

J. RUSSELL.

APPARATUS FOR RECORDING BELL OR LIKE SIGNALS, ESPECIALLY APPLICABLE TO MINES.

APPLICATION FILED JAN. 27, 1908.

938,516.

Patented Nov. 2, 1909.

6 SHEETS—SHEET 1.

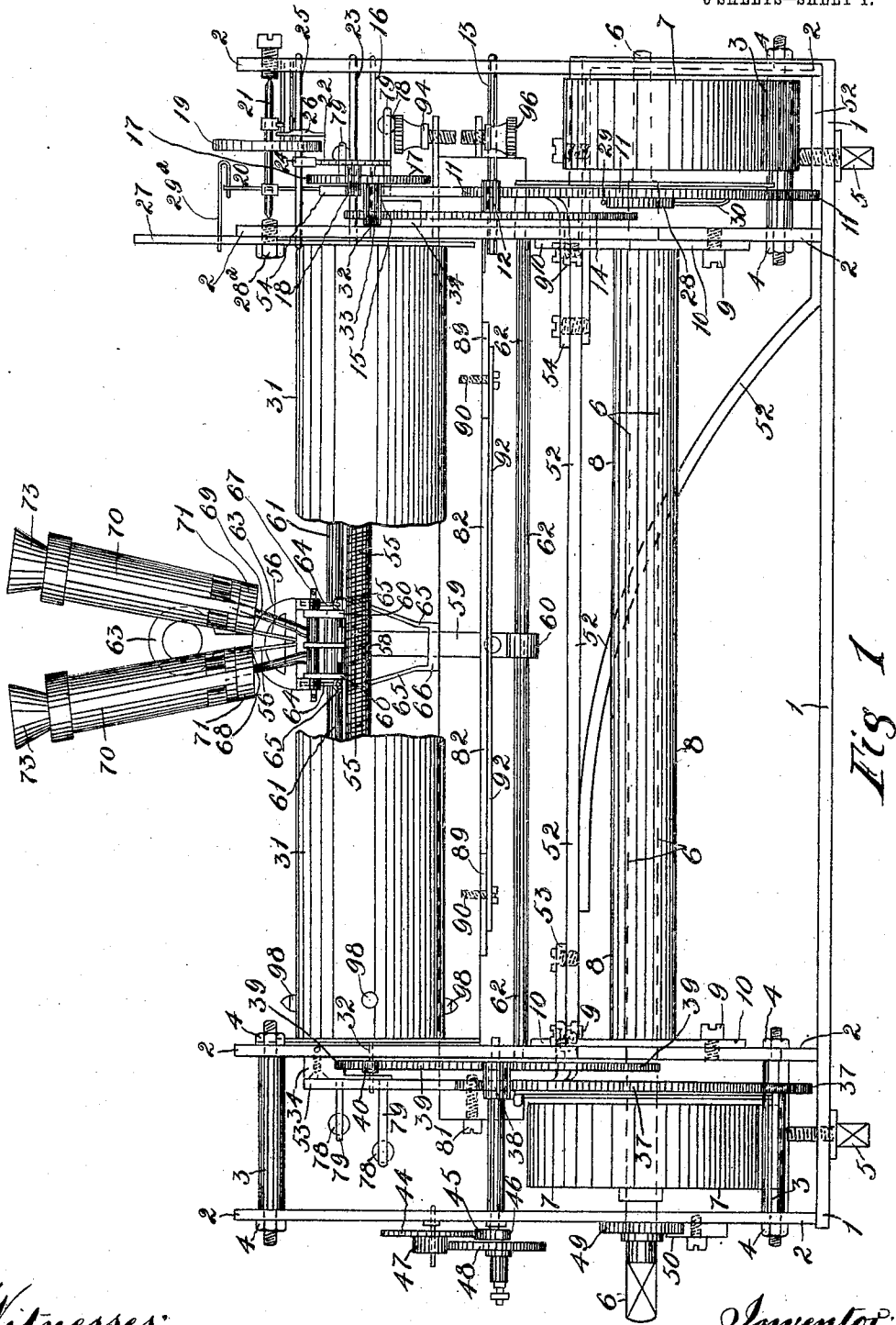


Fig 1

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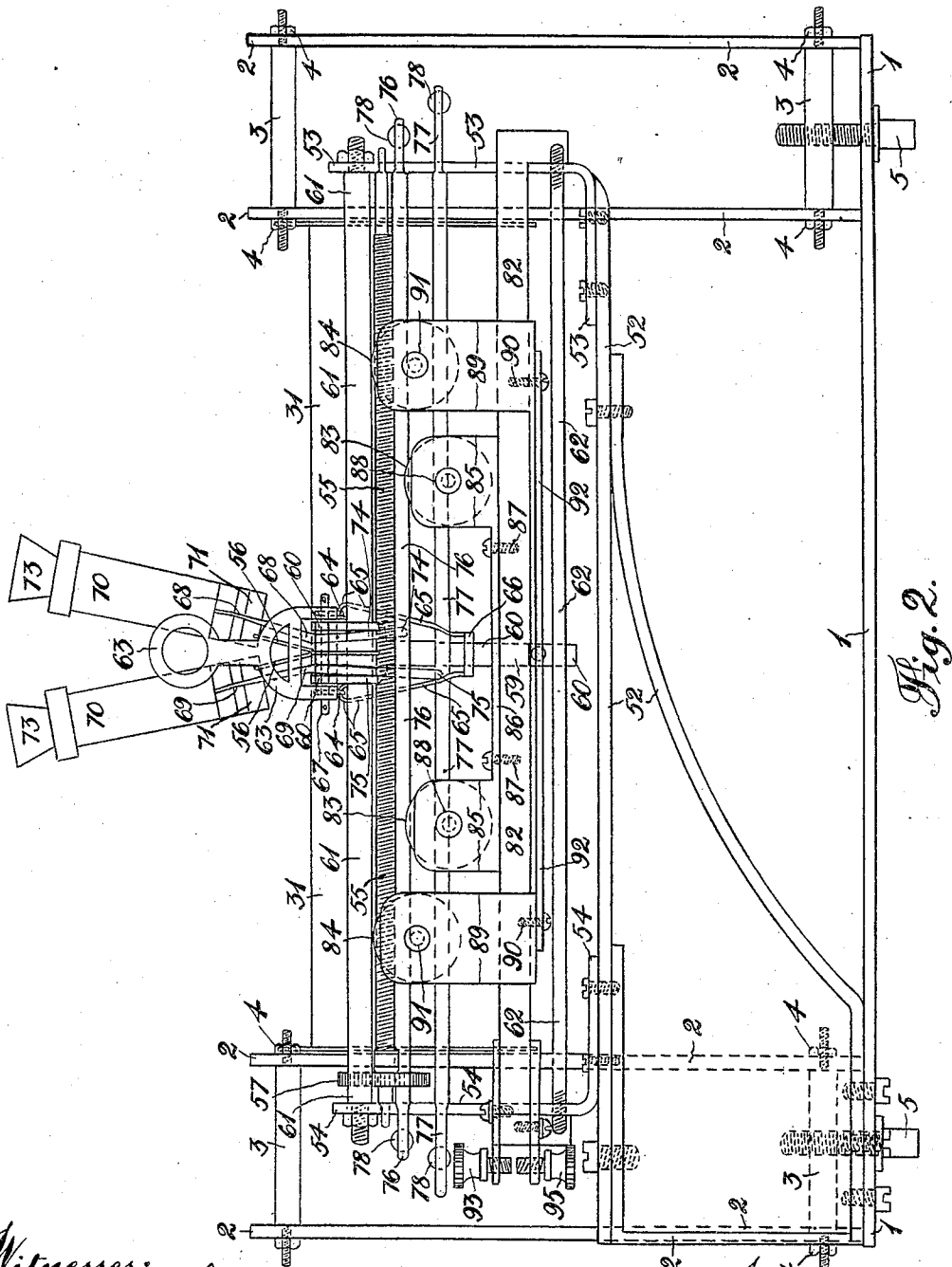
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6 SHEETS—SHEET 2.



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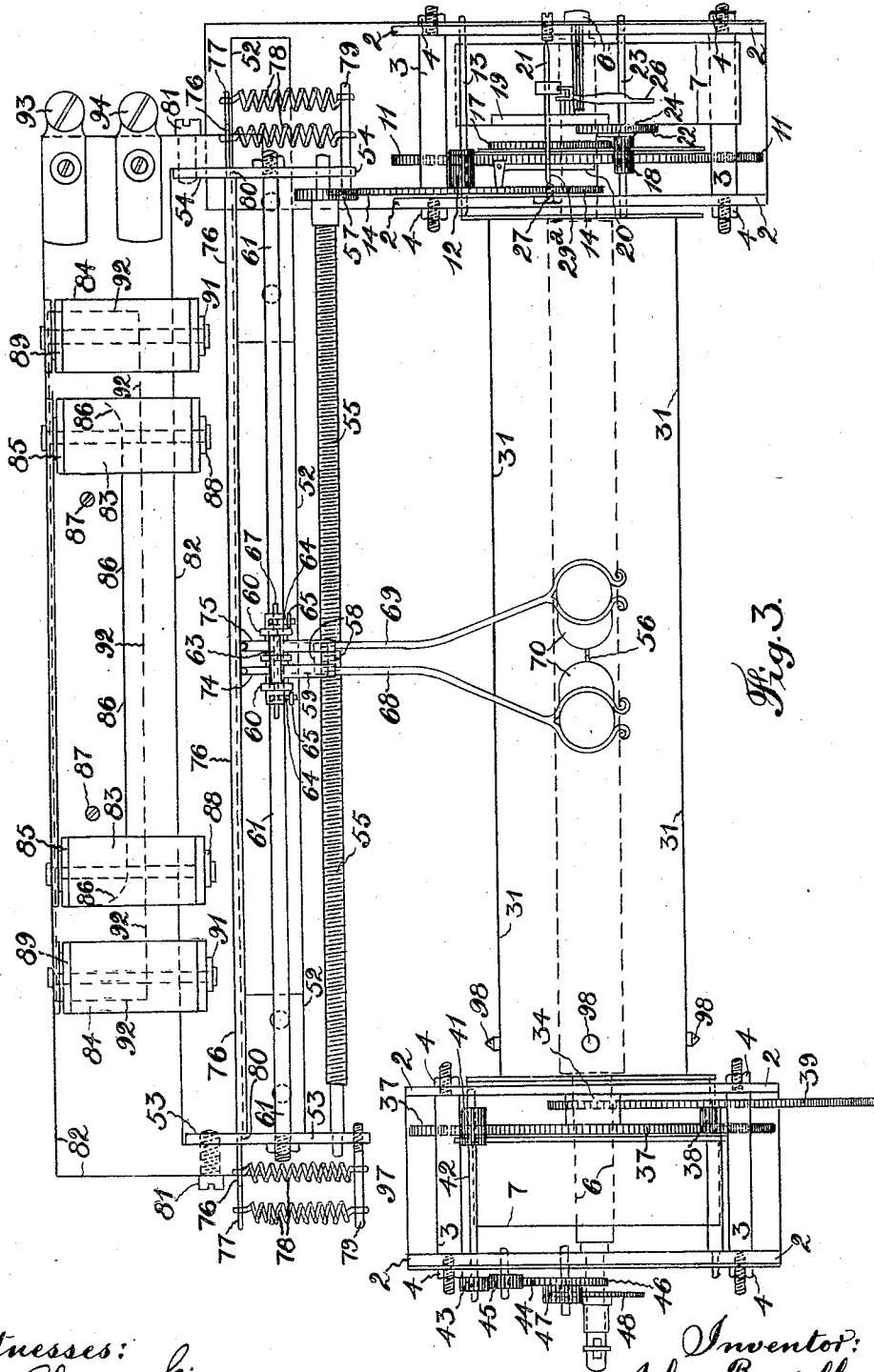


Fig. 3.

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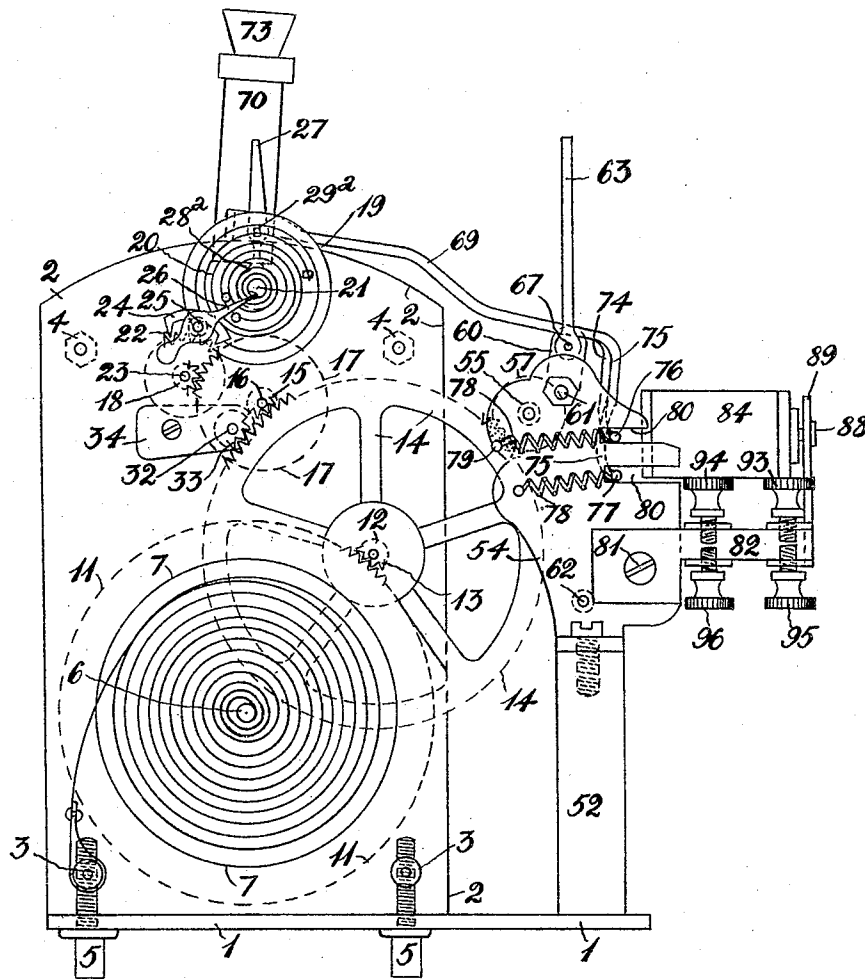


Fig. 4.

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6 SHEETS—SHEET 5.

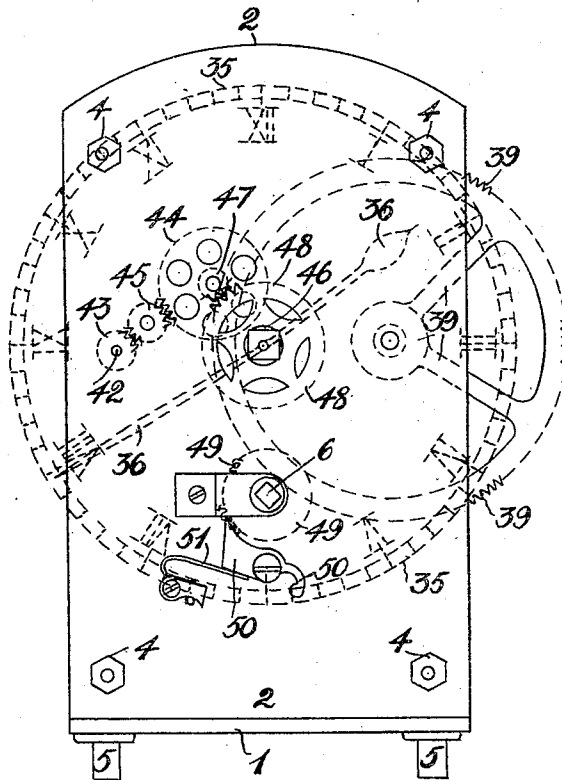


Fig. 5.

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6 SHEETS—SHEET 6.

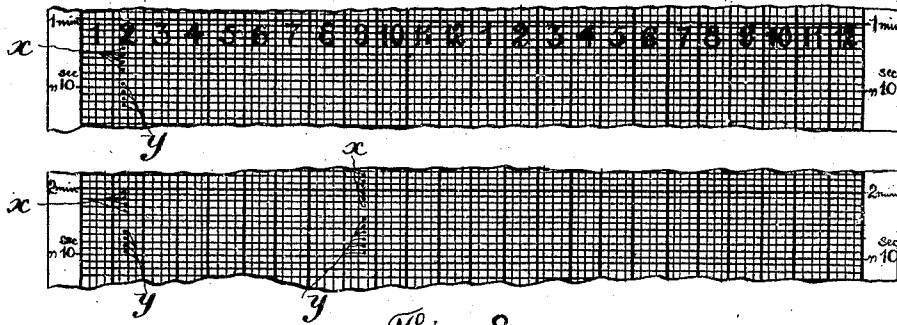


Fig. 8.

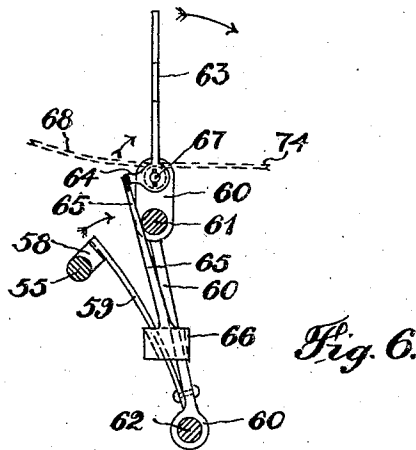


Fig. 6.

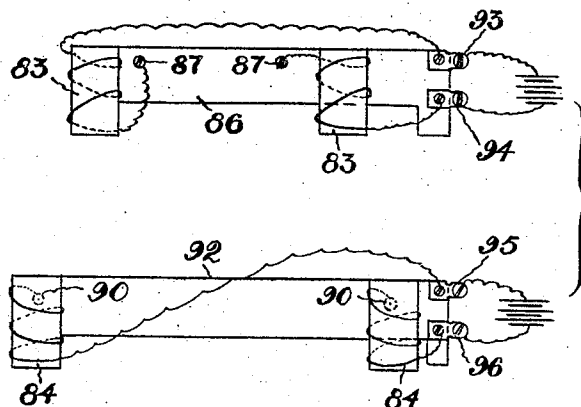


Fig. 7.

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UNITED STATES PATENT OFFICE.

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ONE-HALF TO JOHN HUGH MILLIGAN, OF LANGLAAGTE, TRANSVAAL.

APPARATUS FOR RECORDING BELL OR LIKE SIGNALS, ESPECIALLY APPLICABLE TO
MINES.

938,516.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed January 27, 1908. Serial No. 412,875.

To all whom it may concern:

Be it known that I, JOHN RUSSELL, a subject of the King of Great Britain, and resident of Langlaagte, near Johannesburg, Transvaal, have invented certain new and useful Improvements in Apparatus for Recording Bell or Like Signals, Especially Applicable to Mines, of which the following is a specification.

10 This invention relates to apparatus for recording bell or like signals and is especially designed for mine use.

The invention is applicable for recording the bell signals transmitted from the stations or other points in the shaft of a mine to the engine room and vice versa. By its use an accurate record may be kept of all signals transmitted and received between these points for future reference. The exact time the signals are transmitted may also be ascertained from the recording tape so that a complete record of the signals is thereby obtained.

As adapted for use with electrical bell systems where separate circuits are provided in the shafts for the outward and return signals the apparatus is preferably constructed to provide recording mechanism for both circuits, one of the recording pens being actuated through the medium of coils interposed in the one circuit and the other pen through the medium of coils interposed in the other circuit. The apparatus may also be adapted for "knock" signals and for this purpose the knocker line, which is pulled to transmit the "knock" signal to or from the engine room, may be arranged to open and close the circuit actuating the recording device.

40 The apparatus may be conveniently located in the engine room or other suitable position and be suitably inclosed to prevent unauthorized access to the recording tape, or the instrument might be located in a private room and placed under lock and key to prevent it being tampered with and so that the record would be available as evidence in case of accidents due to wrong signals having been given or the signals transmitted not having been complied with.

The invention will be described by aid of the accompanying drawings in which—

Figure 1 represents a side elevation of the apparatus with a portion of the recording

drum or roller broken away. Fig. 2 is an elevation of the apparatus as seen from the other side. Fig. 3 is a plan view. Fig. 4 is an end elevation as seen with one of the plates (2) removed, and Fig. 5 is an end elevation from the other end of the apparatus showing the clock dial and hands in dotted lines. Fig. 6 is an enlarged detail of the sliding piece 60, lever 63, spring 59 and half nut 58. Fig. 7 is a diagrammatic view showing the circuit connections and Fig. 8 is a portion of the record sheet with a record thereon such as the device is adapted to make.

In the drawings 1 represents a base plate which may be employed for fixing the instrument on any suitable stand or support. At each end of this plate 1 are arranged two vertical and parallel plates 2, which carry the clock mechanisms.

3 are pins forming distance pieces between the plates 2. These distance pieces have screwed on their extremities the retaining nuts 4. The plates 2 are secured by means of the set-screws 5, which project through holes in the bottom plate 1 and engage screw-threaded holes tapped in the pins 3.

6 is the main spring arbor or spindle which is arranged longitudinally of and above the base plate 1 and extends through the vertical plates 2 at both ends thereof. The main springs 7 of both mechanisms are attached to this spindle 6 and that portion of the spindle extending below the roller may be inclosed by a tube 8 secured to the vertical plates 2 by means of the screws 9 engaging flanges 10 on the ends of the tube. The one clockwork mechanism consists of the main spring 7, which as previously explained is attached at one extremity to the arbor of spindle 6, and at the other end to the main spring or power wheel 11.

28 is the ratchet wheel fixed on the main spring arbor 6, 29 the pawl engaging the teeth thereof, and 30 the spring for the pawl both fixed to the power wheel 11, for preventing unwinding of the main spring 7.

The power wheel 11 revolvably mounted on the main spring arbor 6 gears the pinion 12 driving through its arbor 13 the toothed wheel 14. This latter toothed wheel drives through pinion 15 and arbor 16, the toothed wheel 17, the latter gearing the escape wheel pinion 18. The ordinary clock escapement

or balance consists of the balance wheel 19, and spring 20 on the staff or spindle 21, escape wheel 22 on its spindle 23, and the pallet or pawl 24, spindle 25 and lever 26 to which rocking motion is imparted from the balance wheel staff or spindle 21. The regulator comprises the arm 27 pivoted to one of the plates 2 at 28^a and constructed with a hooked branch 29^a engaging the balance spring 20.

31 is the recording drum or roller around which passes the tape or sheet of paper on which the record is made. The spindle 32 of this roller projects through a hole in the two inner parallel plates 2 which form bearings for it and on the inside it has fixed to it a pinion 33. The spindle 32 beyond the pinion 33 is supported in a bearing formed by a bracket 34 fixed to the plate on the inside. With this pinion 33 meshes the toothed wheel 14 of the clockwork.

In the mechanism above described the wheels for driving the hands are dispensed with but if preferred they may be provided and the dial be provided in connection with this clockwork. In Fig. 5 I show the dial 35 and hands 36 of the timepiece in dotted lines arranged in connection with the other clockwork. The other clockwork mechanism comprises the main spring 7, which as previously stated is fixed on the common main spring arbor or spindle 6 and attached to the main spring wheel 37 driving through pinion 38 the toothed wheel 39, which latter meshes with the pinion 40 (corresponding to the pinion 33 on the other end of the recording drum or roller spindle). 41 is a pinion on a spindle 42 in gear with the power wheel 37. The spindle 42 extends to the front of the vertical plate 2 and on it is fixed a pinion 43. This pinion 43 drives the toothed wheel 44 through pinion 45. The latter toothed wheel 44 meshes with pinion 46, which drives the minute hand. The toothed wheel 44 has attached to it pinion 47 which meshes the toothed wheel 48 which drives the hour hand. In this mechanism a balance is dispensed with, the balance employed in connection with the other clockwork serving to regulate the beats of the timepiece.

49 is the ratchet wheel fixed on the main spring arbor 6, 50 the pawl and 51 the pawl spring, which prevent the unwinding of the main spring 7.

By the arrangement above described both ends of the recording drum or roller 31 are driven synchronously from both main spring wheels 11, 37, so that the power of both springs 7 is available to operate the recording instrument.

To the base plate 1 at one end is fixed bracket 52. This bracket 52, is not attached at the other end so as to allow of the recording tape or sheet being placed on or removed from the drum or roller 31. The bracket 52

has fixed to it in proximity to its ends, two vertical plates 53, 54. In the vertical plates is journaled the screw-threaded spindle 55 which serves for traversing the pens 56 longitudinally of the recording drum or roller 31. This spindle 55 is driven by means of the toothed wheel 57 from the wheel 14.

58 is the half nut which is adapted to be placed in engagement with the screw-threaded spindle 55. The nut 58 is attached to a flat spring 59 which is fixed to a sliding piece 60. See Fig. 6.

61, 62, are two rods arranged parallel with the screw-threaded spindle 55. These rods 61, 62, support the sliding piece 60. For the purpose of putting the nut 58 out of engagement with the spindle 55 I provide an arm or lever 63 hinged to the top of the sliding piece 60. This lever 63 has attached to it hooks or projections 64. To these hooks or projections 64 are attached the upper extremities of two arms 65 which at their lower ends are attached to a piece 66 encircling the vertical member of the sliding piece 60. This piece 66 is raised and lowered by movement of the lever 63. When the piece 66 is raised it draws the spring 59 inward and so throws the nut 58 out of engagement with the spindle 55, and when it is lowered it allows the spring 59 to move the nut 58 into engagement with the spindle 55. On the pin 67 on which the lever 63 is fulcrumed are pivoted the arms 68, 69, which carry the recording pens 56. The recording pens are shown consisting of the glass vessels 70 fitted at the lower ends with the caps or covers 71 carrying the small tubes 72 through which the ink may pass to the recording points. The arms 68, 69, as shown in Fig. 3, are constructed at their ends in the form of two curved spring members which clasp the vessels 70. The glass vessels 70 are constructed funnel shape or fitted at the top with detachable funnels 73 for facilitating the insertion therein of the ink or marking fluid. The arms or levers 68, 69, carrying the pens 56, are each constructed with a downwardly extending arm or projection 74, 75, beyond the pivot 67, the one 74, extending some distance below the other 75.

In the vertical plates 53, 54, are carried two parallel rods 76, 77, one for each of the downwardly extending arms 74, 75, of the levers 68, 69. To the ends of these rods 76, 77, are attached spiral springs 78, which are attached at their other ends to pins or projections 79 on the plates 53, 54. The rods 76, 77, are movable in slots 80 formed in the plates 53, 54, toward and away from the arms 74, 75.

Fixed to the plates 53, 54, by means of the set screws 81 is a carrier 82 which may be made of wood or other suitable material for the coils 83, 84.

85 are brackets fixed to the carrier 82 for supporting the inner pair of coils 83. The brackets 85, which may be made of metal are connected by means of the metal strip 5 86 (through the medium of which they may be fixed by the screws 87 to the carrier 82) which may also serve for electrically connecting the coils 83. The coils 83 are so disposed that their cores 88 are opposite the 10 rod 77. The pair of coils 83 are interposed in one of the electric bell circuits in a manner well understood. 89 are two other brackets fixed by means of the screws 90 to the carrier 82. The brackets 89 carry the 15 other pair of coils 84 which are arranged at such a height that the cores 91 are opposite the other rod 76.

92 is a plate connecting the brackets 89 so that the brackets 89 and plate 92 may serve 20 for placing the two coils 84 in electrical connection. The pair of coils 84 are interposed in the other electric bell circuit.

93, 94, are the terminals for one pair of coils and 95, 96 the terminals for the other 25 pair of coils. Fig. 7 clearly shows the circuit connections.

In the operation of the instrument it is preferable that the vessel 70 for one of the pens 56 be filled with ink or marking fluid 30 of a different color to the other so that the marks made thereby will be readily distinguishable. The sheet of paper or tape, which as previously explained is preferably in the form of an endless band, is passed 35 through the opening provided at 97 between the end of bracket 52 and one of the clock-works.

The margin or margins of the tape a portion of which is shown in Fig. 8 are preferably marked with hours, minutes and seconds and with light transverse lines (crossing the ninety six parallel lines) and the tape is adjusted on the surface of the roller 31 in relation to the pens to correspond to 40 the time indicated by the timepiece. The margins of the tape are perforated and on one end of the roller 31 are provided pins 98 which engage the perforations to insure movement of the tape with the roller. The 45 tape having been adjusted and assuming that both pairs of coils 83, 84, are operatively interposed, the one in the electric circuit from the shaft to the engine room and the other from the engine room to the shaft, 50 then the closing of the circuit in the trans-

mission of a signal, say through the pair of coils 83, will attract the rod 77 and the latter disengaging the arm 75 will allow the corresponding pen 56 to strike the surface of the recording tape. Each time the bell 60 is rung in transmitting a signal the circuit is closed and the pen marks the surface of the tape. When the circuit is opened the rod 77 is moved by its springs 78 into contact with the arm 75 which raises the pen off 65 the surface of the recording tape. The other pen is operated in the same manner. The marks made by the one pen are indicated by the letter *x* and the marks made by the other pen are indicated by the letter *y* in Fig. 8. 70

What I claim as my invention and desire to protect by Letters Patent is:—

1. Apparatus of the character described comprising in combination a cylinder which serves for moving the record strip, mechanism 75 for rotating said cylinder at a suitable rate of speed, an electric circuit for the outward signals and another circuit for the return signals, a record marking device for each circuit, means for traversing the marking devices longitudinally of the cylinder 80 said means comprising a screw-threaded spindle engaging a nut connected with the marking devices, means for disconnecting said nut from said spindle, a pair of coils 85 interposed in each circuit, a slidable rod for each circuit, said rods being adapted when attracted by their magnets to allow the marking device to mark the record strip and means for returning said rods and marking 90 devices to their normal position as set forth.

2. Apparatus of the character described comprising in combination a cylinder which serves for moving the record strip, springs for driving said cylinder at both ends at a 95 suitable rate of speed, a timepiece actuated by said springs, a marking device, means for traversing said marking device longitudinally of the cylinder, a coil interposed in the electric circuit, and means actuated by said 100 coil for actuating the marking device to mark the record strip, for each stroke of the signal, as set forth.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses this 28th day of October 1907. 105

JOHN RUSSELL.

Witnesses:

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R. OVENDALE.