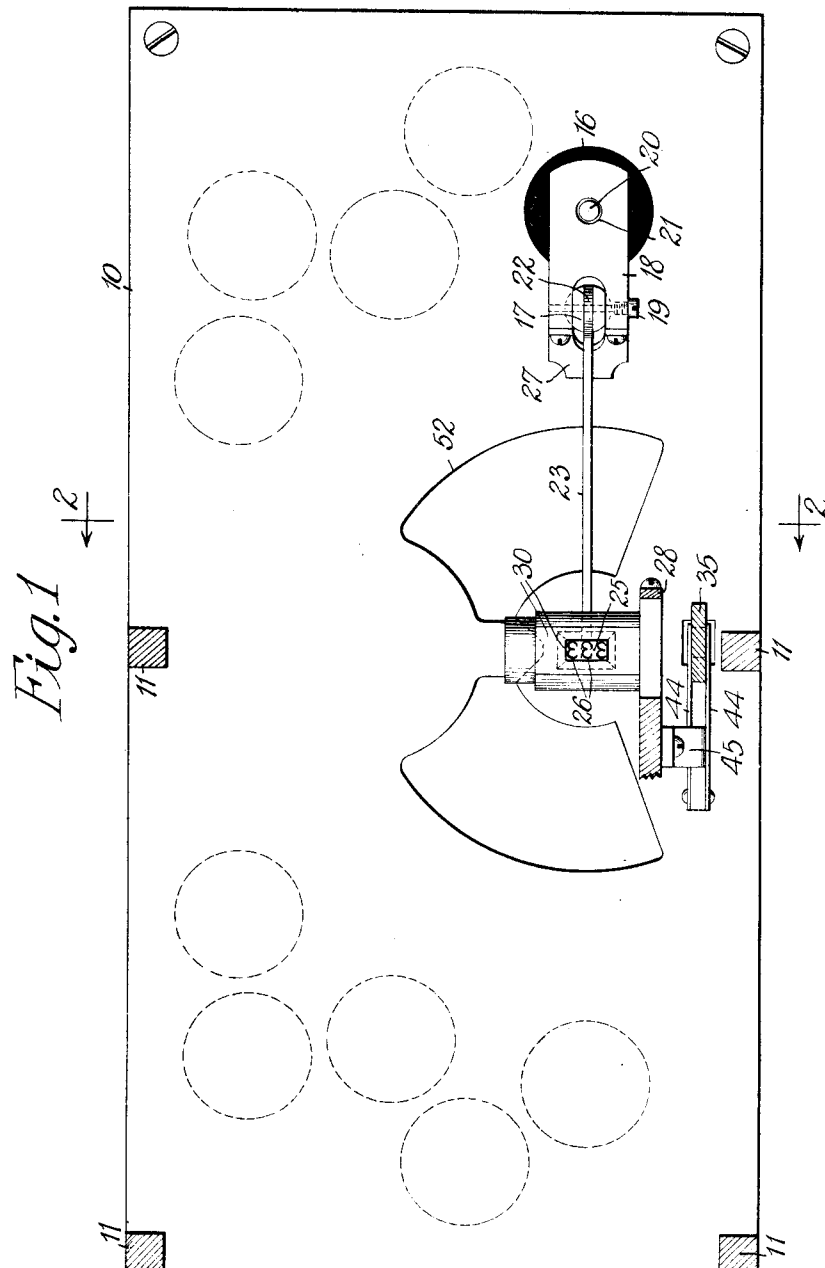


A. L. SOHM.
ELECTRICAL RECORDING APPARATUS.
APPLICATION FILED MAY 11, 1911.

1,055,949.

Patented Mar. 11, 1913.

4 SHEETS—SHEET 1.



Witnesses:
Leonard W. Novander
Robert F. Biacke

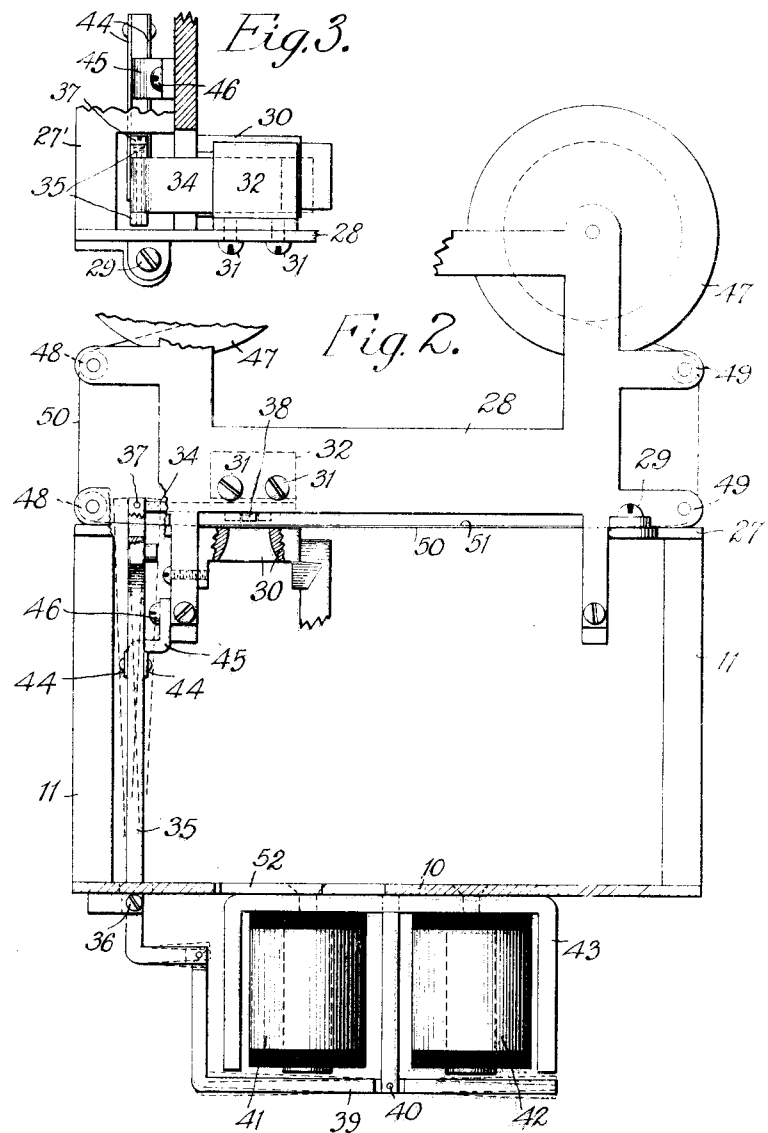
Inventor
Alfred L. Sohm
By *Proven Williams*
Attorneys

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4 SHEETS-SHEET 2.



Witnesses
Leonard W. Novander.
Robert F. Bracke

Inventor
Alfred L. Sohm
By *Brown & Williams*
Attorneys

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4 SHEETS—SHEET 3.

Fig. 5.

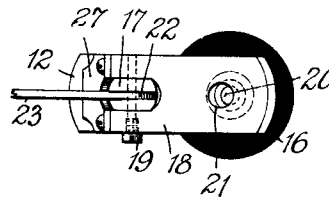
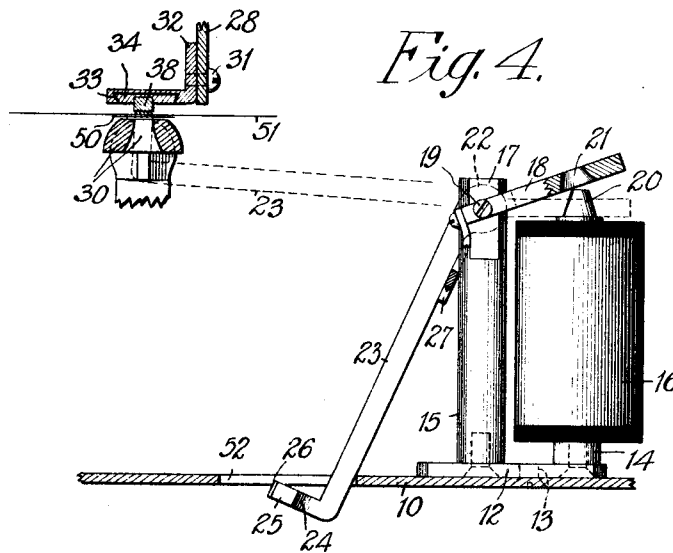


Fig. 4.



Witnesses:
Leonard W. Novander.
Robert F. Bracke

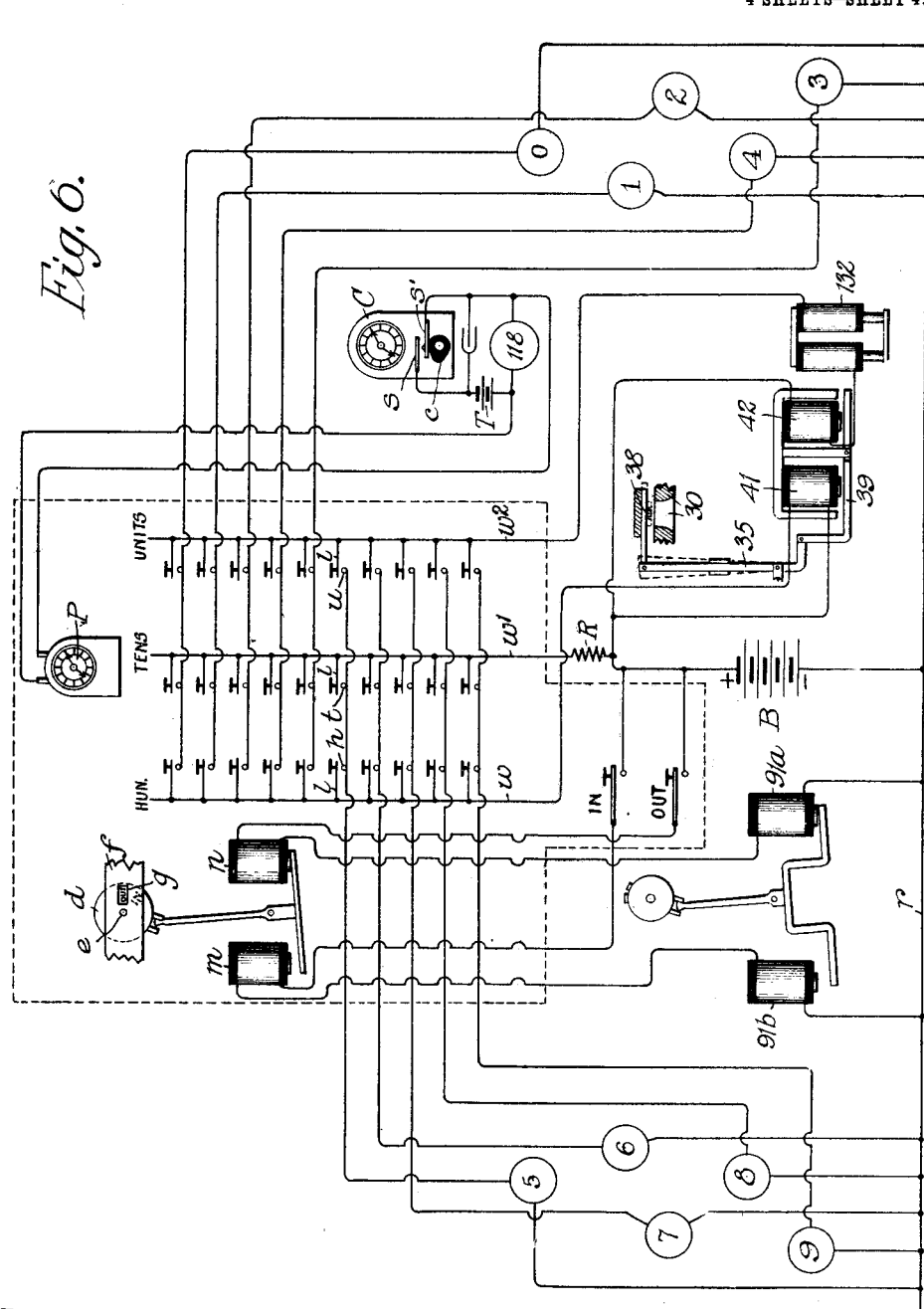
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4 SHEETS—SHEET 4.



Witnesses:
Leonard W. Novander.
Robert F. Bracke

Inventor:
Alfred L. Sohm
By *Primmer & Williams*
Attorneys

UNITED STATES PATENT OFFICE.

ALFRED L. SOHM, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO SOHM ELECTRIC
SIGNAL & RECORDING COMPANY, OF SPOKANE, WASHINGTON, A CORPORATION
OF ARIZONA.

ELECTRICAL RECORDING APPARATUS.

1,055,949.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed May 11, 1911. Serial No. 626,420.

To all whom it may concern:

Be it known that I, ALFRED L. SOHM, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Electrical Recording Apparatus, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric recording apparatus and, more particularly, is concerned with that kind of apparatus which makes a record of the time of day simultaneously with other circumstances and events which are to be permanently noted.

My invention may be considered as an improvement on the device illustrated and described in my copending application, Serial No. 603,621, filed January 20, 1911.

My invention as a whole has to do with the so-called "in and out" registers which are used in large industrial establishments where many workmen are employed. The registration identifies each particular employee and is accompanied by the registration of the time of day. In some instances, the registration is further supplemented by a positive notation as to whether the employee is entering or leaving the premises.

The device of my invention is operated electrically and this is consistent with the important feature thereof that the operating board or "entrance plate", as I term it, may be disposed at the workmen's entrance to an industrial establishment, while the recording mechanism, *per se*, may be disposed in the office or some convenient place for the person in charge of the record sheet. The operating board or entrance plate comprises a number of switches for controlling circuits which include electromagnets for operating the printing mechanism, as will be described. The electromagnets which are operated to identify the employees, and the directly associated printing mechanism, are the features of my present invention. It is in these respects that my present device differs from my former one.

In making a registration, the employee successively operates certain switches on the entrance plate so that the corresponding

printing magnets will be operated. Each of these electromagnets is provided with a type bar and, when the electromagnet is energized, the type piece is drawn up against the record sheet quite in the manner of the operation of the typewriter. It will appear that sometimes a particular digit is printed in the units column, by the energization of the corresponding electromagnet, that sometimes it is printed in the tens column, and that sometimes it is printed in the hundreds column. One of the features of my invention is directed toward the means for determining which of these columns the digit is to be printed in. Consistently with the particular means for determining the position of the printed digit, I provide a novel mechanism whereby the type piece is actuated upon the energization of the electromagnet. In my former application, referred to, each type bar was provided with one type and the type bar itself was loosely associated with the electromagnetically operated mechanism so that independent means could be provided for shifting the bar from side to side so as to direct the type to the proper column. In my present invention, however, the type bar is designed to operate always in the same plane—and this is the better mechanical arrangement—and means is provided for shifting a small platen so that any one of three type carried by the type bar may be made effective. The relation between the armature of the electromagnet and the typebar forms the further subject-matter of my invention. By the particular structure which I propose, the type bar is given a sharp hammer blow upon the energization of the electromagnet, the structure being simple and consisting of few parts.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the parts particularly involved, parts being removed to clearly reveal the construction; Fig. 2 is a view taken on the line 2—2 of Fig. 1; Fig. 3 is a plan view of some of the parts shown in Fig. 2, which are not shown in Fig. 3; Fig. 4 is an elevational view of the electromagnet and the directly associated parts; Fig. 5 is a plan view of the electromagnetic mechanism, showing the movable parts in

a different position from that of Fig. 1; and Fig. 6 is a diagrammatic view showing the entire system.

Like reference characters are applied to the same parts throughout the various figures.

Referring first to the structural embodiment of my invention, it will be seen that the various parts are mounted upon a base 10 which, toward one side thereof, is provided with four pillars, 11, 11 which support a shelf carrying the paper advancing mechanism and the directly associated parts. The present invention is concerned with the means for making the particular registration identifying the employee and the description will be therefore confined to this feature.

The various so-called "printing electromagnets" are mounted vertically upon the base 10. One of them has been shown in full and the entire arrangement has been indicated by the dotted circle. I shall first describe the detailed construction of these printing electromagnets, referring particularly to Figs. 1, 4 and 5. A base plate 12 is secured to the main base 10 by means of a screw 13 and this supplementary base is provided with the two upward extensions 14 and 15. The base 12 and the extensions are of magnetic material and this magnetic circuit is closed by the armature as will be presently described. The upward extension 14 is in the form of a cylindrical post which carries an energizing winding 16. The upward extension 15 is cylindrical except at the top where it has the flattened sides 17. The armature 18 is mounted upon the post 15, embracing that part of the post which has the flattened sides and being pivoted thereto by means of a pin 19 extending inwardly from a screw secured in the armature. The top of the core 14 is provided with a central conical portion 20 which is adapted to enter into a correspondingly shaped aperture 21 in the armature 18, when the armature is brought down to the core upon the energization of the electromagnet. The top of the post 15 is bifurcated for the reception of the hub 22, of the type bar 23, which is mounted upon the pivot pin 19. The end of the type bar 23 is provided with a toe 24 which carries the type piece 25 having three types 26, 26. The rear end of the armature is provided with a tail piece 27, extending downwardly therefrom and suitably cut out so as to embrace the post 15 more or less when the armature is in its raised position. With this arrangement of parts, the type bar 23 can rest down upon the tail piece, as best shown in Fig. 4, and when the winding 16 is energized, the attraction of the armature 18 will result in the raising of the tail piece 27 and the consequent movement of the type bar 23. The

type bar 23 is loosely mounted relative to the pin 19 and it follows that when the armature is suddenly attracted, the transmission of the movement from the tail piece to the type bar will be in the form of a kick or hammer blow, so that even though the movement of the armature may stop, by its striking the top of the core 14, the type bar may continue upwardly into the position shown in dotted lines in Fig. 4. The shelf or secondary base which the pillars 11, 11 support, is illustrated at 27, the forward end of this shelf being provided with a vertical frame piece 28 secured thereto by means of screws 29, 29. The framework carries a box 30, into which the type bar is adapted to be thrown, as will be described, and above this box, the vertical frame piece 28 has secured thereto, by means of screws 31, a bracket 32. The under side of this bracket is provided with a dove tail slot 33 in which a slide piece 34 is mounted, as clearly illustrated in Fig. 4, this slide piece operating from side to side over the box 30 as is evident from Fig. 2. A shifting lever 35 is pivoted to the base 10 at 36, passing through a suitable opening in the base, and, at its upper end, is pivotally connected, at 37, to the slide piece 34. The upper end of the shifting lever 35 is widened and is bifurcated for the reception of the slide piece 34 between the resulting tangs. Upon its under side, the slide piece 34 is provided with a small platen 38, which is of width approximately equal to the overall width of one of the type on the type bar. As indicated in dotted lines in Fig. 2, it will be seen, that by the movement of the slide piece 34, the platen 38 is adapted to occupy three positions, such positions being in regular side by side order over the box 30. The shifting lever 35 extends downwardly from its pivot 36 where it is pivotally connected with the oscillating armature 39, pivoted at 40 between two electromagnets 41 and 42, mounted upon a frame piece 43 secured to the under side of the base. The linkages which have been described are such that when the armature 39 is in its normal position, the platen 38 will occupy the central position relative to the printing area in the box 30. The parts are normally held in this neutral position by means of a pair of leaf springs 44, 44 which extend from a bracket 45 secured to the framework by means of a screw 46, as best shown in Figs. 1 and 2. The two springs normally neutralize each other so that the shifting lever 35 is held in a central position and so that, consequently, the armature 39 is held in a position where it is subject to movement by the energization of either of the electromagnets. The three positions of the kinematic chain are all indicated, two of them being shown in dotted lines. When the magnet 41 is energized the

platen 38 occupies the left hand position (Fig. 2), and when the magnet 42 is energized, it occupies the right hand position. One of these abnormal positions is the "units" position, and the other is the "hundreds" position. The platen normally remains in the "tens" position. The upright supporting frame 28 carries the ribbon rolls 47, 47 and the ribbon, passing from one to the other, passes over the idlers 48, 48, between the tangs of the bifurcated end of the lever 35, under the sliding piece 34, between the platen 38 and the box 30, onto other idlers 49, 49. The ribbon is supplied with the reference characters 50 and the paper, which in this instance travels at right angles to the travel of the ribbon, is indicated at 51; this strip of paper passing between the ribbon and the platen. As before stated, the various printing electromagnets, arranged on the base 10, are all of the same construction. In order that the type carried thereby may always properly rise into the printing area, the toe 24 may be twisted one way or the other to compensate for any offset in the position of the printing magnet itself. There are ten of these printing magnets, one for each digit, five being preferably located on each side of the printing area. The box 30 is flared so as to guide the printing piece which carries the type properly into the printing line, thus providing against inaccuracies due to lost motion and the bending of the type bar. In order that the various bars may clear each other, the base is provided with openings 52, 52 into which the lower end of the type bars may rest, as illustrated in Fig. 4. The present invention is not concerned with the means for printing the time of day and the means for advancing the paper strip so, therefore, the illustration of such parts is omitted. It will be understood that means are provided for these various purposes and they will be taken up in a general way when the entire system is described.

I shall now refer to Fig. 6 and describe the operation of my system. The parts carried by or with the "entrance plate" are inclosed in the dotted line in this figure. The other parts, except the master clock and its associated parts, and the battery, are parts of the machine which has been described in detail. The battery can be disposed anywhere and so can the master clock with its directly controlled elements. The circuit wires of course can be of any length. The circles with the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 indicate the various printing magnets 16. The entrance plate is provided with three series of ten switches each, one series constituting the hundreds column, the second constituting the tens column, and the third constituting the units column. Each of these switches is adapted to close a circuit

through the main battery B and one of the printing magnets 16. The circuit of each of the printing magnets is adapted to be closed by three switches, one in each column. It will suffice to give a detailed explanation of the circuit of one printing magnet since the same applies to all. It will be seen for instance that one terminal of printing magnet No. 5 is connected with the common return wire r which leads to the negative pole of the battery B, while the other terminal of this printing magnet is connected with three contacts h , t and u . The contact h is adapted to be engaged by the switch lever l of the hundreds wire w , the contact t is adapted to be engaged by the switch lever l of the tens wire w' and the contact u is adapted to be engaged by the switch lever l of the units wire w^2 . The tens wire w' is connected with the positive pole of the battery through the resistance R. The units wire w^2 is connected with the positive pole of the battery through the electromagnets 132 which, for convenience, I shall term the "impression" magnets, and the unit magnet 42 which has heretofore been described. The hundreds wire w is connected with the positive pole of the battery through the hundreds magnet 41 which has hereinbefore been referred to. When it is desired to print "5" in the hundreds column the switch lever l of the hundreds column is depressed to close the circuit through the hundreds magnet 41, through the battery B and through the printing magnet No. 5. The energization of the magnet 41 will bring the platen 38 over into the hundreds position, as has been described, and the energization of the printing magnet No. 5 will cause the type bar No. 5 to be actuated and, as has been described, this type bar will have a type "5" for engaging the platen in that position. When it is desired to print a "5" in the tens column the lever l in the tens column is operated and the circuit is closed through the printing magnet No. 5, the battery B, and the resistance R. The resistance R is provided since the current which is used is of sufficient strength to operate one of the printing magnets, one of the shifting magnets 41 or 42, and the impression magnets 132, simultaneously, and since in the instance of the tens impression these last-named magnets are not used, the entire current will otherwise be confined to the printing magnet alone. As has been described, the normal position of the platen 38 is the tens position and when it is desired to print a figure in the tens column it is unnecessary therefore that this platen be moved and the type bar will print in the tens column. When it is desired to print a "5" in the units column the switch l of the units column is operated and the circuit is closed through the impression magnets 132, the units magnet 42, the battery B,

and the printing magnet No. 5. The energization of the electromagnet 42 brings the platen 38 over into the units position, as has been described, and the energization of the printing magnet No. 5 causes the actuation of the associated type bar which has a type for the platen in that position. The energization of the impression magnets 132 causes the printing of the time of day, and the "in" or "out" indication. This actuation also results in the advance of the paper strip. The entrance plate is also provided with a switch marked "In" and a switch marked "Out" and these switches control the circuits through the electromagnets 91^a and 91^b, respectively. It will appear that it is not always necessary to operate these switches. If a person desiring to make a registration finds that the "in and out" wheel is already in the proper position he need pay no attention to these switches and may proceed at once to record his number. In order that such a person may be advised of the position of the "in and out" wheel I provide an indicator on the entrance plate, such as diagrammatically shown in the figure under consideration. The disk *d* pivoted at *e* is provided at different points near its periphery with the indications, "Out" and "In." This disk is disposed behind the bar *f* which has a window *g* through which either one of the notations referred to may be exposed. This disk *d* is adapted to be operated in unison with the "in and out" wheel by means of the magnets *m* and *n*. The electromagnet *n* is in series with the electromagnet 91^a and with the "out" button and the battery, and it is clear that when this button is depressed both electromagnets will be energized and, unless the wheel and the disk are already in that position, the "out" characters will be brought into the printing line and the "out" indication will be made at the entrance plate. The analogous operation takes place in the case of the magnets *m* and 91^b which are similarly related and controlled.

The master clock is indicated at C and the insulating cam *c* is adapted to make one revolution per minute. A change in this period is immaterial. The cam *c* operates to make intermittent engagement between the contact springs *s* and *s'* and the circuit which these springs control includes the local battery T and a time printing magnet 118 which operates the time printing mechanism. A condenser may be connected across the springs *s* and *s'* to cut down the sparking. A secondary clock P may also be controlled by contacts *s* and *s'* and may be disposed upon the entrance plate.

I have deemed it wise to describe the operation of the various parts of my machine and system as the description of the structure went along and I consider it un-

necessary therefore to append a detailed summarization of the operation. Suffice it to say that when a person, to whom the number 374, for instance, is assigned, desires to make an entry, he approaches the entrance plate and looks to see if the "in and out" indication is proper. If it is not he presses either the "in" or "out" button to make it so. He then presses and releases the fourth button from the top in the hundreds column and the figure "3" is printed on the record sheet. He then presses and releases the eighth button from the top in the tens column and the figure "7" is printed on the record, after the figure "3." He then presses the fifth button from the top in the units column and the figure "4" is printed on the record, after the figure "7." At the same time the movable platen comes down and prints the date and the time as indicated by the register wheels, this time being the same as indicated by the master clock and the secondary clock. Upon releasing this last button the inking ribbon is advanced and the paper is also advanced. If, by mistake, the person presses the fourth button from the top in the units column instead of the fifth button from the top, he, upon discovering the mistake, immediately presses the mistake button, and the record is canceled. He then proceeds to make an entirely new registration. The record is as follows:

374 IN JAN 5 8 43 AM 1911

I claim as new and desire to secure by Letters Patent:

1. In a recording device, in combination, an actuating type bar carrying a plurality of printing characters, a platen of substantially the same width as one of said characters, and means for shifting said platen.
2. In a recording device, a type bar operating in a single plane, a plurality of printing characters on said type bar, a platen of substantially the same width as one of said characters, and means for shifting said platen.
3. In a recording device, in combination, an actuating type bar operating in a single plane, a plurality of type characters disposed side by side on said type bar, a platen of substantially the same width as one of said characters, and electromagnetic means for shifting said platen into position corresponding to any one of said characters.
4. In a recording device, in combination, an actuating type bar operating in a single plane, three type characters mounted side by side at the end of said type bar, a platen with which said type bar coöperates, said platen being of substantially the same width as each of said characters, the normal position of said platen being in alinement with the middle type character, and electro-

magnetic means for shifting said platen to one side or the other into position in alinement with either of the other characters.

5 5. In a recording device, an electromagnet, a pivoted armature for said electromagnet, a type bar pivoted independently of said armature, means carried by said armature for engaging said type bar to strike it a hammer blow when the electromagnet is energized, and a platen for coöperation with said type bar.

10 6. In a recording device, in combination, an electromagnet, an armature for said electromagnet pivoted upon a spindle, a type bar independently mounted upon said spindle, means on said armature for engaging said type bar to give it a hammer blow when the electromagnet is energized, and a platen for coöperation with said type bar.

20 7. In a recording device, an electromagnet with a vertical core, a vertical standard of magnetic material mounted adjacent said electromagnet, said standard and the core of said electromagnet being connected together at the lower end, an armature pivoted upon a spindle at the top of said standard, said armature being adapted to close the magnetic circuit with the core, a type bar mounted upon said spindle, and a tail on said armature for engagement with said type bar to give it a hammer blow when the electromagnet is energized, and a platen for coöperation with said type bar.

30 8. In a recording device, in combination, a standard, a type bar mounted upon a spindle in said standard to operate in a single plane, an electromagnet mounted next to said standard, an armature for said electromagnet mounted upon said spindle, means on said armature for engaging said type bar to give it a hammer blow when said electromagnet is energized, a plurality of characters on said type bar, and a platen

for coöperation with said characters, and means for shifting said platen to confine it to alinement with any one of said characters.

9. In a recording device, an electromagnet, a pivoted armature for said electromagnet, a type bar pivoted independently to said armature, a plurality of printing characters on said type bar, mechanism secured to said armature for engaging said type bar to strike it a sharp blow when the electromagnet is energized, and a platen for coöperation with said type bar.

10. In a recording device, an electromagnet, a pivoted armature for said electromagnet, a type bar pivoted independently of said armature, a plurality of printing characters on said type bar, mechanism secured to said armature for engaging said type bar to strike it a sharp blow when the electromagnet is energized, a platen for coöperation with said type bar, and devices for shifting said platen.

11. In a recording device, the combination of a type bar operating in a single plane, a plurality of printing characters on said type bar, a platen of substantially the same width as one of said characters, and mechanism for moving said platen so that it may occupy any one of a plurality of positions.

12. In a recording device, the combination of a type bar operating in a single plane, a plurality of printing characters on said type bar, a platen of substantially the same width as one of said characters, and mechanism for moving said platen so that it may be held in any one of three positions.

In witness whereof, I hereunto subscribe my name this 5th day of May, A. D., 1911.

ALFRED L. SOHM.

Witnesses:

ARTHUR H. BOETTCHER,
ALBERT G. MCCOBB.