Aug. 15, 1933. C. BATTEGAY 1,922,836

PRINTING CLOCK

Filed May 22, 1931 4 Sheets-Sheet 1

Fig. 1

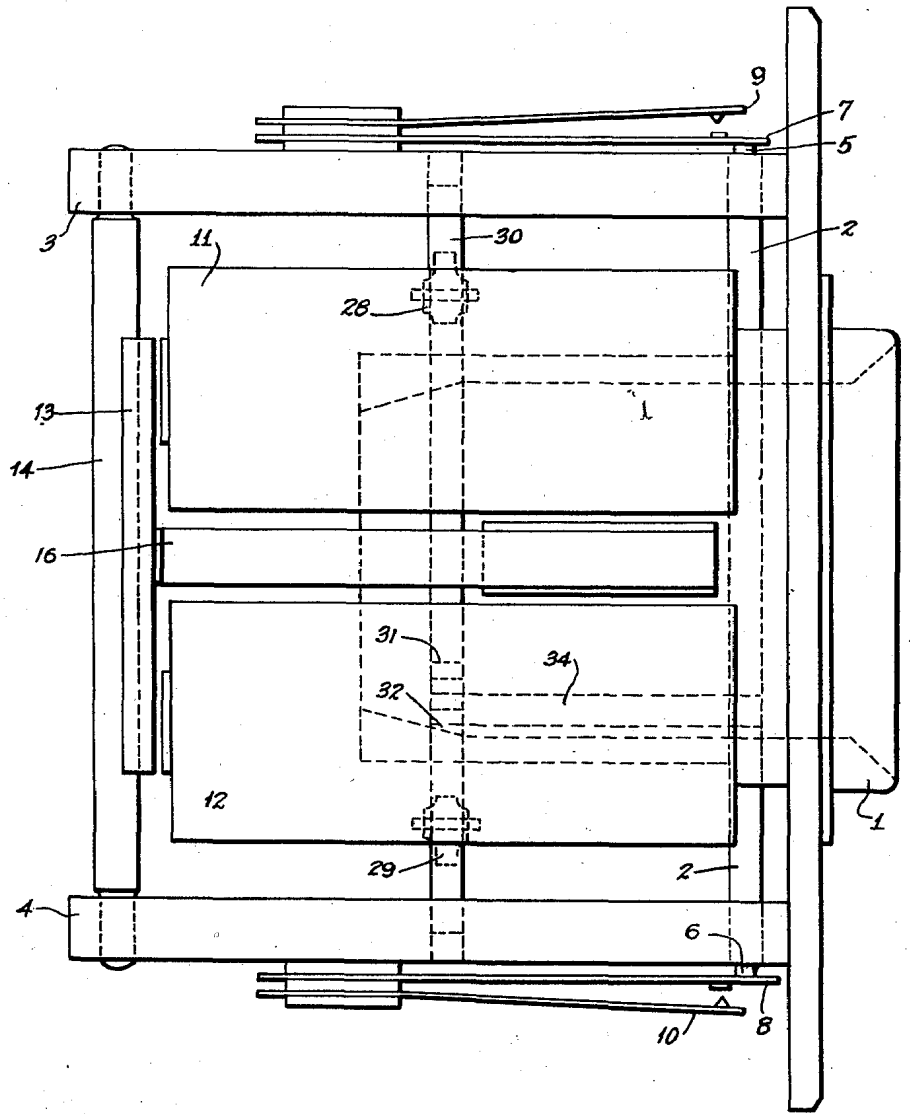

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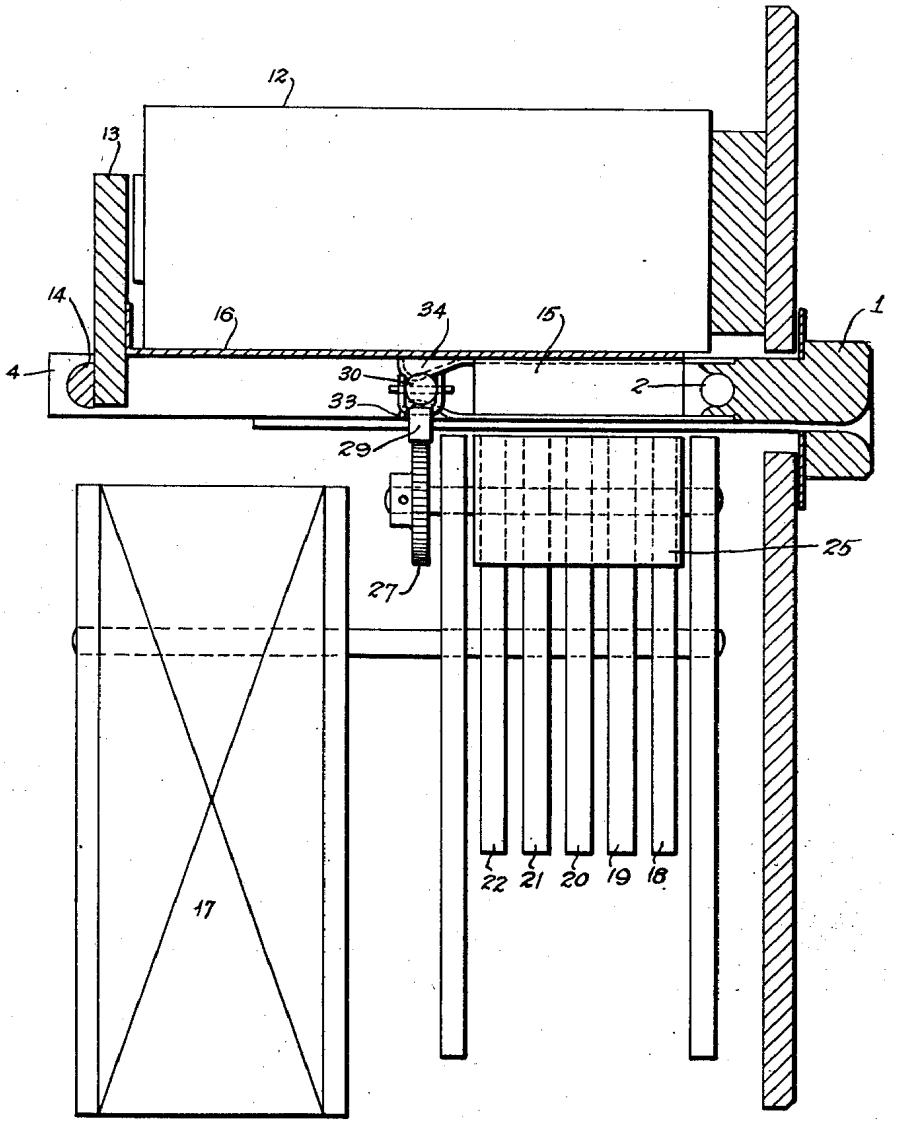
Fig. 2



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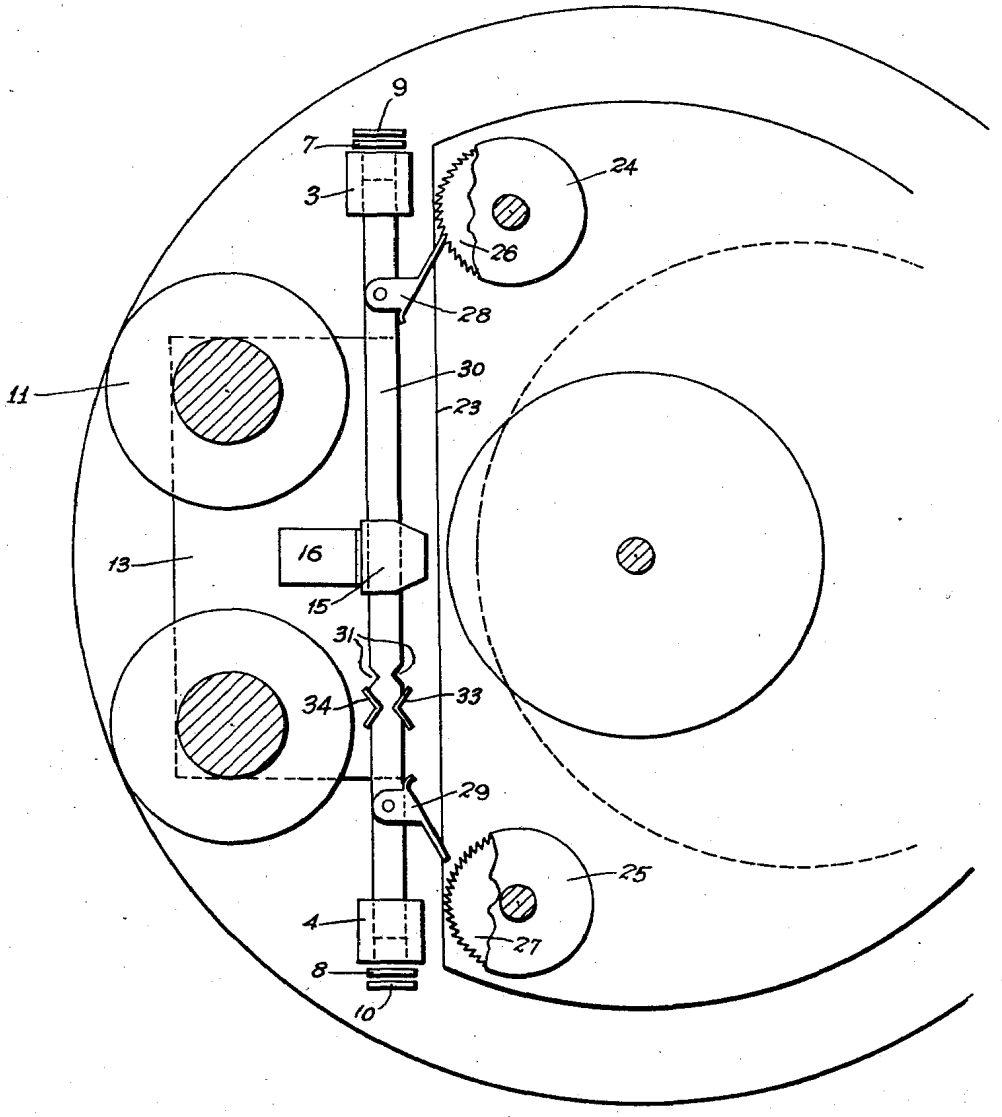

Fig. 3

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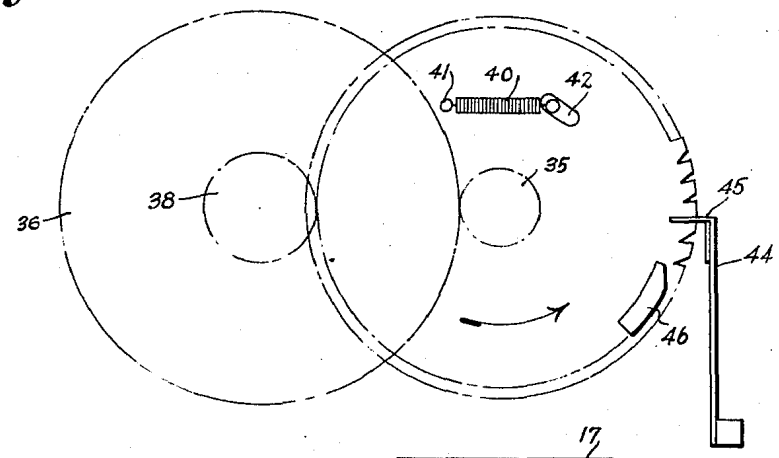
Filed May 22, 1931 4 Sheets-Sheet 4

Fig. 4



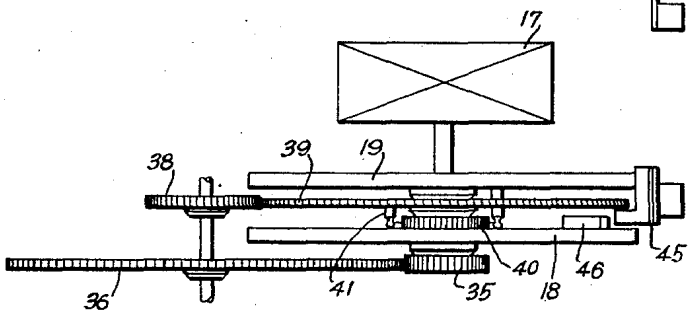


Fig. 5

Fig. 6

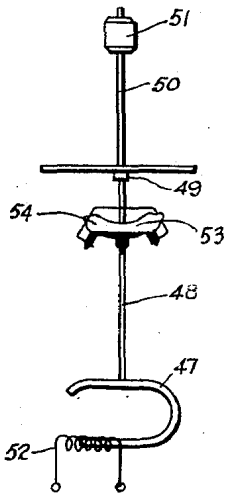
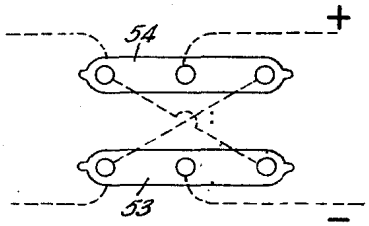


Fig. 7



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Patented Aug. 15, 1933 1,922,836

UNITED STATES PATENT OFFICE

1,922,836

PRINTING CLOCK

Constant Battegay, Levallois-Perret, France, assignor to Societe Anonyme des Ateliers Brillie Freres, Levallois-Perret, Seine, France, a Corporation of France

Application May 22, 1931, Serial No. 539,313, and in France June 6, 1930

8 Claims. (Cl. 234—43)

My invention has for its object a clock adapted to print automatically the time of the beginning and the time of the end of any operation on a sheet of paper such as a worker's pay roll or a telephone control paper.

It has for its object to provide this printing electrically in a manner such that the recording of the time of beginning may appear just underneath that of the end so as to allow an easy substraction.

It consists chiefly in that the strip or sheet of paper is introduced into a funnel which is displaced sidewise in one direction or the other at the beginning or at the end of the operation, whereupon at the end of the travel of the funnel an electric contact is closed so as to send current through a printing electro-magnet the armature of which carries a hammer which presses the paper against a dating device with the interposition of an inking-ribbon.

My invention has for its further object certain constructional features to be disclosed hereinafter chiefly driving means for the wheels of the date-recording device and an automatic reversing gear for the winding of the inking ribbon.

It will be well understood from the following description and accompanying drawings which are given solely by way of example.

Fig. 1 is a front view of the printing clock according to my invention.

Fig. 2 is a side view thereof.

Fig. 3 is a cross-section thereof.

Figs. 4 and 5 show the driving means for the dating wheels.

Figs. 6 and 7 show a reversing relay constituted by a pendulum beating the second and adapted to control electrically the printing clock.

Referring to Figs. 1, 2 and 3, 1 is a funnel into which is introduced the telephone ticket or the like record paper. This funnel may move sideways and carry along with it a guide rod 2 sliding in bearings provided in the longitudinal rods 3 and 4. This guide ends with two insulating parts 5 and 6 against which bear two springs 7 and 8 which urge the funnel into its mean position, when the funnel is pushed in one direction or the other, it deforms one of the springs 7 or 8 which meets a cooperating contact spring 9 or 10. The two contacts 7—9 and 8—10 are connected in parallel and close the circuit of a printing electromagnet formed of two coils 11 and 12, of a common core and of an armature 13 carried by a shaft 14 adapted to pivot in bearings formed in the rods 3 and 4.

The armature carries a hammer 15 secured to the end of a yielding blade 16. The armature is normally held away through its weight from the pole pieces of the electromagnet; when the latter is excited, the armature is suddenly attracted and the hammer 15 is brought with force against the paper in the funnel.

On the other side of the paper is disposed the date giving device the axis of which is vertical and comprises a certain number of wheels controlled by clockwork. The latter may be advantageously constituted by an electric receiving motor 17 moving intermittently, say every second. The movement of the receiver drives the first wheel 18 or seconds recording wheel which drives at every full minute the next wheel 19 or minutes recording wheel through a gear to be disclosed hereinafter. This latter wheel drives in its turn the hour-recording wheel which drives the date-recording wheel 21 and through the latter the month recording wheel 22.

Between the date-recording device and the paper is disposed (Fig. 3) an inking ribbon 23 winding and unwinding between the two reels 24 and 25 disposed on either side of the date-recording-device. The ribbon is driven in one direction or the other by one of the two ratchet wheels 26 or 27 keyed to the shaft carrying the reels 24 and 25. These ratchet wheels may be actuated in one direction or the other by one of the two catches 28 or 29 secured to a stem 30 slidably held between the two uprights 3 and 4. This stem is provided with couples of notches 31 and 32 cooperating with the springs 33 and 34 carried by the guide 2 of the funnel.

The working of the apparatus is as follows:

In its normal position, the funnel is in its mean position under the action of the two springs 7 and 8. At the beginning of an operation, say a telephone communication, the paper is introduced in the funnel or like container which is pushed to the right. This causes the spring 8 to yield whereby when the funnel is at the end of its travel, the contact 8—10 is closed. This allows the current from a storage battery to pass through the coils 11—12 of the electromagnet. The armature 13 is attracted and comes against the pole-pieces of the electromagnet; at the same time, the hammer 15 is projected against the paper record and owing to the yieldingness of the spring 16 it strikes said record without remaining in contact therewith. When the hammer strikes the paper strip in the holder as stated, it serves to momentarily press the strip against the dating device, but this operation is accomplished

so quickly as to not interfere with rotation of the dating wheels. The presence of the inking ribbon interposed between the dating device and the strip causes clear inscriptions to be made upon the strip in accordance with the actual position of the dating wheels at the time of the impression. The hammer may be thus said to serve as a percussion member and that it strikes one sharp tap upon the paper strip at each operation of the magnet.

At the end of the conversation, the strip is replaced in the funnel which is now moved leftwards so as to close the contact 7—9 inserted in parallel with the above-mentioned contact 8—10. The electromagnet is thus excited again and thereby the time is again recorded on the paper strip. Owing to the movement of the funnel and strip carried therein, the two records are not superimposed on the strip but are on the contrary disposed underneath one another in a manner suitable for subtraction.

The movement of the funnel provides also a movement of the inking ribbon in one direction or the other. In the case illustrated, springs 33—34 engage the notches 32 of the sliding rod 30. In this position the ratchet wheel 26 may be engaged by the catch 28 when the funnel is moved leftwards whereas the ratchet wheel 27 cannot be engaged by the catch 29 when the funnel is moved towards the right. Under these conditions, the ratchet wheel 26 is alone actuated during the movements of the funnel and consequently the ribbon 23 is wound over the reel 24. When the coil 25 is quite empty, the ribbon secured thereto through one end can no more pass on to the reel 24 and the ratchet 26 consequently resists the action of the catch 28. The latter cannot follow the movement of the funnel on account of this resistance and pushes the sliding rod 30 which snaps into its other position owing to the cooperation of its notches and of the springs 33 and 34. The latter engage the notches 31 whereby the relative position of the catches 28—29 with reference to the funnel is reversed.

In this new position, the catch 28 can no more engage the ratchet 26 and the other catch 29 is adapted to act on the ratchet 28 when the funnel is pushed towards the right. Therefore the reel 25 receives the ribbon wound off the reel 24 until the latter is empty and causes another shifting of the position of the sliding rod 30 with reference to the funnel.

The driving means for the date wheels is illustrated separately in Figs. 4 and 5, as far as the drive of the minute wheel by the second wheel is concerned, as the other drives are similar in all respects with suitable modifications of the gear ratio. This driving device which may be used with any dating or recording means provided with a succession of intermittently advancing numerals shows the advantage of opposing a comparatively regular resisting torque to the drive and moreover of requiring no catches and no ratchet wheels which wear speedily when continuously in operation.

The principle of the drive is as follows:

The wheels are interconnected through a gear transmission having a suitable reducing ratio whereby if the first wheel advances, the other wheels reliably advance through the proper angle. But as it is necessary for printing to correctly position the figures, the movement of the wheels must be intermittent and they must pass suddenly from one position to the next. To this end, the gear drive is not rigid but yielding owing to the interposition of springs which allow the gears to advance while the date wheels are held back in a stationary position by a catch.

At the moment when a change of position is required, the precedent wheel releases the catch and the springs bring suddenly the wheel into the position corresponding to the actual position of the gears.

In Figs. 4 and 5 the seconds wheel 18 carries a pinion 35 meshing with a transmission wheel 36 meshing with a pinion 38 meshing in its turn with the wheel 39.

The reduction ratio obtained must be equal to 60.

The minute wheel 19 is held in its actual position by the spring 44 ending with a knife 45 adapted to engage notches at the periphery of the wheel 19. This knife may be raised once per revolution of the seconds wheel 18 by a shoe 46 carried by the said wheel.

The working is as follows:

The time receiver 17 makes the wheel 18 advance stepwise second per second. The gear transmission 35—36—38—39 rotates at the same time, the wheel 39 rotating through one sixtieth of a second when the wheel 18 rotates through one whole revolution. But the wheel 39 does not make the minute wheel 19 rotate as the latter is held back by the knife 45. The spring 40 is tensioned while the wheel 39 and its aperture 43 move with reference to the wheel 19. When the seconds wheel 18 passes away from the position corresponding to the 59th second of a minute and enters that corresponding to a full minute 00, the shoe 46 lifts the knife 45 which releases the wheel 19. Under the action of the spring 40, the wheel 19 rotates suddenly and returns into its original position with reference to the wheel 39 owing to the presence of the pin 42 carried by it and abutting against the bottom of the notch 43. The mechanism continues working in the same manner every minute and a similar mechanism is provided for each wheel of the dating device.

The wheel 39 is not rigidly secured to the minute wheel 19 but urges it forward through the action of the above mentioned spring 40 connecting a pin 41 carried by the wheel 39 and the pin 42 carried by the minute wheel 19 and engaging the oval aperture 43 provided in the wheel 39.

Fig. 6 shows a pendulum relay adapted for the electric control of the receiver 17 working under the action of electric impulses passing through it every second in reversed directions from one second to the next.

Fig. 7 is a horizontal sectional view of the mercury circuit breakers.

The advantages of time distribution provided by reversed current impulses are well known as also those of pendulum relays. But the arrangement disclosed in Fig. 6 is particularly designed for providing impulses reversed every second, with an improved circuit breaking capacity.

My improved pendulum relay makes use of two three-electrode mercury circuit-breakers 53 and 54 carried by a synchronized pendulum. If I were to choose therefor a simple pendulum beating the second, i. e. about 1 m. long, it would be necessary also to make it oscillate through about 15° so as to ensure the proper tilting of the mercury switch, which would require a considerable space.

Now, according to my invention, I use a compound pendulum formed by a magnet 47 carried at the end of a short pendulum 48 hanging from

49. The pendulum 48 extends beyond the suspension point as a rod 50 carrying an adjustable counterweight 51. The magnet 47 engages a coil 52 into which a synchronizing current is sent every two seconds from a master clock. The pendulum 48 carries two three-electrode mercury switches connected so as to form a reversing switch.

The position of the counterweight 51 is adjusted so as to obtain a period of complete oscillation equal to 2 seconds. Owing to this arrangement, the size of the pendular relay is no larger than that of an ordinary half-second pendular regulator.

The advantages of the compound pendulum relay are many in the device of the character under consideration. For example, in a device of this character a great number of electrical contacts, i. e., a frequent making and breaking of circuits is necessary for the operation of the devices and where such a condition is present an ordinary relay will miss every now and then, i. e. will fail to operate with the result that the time control mechanism would lose one or more minutes. With the character of relay described, however, the accurate operation is assured even if the contacts of the master clock fail to function once in a while. Furthermore, the slow and regular motion of the compound pendulum is highly favorable for the operation of the mercury reversing switches and said compound pendulum moreover serves to appreciably diminish the size of the relay and the required amplitude of the oscillations.

The operation of the pendulum will be clear from the drawings, but it may be noted that when the pendulum is in motion, the pools of mercury in the respective mercury switches 53 and 54 shown in Figures 6 and 7 will connect for a second the central terminals with, for instance, the terminals at the left and during the following second will connect the same central terminals with those at the right, so that through the wiring shown in Figure 7, a reversal of current will result each second and produce smooth unerring operation of the pendulum.

Obviously and as already stated, my invention is by no means limited to the forms of execution or of application which have been more particularly described. Any modifications may be brought thereto which fall fairly within the scope of appended claims.

In particular the printing clock may be used for recording durations other than those of telephonic conversations, for instance for timing work in workshops.

The device described for controlling the dating wheels may be used for other dating or the like devices where it is required for the numerals to change suddenly.

My improved pendular relay described in connection with the receiver for the printing clock may be used for distributing time to any desired time-piece such as dials, time-recording devices and the like.

As concerns the forms of execution, the movement of the funnel towards the right for instance, may be used not only for closing the printing contacts, but also another contact providing other operations.

The clock may also be provided with an apparent dial at the top, over which move hands controlled by the receiver together with the date-recording device.

A clutch may also be inserted between the receiver and the dating device so as to allow the latter to be easily and speedily set right.

Also certain wheels, giving out for instance the days and months may be controlled by hand instead of through the time receiver.

What I claim is:

1. An apparatus for recording on a card the beginning and end of an intervening period of time comprising a card-holder, two uprights, means for mounting the card-holder to horizontally slide along said uprights, springs urging the holder back into its mean position, a circuit, means whereby the holder closes said circuit in its outermost positions, a vertical electromagnet in said circuit, an armature adapted to be raised thereby when the electromagnet is excited, a hammer yieldingly carried by the armature in front of the card in the holder, a date recording device adapted to record the date vertically on the card on the side opposed to the hammer and means controlling said date-recording device.

2. An apparatus for recording on a card the beginning and end of an operation comprising a card-holder, two uprights, means for mounting the card-holder to horizontally slide along said uprights, springs urging the holder back into its mean position, a circuit, means whereby the holder closes said circuit in its outermost positions, a vertical electromagnet in said circuit, an armature adapted to be raised thereby when the electromagnet is excited, means for imparting to the armature a pivoting motion, a hammer yieldingly carried by the armature in front of the card in the holder, a date recording device adapted to record the date vertically on the card on the side opposed to the hammer and means controlling said date-recording device.

3. An apparatus for the recording on a strip of the beginning and end of an intervening period of time, comprising a strip-holder mounted for edgewise movement, blade springs normally urging the holder into its mean position, cooperating contact springs on the outside of said blade springs, a circuit in which the pairs of springs are included in parallel and adapted to be closed when either of the blade springs is pushed by the holder against its cooperating contact spring, an electromagnet controlled by said circuit, an armature therefor, a hammer yieldingly carried thereby and adapted to impinge one side of the strip in the stripholder when the armature of the electromagnet is attracted, a dating device on the other side of the strip in the holder, and an inking strip between the strip and the dating device, the edgewise movement of the strip-holder allowing the dates recorded at each end of its travel to appear one over the other.

4. An apparatus for recording on a strip the beginning and end of an intervening period of time, comprising a supporting frame, a strip holder supported on said frame for edgewise movement and normally impelled into a mean position, an electric circuit including switches positioned to be engaged and closed by the holder when it is in either of its terminal positions, a dating device positioned in proximity to a strip carried by the holder, an electromagnetic means included in said circuit for momentarily forcing the strip into contact with the dating device when the circuit is closed by either of said switches.

5. In an apparatus for recording on a strip the beginning and end of an intervening period of time, a dating device comprising a plurality of impression wheels, a reducing gear between each two successive wheels, positively controlled by

the quicker moving wheel, means for locking the slower moving wheel with one of the numerals on it in front of the strip, means for yieldingly securing it to the slower gear of the corresponding reducing gear, and means carried by the quicker moving wheel for releasing the locking means when the next numeral on the slower wheel is ready to appear through the return thereof into normal angular relationship with the above mentioned slower gear.

6. An apparatus for recording on a strip the beginning and end of an intervening period of time, comprising a supporting frame, a strip holder supported on said frame for edgewise movement and normally impelled into a mean position, an electric circuit including switches positioned to be engaged and closed by the holder when it is in either of its terminal positions, a dating device positioned in proximity to a strip carried by the holder, electromagnetic means included in said circuit for momentarily forcing the strip into contact with the dating device when the circuit is closed by either of said switches, said dating device including an inking ribbon positioned in proximity to the strip in the holder and normally free from engagement with said strip.

7. An apparatus for recording on a strip the beginning and end of an intervening period of time, comprising a time controlled printing device, a strip holder mounted for edgewise movement in proximity to said printing device and adapted to receive and support a strip normally in a position free from engagement with the printing device, means for normally impelling the holder into its mean position, normally open electric switch elements operable by the holder and positioned to be closed thereby when the holder is moved from its mean to either of its terminal positions, a circuit including said switch elements and adapted to be closed thereby, a magnet included in said circuit, and a percussion member operable by said magnet to momentarily force the strip against the printing device when the holder is in either of its terminal positions.

8. An apparatus for recording on a strip the beginning and end of an intervening period of time, comprising a time controlled printing device, a strip holder mounted for edgewise movement in proximity to said printing device and adapted to receive and support a strip normally in a position free from engagement with the printing device, means for normally impelling the holder into its mean position, normally open electric switch elements operable by the holder and positioned to be closed thereby when the holder is moved from its mean to either of its terminal positions, a circuit including said switch element and adapted to be closed thereby, a magnet included in said circuit, and a percussion member operable by said magnet to momentarily force the strip against the printing device when the holder is in either of its terminal positions, the holder being movable in a direction perpendicular to the printed line, whereby the successive printings on the strip are arranged in column when the holder is moved to its respective terminal positions in succession.

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