(No Model.) 3 Sheets—Sheet 1.

F. B. WOOD.

ELECTRICAL RECORDING INSTRUMENT.

No. 420,850. Patented Feb. 4, 1890.

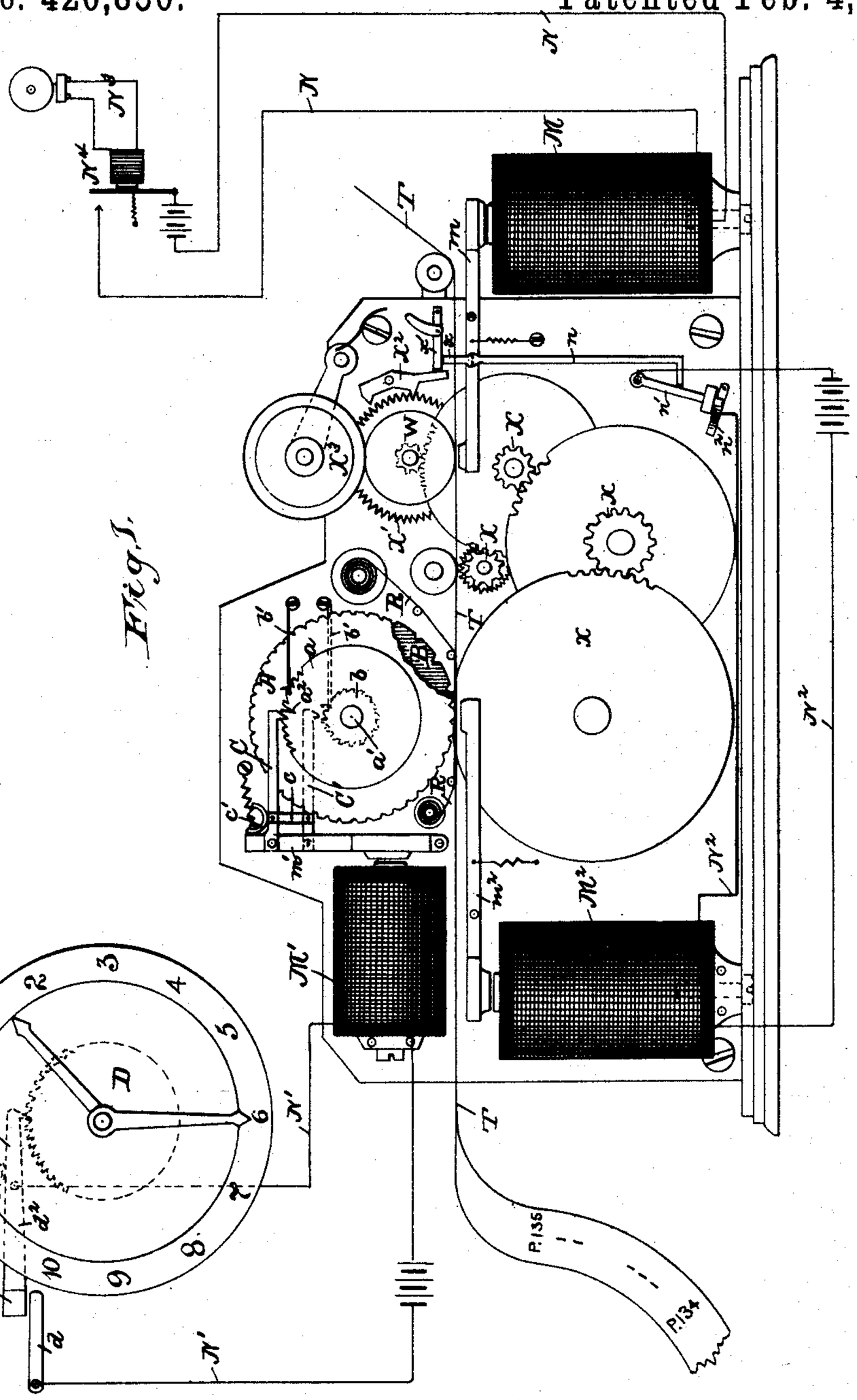


Fig. 1.

WITNESSES:

W. Benjamin

A. F. Fales.

INVENTOR

Frank B. Wood

BY Arden S. Fitch

His ATTORNEY

(No Model.) 3 Sheets—Sheet 2.

F. B. WOOD.

ELECTRICAL RECORDING INSTRUMENT.

No. 420,850. Patented Feb. 4, 1890.

Fig. 4.

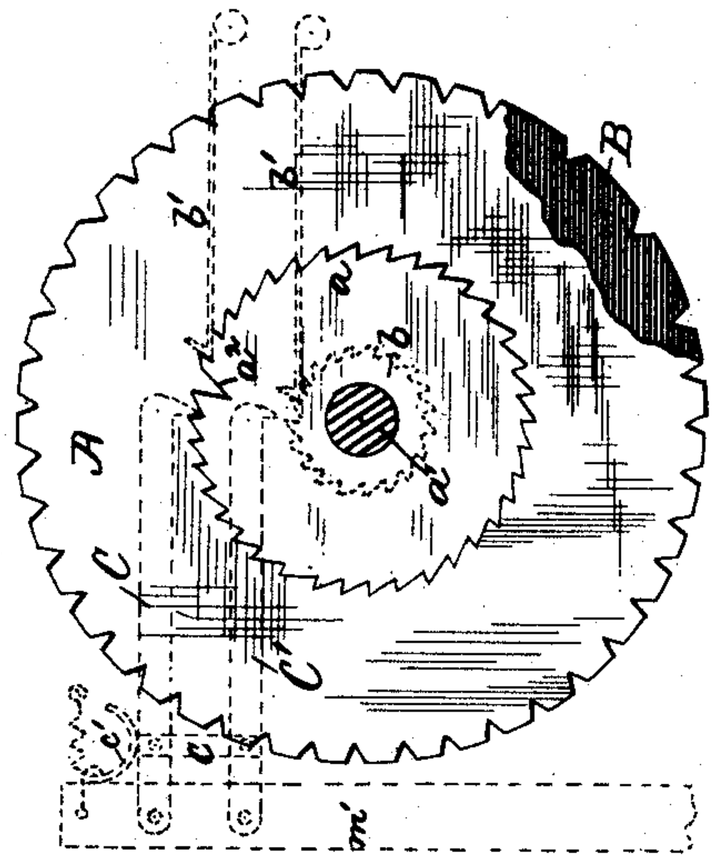


Fig. 3.

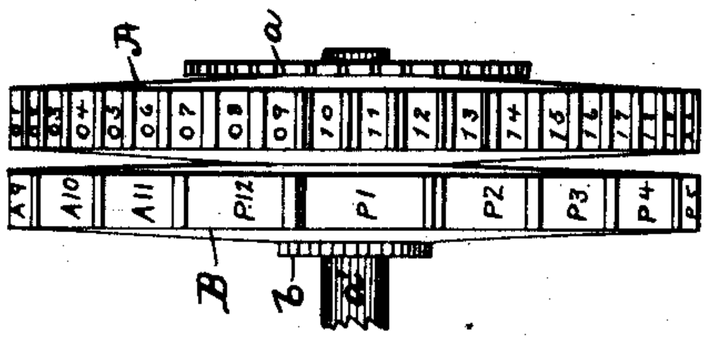


Fig. 2.

Fig. 6.

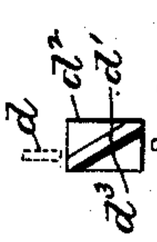
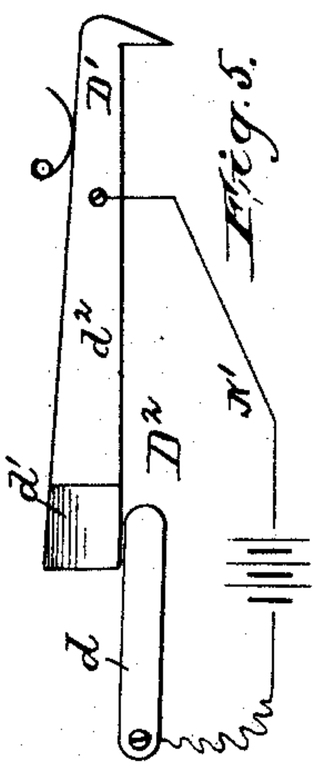


Fig. 5.



WITNESSES:

W. W. Benjamin

A. F. Hales.

INVENTOR

Frank B. Wood

BY

Arden A. Fitch

His ATTORNEY

(No Model.) 3 Sheets—Sheet 3.

F. B. WOOD.

ELECTRICAL RECORDING INSTRUMENT.

No. 420,850. Patented Feb. 4, 1890.

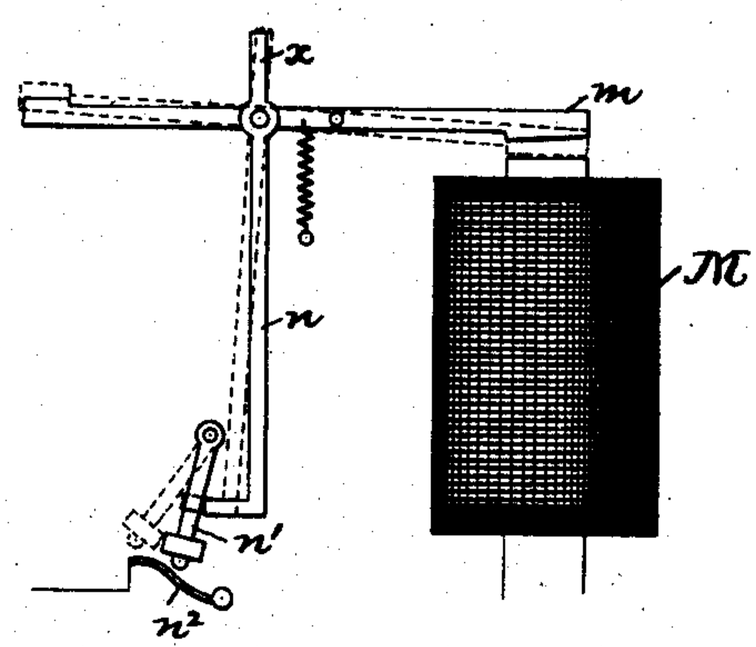


Fig. 1.

WITNESSES:

C. W. Benjamin

A. T. Tales

INVENTOR

Frank B. Wood

BY Arden A. Fitch

His ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK B. WOOD, OF NEW YORK, N. Y., ASSIGNOR TO THE E. S. GREELEY & COMPANY, OF CONNECTICUT.

ELECTRICAL RECORDING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 420,850, dated February 4, 1890.

Application filed May 9, 1889. Serial No. 310,110. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. WOOD, of the city, county, and State of New York, a citizen of the United States, have invented certain new and useful Improvements in Electrical Recording-Instruments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to electrical instruments which serve to record time as well as signals; and my invention consists in the devices and their combinations hereinafter described, and as more particularly recited in the claims.

Figure 1 is an elevation of an electrical recording-instrument containing my invention. Fig. 2 is a plan of the same. Fig. 3 is an enlarged edge view of my time-recording wheels and their ratchets. Fig. 4 is an enlarged side or face view of the same. Fig. 5 is an enlarged side elevation in detail of a circuit-closing device I employ to establish electrical connection between the clock mechanism or time-piece and the devices which actuate the time-recording wheels, and Fig. 6 is an end view in detail of said circuit-closing device. Fig. 7 is an elevation in enlarged detail of circuit-closing device n' n^2 seen in Fig. 1.

In the instrument shown in the drawings the signal-recording devices are in the usual and ordinary form. A tape T is carried by suitable rollers and passes under a signal-printing wheel W, said tape-rollers and printing-wheel being actuated by a clock-work train of gears and pinions X and an escapement or ratchet X′ and pallet X^2, and the printing-wheel having the usual inking-roller X^3. M is the signal-recording magnet, and m is its armature, working to the under side of the tape on the printing-wheel. The operation of these devices in recording a signal upon the tape is well known, and no claim is made herein for novelty in said devices.

My improved time-recording mechanism is as follows:

A is the minute-recording wheel, the periphery of which is formed or provided with a number of faces or divisions equal to the number of minutes which it is desired shall be recorded upon the tape at uniform intervals during each hour. Thus the wheel may have, as shown, sixty peripheral faces or divisions, whereby it is adapted to record each minute of the hour, or by giving it a less number of faces it may, as is evident, be adapted to record intervals of two, five, ten, fifteen, or other number of minutes during each hour.

B is the hour-recording wheel, which I provide with twenty-four peripheral faces or divisions, one for each hour of the day, and upon the faces which bear or name one succession of twelve hours I place a sign to indicate morning hours—namely, from midnight to noon—which sign is preferably the letter A, while upon the faces which bear or name another succession of twelve hours I place a sign to indicate afternoon hours—namely, from noon to midnight—which sign is preferably the letter P. I thus arrange upon a single hour-wheel the twenty-four hours of an entire day with suitable signs indicating the ante-meridian and post-meridian hours.

The minute-wheel A is provided with or has fixed upon it the ratchet-wheel a, which has a number of peripheral teeth equal to the number of faces or divisions on the said minute-wheel, as described. Similarly the hour-wheel B is provided with or has fixed upon it the ratchet-wheel b, which has a number of peripheral teeth equal to the number of faces or divisions on the said hour-wheel. The said ratchet-wheels a and b are formed with or given such diameters relatively to each other that, while each wheel bears the number of teeth heretofore stated, the teeth upon both said wheels shall be of the same or equal length and pitch. The said wheels A and B and their ratchets are mounted to revolve upon a common shaft a', fixed in the instrument-frame, and they are controlled by spring-detents b', as shown, one of which engages each of the respective ratchets a and b.

Upon the periphery of the ratchet-wheel a, carried by the minute-wheel A, and immediately beyond or forward of that tooth of the series thereon which is opposite to or corresponds with the face or division on said min-

ute-wheel indicating the final minute of the series thereon, is formed the deep notch a^2, as shown, for the purpose hereinafter set forth.

C and C′ are pawls which are pivoted to the armature m' of magnet M′, and are arranged relatively to the ratchets a and b so that they are adapted to respectively engage the same. The said pawls are pivotally united to each other by the cross-piece c, which is of such a length as to hold the pawl C′ free of engagement with the ratchet b during the time that the pawl C is traversing the series of teeth on the ratchet a, and until said pawl C enters the radial deep notch a^2 in said ratchet a, when the fall of said pawl into said notch will permit the pawl C′ to engage a tooth on the ratchet b. The pawl C is held to engagement of the ratchet a by a spring such as shown at c'.

D is a ratchet-wheel on the minute-shaft of a clock mechanism or time-piece, as shown, and having its peripheral teeth equal in number to that of the teeth on the ratchet a of the minute-recording wheel A. D′ is a pawl held to engagement with said ratchet D, preferably by a spring, as shown, and said pawl in its movement over each tooth of the ratchet D operates a circuit-closing device D^2 to close a local circuit N′, in which are said ratchet and pawl and the magnet M′. Now it is evident that at each closing of said circuit N′ by the movement of said pawl D′ over the teeth of the clock-ratchet the movement of the armature m' to its magnet M′ will carry the pawls C and C′ with it, and hence by the engagement of pawl C to one of the series of teeth on ratchet a cause the rotation of the minute-recording wheel A the distance of one face or division on its periphery, the pawl C′ being meantime, as heretofore described, held out of engagement with the ratchet b, and when the wheel A has completed one entire revolution the pawl C by dropping into the notch a^2 on ratchet a will permit the pawl C′ to engage a tooth on the ratchet b of the hour-recording wheel B, whereupon the closing of the circuit N′ by the succeeding movement of the pawl D′ over its ratchet D will cause a simultaneous rotation of both the wheels A and B the distance of one of the teeth on the ratchets of each. By this means the sums of the rotations of the minute-wheel A are indicated in hours on the peripheral faces of the wheel B, and the said wheels may be so arranged relatively to each other and the clock device that at all times the peripheral faces of the two wheels which are in line with each other immediately above the printing-point of the recording-tape T will indicate the hour and minute of time in correspondence with those indicated by the clock, so that an impression of the figures on said peripheral faces of the wheels A and B printed on said tape will at any time indicate the exact time at which said impression is printed.

By means of my described wheels A and B and their ratchets a and b, constructed and arranged as described, in combination with the pawls C and C′, as set forth, I am enabled to actuate both the said wheels A and B in a time-recording instrument by a single magnet and single local circuit and avoid the employment of intricate or duplicate mechanism for this purpose.

I have devised the circuit-closer D^2, which I find preferable to use in combination with the time-recording devices described. This circuit-closer is composed of a flexible leaf-spring d, constituting a contact-point, and a rigid metal tongue d', carried by a lever-arm d^2, which in this case is an extension or part of the pawl D′ beyond its pivot-point, as shown, and this tongue d' is permanently inclined to the vertical axis of the spring d, and is arranged to project into and swing or move on its pivot through the plane of said spring, as shown in Figs. 5 and 6. The under face of the inclined tongue d' is insulated or has a surface of insulating material, as shown at d^3.

The operation of this circuit-closer is as follows: As the inclined tongue d' is swung downward on its pivot, which in this case is effected by the pawl D′ riding upward to the top edge or point of a tooth on the revolving ratchet D, the under or insulated face d^3 of said tongue engages and is traversed by the free end of the spring d, the said spring being by the pressure thereby exerted upon it flexed or deflected laterally during and permitting said downward swing of said tongue. When the tongue d' is swung or oscillated reversely or upwardly on its pivot, which in this case is effected by the descent of the pawl D′ from the point of one tooth of the ratchet D to the bottom of the next tooth, the upper or naked face of the tongue d' engages and is in electrical contact with and is traversed by the spring d, said spring being by the pressure thus exerted upon it flexed or deflected laterally reversely to its first-described movement during and permitting said upward swing of said tongue. The tongue d' and spring d are so proportioned relatively to each other and the tongue d' is swung or moved in its upward and downward oscillations through such an arc or distance that at the conclusion of each said oscillation the tongue and spring are disengaged and the resiliency of the spring returns its free end to a position immediately above or below the tongue, as shown in Fig. 6. By means of these devices I am enabled, when the tongue d' is given a quick upward oscillation on its pivot—as, for example, by the operation of the pawl D′ over the teeth of the ratchet D—to establish a quick and effective electrical contact between the tongue d' and spring d, thus constituting a circuit-closer which is especially serviceable in electrical instruments where a quick electrical connection is demanded, and particularly in a time-recording instrument, substantially as herein described.

M^2 is a magnet in a local circuit N^2, as

shown, and the armature m^2 of which serves to effect the printing of the time-indices on the wheels A and B upon the tape T, preferably through the medium of an ink-ribbon R, interposed between the wheels and the tape, substantially as shown.

When a signal is transmitted to the instrument by a succession of breaks in the main-line circuit N^3 and the local circuit N, in which is the magnet M, is correspondingly closed by the relay N^4, the armature m of said magnet M, which prints the signal upon the tape at the same time that it operates to release the pallet X^2 by means of an arm x on said armature engaging a detent-lever x', as indicated, and so setting the signal-printing devices in motion, will also by means of an arm n, fixed on said armature m and arranged substantially as shown, operate to close the circuit N^2 by the engagement of said arm n with the swinging contact-lever n'. Said contact-lever n' is so proportioned, pivoted, and weighted that when in normal position it is to one side of and away from a spring contact-point n^2, and the local circuit N^2 is thus open, and that when the arm n is drawn upward by the armature m it will lift the lever n' to and across and beyond the point n^2. The closing of the circuit N^2 by the momentary contact of n' and n^2 will actuate the armature m^2, and thus effect the printing of the time upon the tape T from wheels A and B in advance of the impression of the signal upon said tape by wheel W and armature m, and during the vibrations of armature m in printing the signal the arm n will operate to sustain the lever n' above and beyond and from contact with the point n^2. When the signal is thus printed, and the circuit N is therefore again open, the downward vibration to its limit of the armature m will cause the arm n to permit the lever n' to again have momentary contact with the point n^2 as it crosses it in the return of said lever to its normal position, whereupon the circuit N^2 will be again momentarily closed and the time be again imprinted upon the tape from the time-wheels by the actuation of armature m^2.

I regard this operation of closing the circuit N^2 momentarily both before and after the signal is printed, and consequently the printing of the time upon the recording-tape before and after the signal-impressions, as very desirable, as the exact time of the recording the signal may thus be fixed upon the tape. In the drawings I show upon the tape the signal "32," with the time-indication of "P. 1.34" immediately preceding the signal-impression, and the time-indication of "P. 1.35" immediately following the signal, as illustrating that such signal was received and recorded between thirty-four and thirty-five minutes past one o'clock in the afternoon. I do not limit myself, however, to the employment, in connection with the signal and time-recording devices named, of the arm n, lever n', and point n^2 to close the circuit N^2, as any well-known circuit-closing device may be employed in such connection for this purpose, and may effect the closing of the circuit N^2 either before or after, or both before and after, the printing of the signal, so that the time may be printed only before or after, or both before and after, said printing of the signal.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an electrical time-recording mechanism, the combination of independently-revoluble time-indicating wheels A and B, provided, respectively, with ratchets a and b, said ratchet a having the peripheral notch a^2, and pawls C C', pivoted to an armature m', and provided with a uniting pivotal cross-piece c, and adapted to respectively engage said ratchets, substantially as and for the purpose set forth.

2. In an electrical time-recording mechanism, the combination of independently-revoluble time-indicating wheels A and B, provided, respectively, with ratchets a and b, said ratchet a having the peripheral notch a^2, pawls C and C', pivoted to an armature m' of a magnet M' and united by a pivotal cross-piece c, and adapted to respectively engage said ratchets, a ratchet D in and actuated by a time-piece, a pawl D', engaging and operated by said ratchet, said ratchet and pawl being in electrical circuit with said magnet, and a circuit-closer operated by said pawl, substantially as and for the purpose set forth.

3. In an electrical time-recording mechanism, the combination, with a revoluble minute-indicating wheel and its actuating-ratchet, of an independently-revoluble hour-indicating wheel B, adapted to be rotated through the distance of one of its peripheral faces at the conclusion of each complete revolution of said minute-indicating wheel and having upon its periphery twenty-four uniform divisional faces, upon each face of a successive series of which throughout one half the circumference of the wheel is fixed index-type indicating ante-meridian hours, and upon each face of a successive series of which throughout the other half of the circumference of said wheel is fixed index-type indicating post-meridian hours, substantially as and for the purpose set forth.

4. In an electrical time-recording mechanism, the combination, with time-indicating wheels A and B, provided, respectively, with actuating-ratchets a and b, said ratchet a having the peripheral notch a^2, and pawls C and C', respectively engaging said ratchets and united by a pivotal cross-piece c and pivoted to an armature m' of a magnet M' in electrical circuit with a time-piece, of a magnet M^2 in a separate electrical circuit, and its armature m^2, adapted to impinge upon the periphery of both of said time-indicating wheels simultaneously, substantially as and for the purpose set forth.

5. In an electrical recording mechanism, the combination, with the revoluble time-recording wheels, provided, respectively, with ratchets *a* and *b*, and pivotally-united pawls C C′ and their actuating-magnet M′ and its armature *m′*, to which said pawls are pivoted, and an armature m^2 of a magnet M^2, working to the periphery of both said time-wheels, of a signal-recording mechanism and an arm *n*, fixed to the armature *m* of a magnet M, which actuates said signal mechanism, a swinging lever *n′*, engaged by said arm, and a contact-point n^2, located in the path of said lever, said lever and point being in an electrical circuit with said magnet M^2, substantially as and for the purpose set forth.

6. The combination, in an electrical circuit, of a leaf-spring *d*, constituting a contact-point, a rigid metal tongue *d′*, constituting a circuit-closer, projecting into the plane of said spring and inclined to the vertical axis thereof, an insulated face d^3 on said tongue, and a lever d^2, carrying said tongue and adapted to oscillate the same across and in both directions beyond the free end of said spring in the plane thereof, substantially as and for the purpose set forth.

7. The combination, in an electrical circuit, of a leaf-spring *d*, constituting a contact-point, a rigid metal tongue *d′*, constituting a circuit-closer, projecting into the plane of said spring and inclined to the vertical axis thereof, an insulated face d^3 on said tongue, and a lever d^2, carrying said tongue, together with a revoluble ratchet D and its pawl D′, which is carried by and actuates said lever d^2, and a magnet M′ and its armature *m′* in said circuit, substantially as and for the purpose set forth.

FRANK B. WOOD.

Witnesses:
MILES W. GOODYEAR,
A. S. FITCH.