Each compartment has its own discharge port 116, 117, respectively, communicating with a three-way valve (Figure 9) designated generally by the numeral 118. By
 55 means of this valve the flow of ink may be shut off or turned on, or a cleansing fluid may be released from compartment 115 to flush the ink conduits, hereinafter mentioned. A nipple 119, screwed into valve 118, provides for the attachment of a conduit 120,
 60 preferably a piece of rubber hose. As shown, hose 120 at its other end slips over the larger portion of a connecting sleeve, which has two diameters and is clearly indicated in Figure 1, although not directly shown. A bracket

121, secured to cover 4 by screws 122, anchors hose 120 and the connecting sleeve to cover 4. A smaller hose 123 is slipped over the reduced portion of the connecting sleeve at one end and at its other end is slipped
 70 over an axial extension 37^a of hollow shaft 37, being securely clamped thereon by means of an interiorly tapered ring 37^b. As previously described, hollow shaft 37 communicates with the interior of pen 35, thus completing a passage for ink (or cleansing fluid) from the reservoir to the tip of the pen. The supply of ink to the oscillating pen through its axis provides for the least possible relative movement between the stationary source
 75 of ink and the moving pen, and this small movement is effectively and simply taken care of by torsional flexing of hose 123. Beneath the recording point is a trough 124 which projects from the lip of a drip-cup 125, secured to the side of cylinder 1 by a spring clip 126.

The operation of the recorder has been described during the foregoing description of the structure.

We claim:—

1. In a device of the character described, a pen projecting from a hollow rock shaft, said shaft being axially open at one end, a torsionally flexible conduit fixedly joined to said shaft at its open end, means for supplying marking fluid through said conduit and shaft to the pen, and means for oscillating the pen and shaft.

2. In a device of the character described, an electromagnet having a core, said core having a radial longitudinal slot open laterally and at the outer end of the core, a stylus pivotally mounted upon a transverse axis, a frame in coaxial telescoping relation with said core, a signalling circuit comprising an armature coil carried by said frame in coaxial telescoping relation with said core, a stem projecting outwardly from said frame and pivotally connected to said stylus, a stem projecting inwardly from said frame and into said radial slot, and a link pivotally connected at one end to said last mentioned stem within the slot and pivotally connected at the other end to a fixed support.

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