

W. L. GREEN & W. S. EATON.

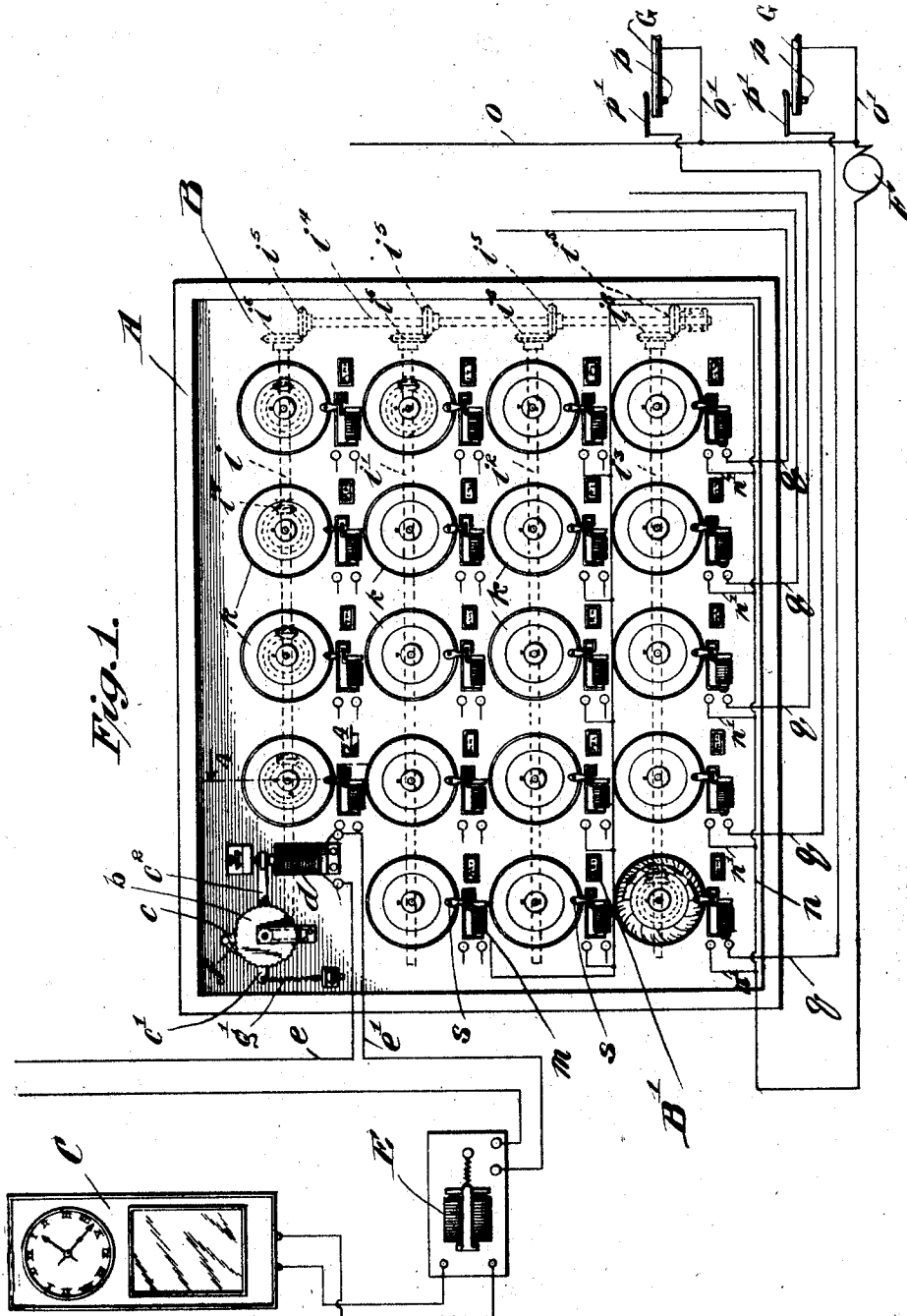
TIME RECORDER.

APPLICATION FILED AUG. 25, 1906.

Patented Mar. 14, 1911.

2 SHEETS—SHEET 1.

986,457.



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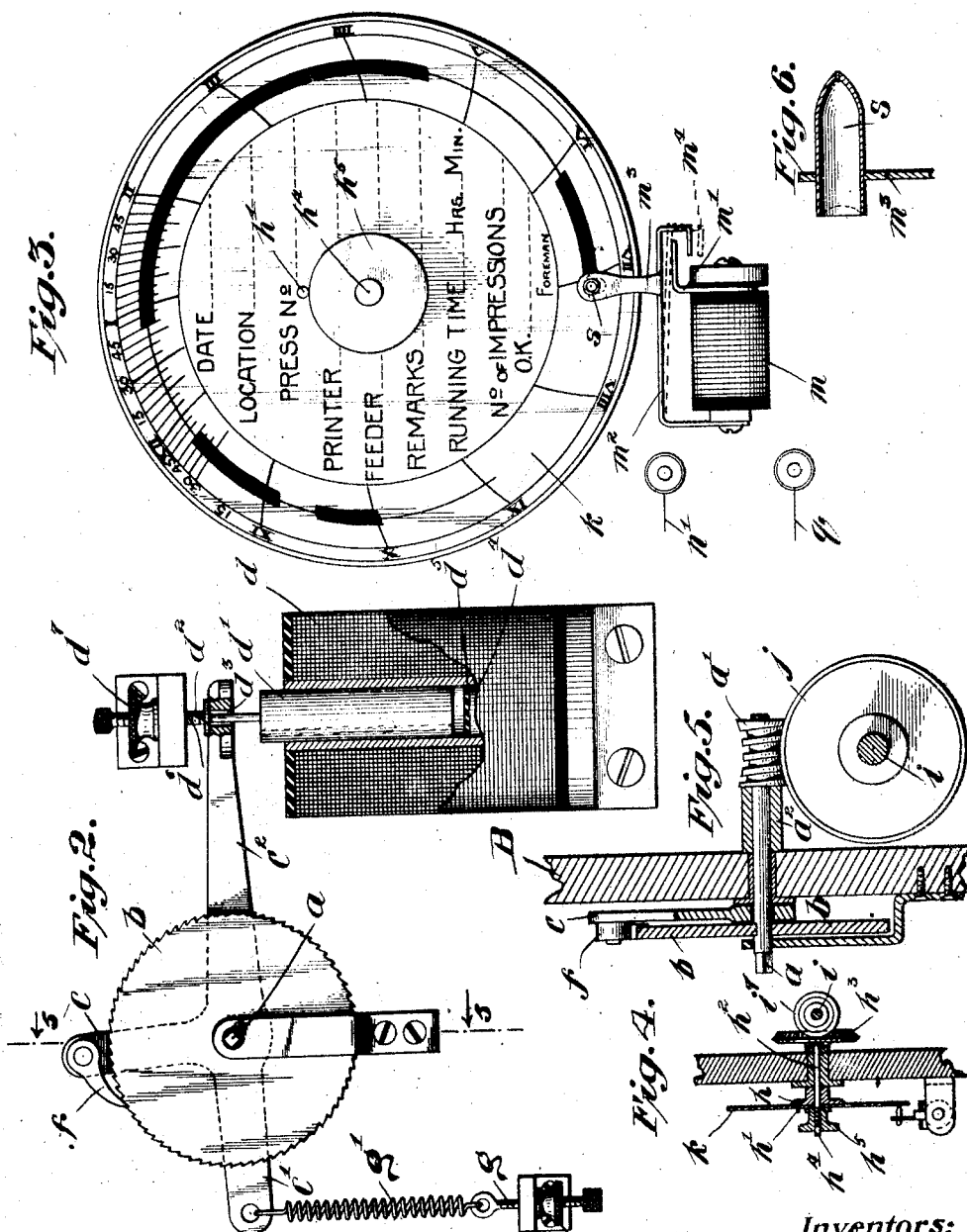
Inventors:
Warren L. Green
William S. Eaton
by *Frothingham & Westworth*
their Attys

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TIME RECORDER.
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Attest:
[Signature]
J. C. Samson.

Inventors:
William L. Green
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UNITED STATES PATENT OFFICE.

WARREN L. GREEN, OF NEW YORK, AND WILLIAM S. EATON, OF SAG HARBOR, NEW YORK, ASSIGNORS TO AMERICAN BANK NOTE COMPANY, A CORPORATION OF NEW YORK.

TIME-RECORDER.

986,457.

Specification of Letters Patent. Patented Mar. 14, 1911.

Application filed August 25, 1906. Serial No. 332,038.

To all whom it may concern:

Be it known that we, WARREN L. GREEN and WILLIAM S. EATON, both citizens of the United States, and residents, respectively, of the borough of Manhattan, in the city, county, and State of New York, and of Sag Harbor, in the county of Suffolk and State of New York, have jointly invented certain new and useful Improvements in Time-Recorders, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

Our invention relates to time recorders and more particularly to a class of electric time recorders adapted to time the starting of a machine and the duration of the run thereof.

The main object of the invention is to provide a time recorder, the dials or other record sheet and the marker of which may be located in the office or other point of supervision of an establishment employing printing presses or other machines and be so connected with a machine or machines, as to cause the operation of said machine or machines to actuate said marker in a manner to produce a complete record of the time of starting, and the duration of the run of said machine or machines.

A further object is to provide a time recorder of this character wherein the relative location and operation of the dial or other record sheet and the marker will be such as to record on the dial or record sheet, those periods when the machine is not running as well as those when it is, thus insuring a complete accurate record of the running time of the machine.

A still further object is to provide a simple and effective time controlled mechanism actuating one or more dial holders to rotate or actuate dials carried by said holders in a manner to bring successive portions thereof within the range of the marker or stylus of each said dial holder, by a timely, uniform movement.

A still further object is to provide in a recorder of this character, a marker or stylus and means actuating same in synchronism with the operation of the machine connected therewith, which will maintain the point of the marker or stylus in a substantially uniform position relative to the dial, and avoid unevenness or irregularities in the record

made thereby and the necessity for substituting or repairing the marker or stylus.

A still further object is to provide a recorder wherein a plurality of dials may be associated together and driven from a single source of power in synchronism with each other, and each dial may be so provided with an individual marker or stylus and means actuating same, actuated by separate machines, as to permit a complete record of all the machines in a factory or shop to be made in the office in a manner to enable the superintendent to ascertain at any time the working conditions of the entire factory or shop.

A still further object is to provide a dial actuating mechanism which may be actuated by an electric circuit containing therein a time controlled make and break mechanism in a manner to cause said dials to be rotated or actuated by a uniformly timed step by step movement, without material noise and under substantially uniform power so regulated as to prevent excess movement of the dials over the predetermined quantity of each such movement.

A still further object is to provide a recorder of this character employing dials the graduations of which, will be slightly curved from the radial to compensate for the direction of the line made by the marker or stylus, due to the simultaneous movement thereof and of the dial face in different directions, thus permitting the determination to a nicety of the time of the start and of the end of a run.

A still further object is to provide a marker or stylus and means actuating same wherein the record will be made in part by a movement of the stylus substantially radially of the dial, which movement will be so restricted as to produce a fairly clear cut and uniformly broad record line.

A still further object is to provide in a recorder of this character, a marker or stylus and means actuating same in synchronism with the operation of the machine connected therewith, wherein the marker or stylus will be normally in contact with the dial sheet and will be capable of making a continuous mark thereon whether said actuating mechanism is operative or not, and will not be subject to such wear as to vary the width of the line made thereby.

A still further object is to provide a re-

order of this character employing a marker or stylus of simple construction which cannot readily get out of order or be broken, and which will utilize a fluid ink and retain same in sufficient quantities to insure a clear, well defined record, and require little attention to prevent a failure of the marker to properly record its movement.

A still further object is to provide a recorder wherein the various dials may be rotated independently of the source of power normally controlling same, to bring them into such position as to have the marker or stylus positioned relative thereto in conformity with the clock mechanism when for any reason, as a failure of power driving said dials, or a setting of the clock, the clock and the dials are not in accord. And a still further object is to provide a recorder which will be simple and inexpensive as to its construction, reliable in use and sufficiently neat and compact in form to be suitable for use in an office.

The invention consists primarily in the combination in a time recorder of a dial holder, having a face plate thereon, time operated means actuating same, a record dial of flexible material having graduations thereon, removably mounted on, and extending radially beyond said face plate, a marker or stylus mounted adjacent to and beyond the edge of said holder, means adapted to actuate same mounted adjacent to said dial and opposed contacts adapted to be actuated by the operation of a machine, said contacts and said means being arranged in circuit; and in such other novel features of construction and combination of parts as are hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

Referring to the drawings: Figure 1 is a front elevation of a recorder embodying our invention, with a conventional showing of the circuit and the contacts operated by the machine; Fig. 2 is a front elevation on an enlarged scale, of the dial actuating mechanism, partly broken away; Fig. 3 is a front elevation on an enlarged scale of a single dial, and the marker or stylus and its actuating mechanism, the operation thereof being shown in dotted lines; Fig. 4 is a section on an enlarged scale, on the line 4-4 of Fig. 1; Fig. 5 is a section on the line 5-5 of Fig. 4, and Fig. 6 is an enlarged sectional view of the marker or stylus.

Like letters refer to like parts throughout the several views.

In the embodiment of our invention shown in the drawings, A indicates a casing having a swinging door with a light of glass there, in closing the front thereof. This casing has a partition B therein which supports a plurality of rotary dial holders, the means

styluses with the means actuating same, each of which will be more fully described hereinafter. The space behind said partition B serves as a housing for the transmission mechanism by means of which all said holders are driven at uniform speed from the same source of power, and also for the wires leading to the various means actuating the markers, and to the solenoid driving said dial holders.

At C we have shown a clock of ordinary construction, the escapement mechanism of which alternately opens and closes an electric circuit from the battery D actuating an ordinary relay E, which in turn alternately opens and closes a local circuit by which the means actuating the various dial holders is operated.

Mounted in suitable bearings carried by the partition B, is an angularly headed worm shaft *a* carrying a worm *a'* which has a distance collar *a''* to properly position said worm. Keyed to said shaft *a* in front of said partition and spaced forwardly thereof, is a ratchet wheel *b*, the teeth of which in the form shown number one hundred and fifty. A lever comprising a vertical arm *c* and horizontal arms *c'* and *c''* is loosely mounted on said shaft behind said ratchet wheel and between it and the partition B.

Below the horizontal diameter of the ratchet wheel *b* and substantially below the end of the arm *c''*, a bracket on said partition supports a solenoid *d*, the movable core *d'* of which is connected by a headed screw *d''* carried thereby and passing through a way *d'''* in the arm *c''*, to said arm in a manner to impart movement thereto when said solenoid is energized. The lower part of the spool of said solenoid is closed by a plug *d''''* between which and the movable core *d'* is a rubber cushion *d'''''* adapted to limit the movement of said movable core and absorb the shock and deaden the noise of impact. Said movable core has a vent opening therethrough communicating with the chamber in the spool beneath it. In axial alinement with the movable core *d'*, and adapted to be engaged by the head of the screw *d''*, is mounted a stop screw *d''''* having a lock nut *d'''''* by means of which it may be set after such adjustment as may be required to limit the quantity of movement of the lever *c''* to that required to actuate the ratchet wheel *b*. The winding of the solenoid *d*, the wires *e* *e'* and the relay E are included in a local circuit from any desired source of energy, either an electric battery or a dynamo circuit being suitable. A battery circuit is preferable, as in isolated plants, the dynamo may be shut down with the power, thus necessitating the setting of the dials each time the power is put on.

Pivotaly mounted on the arm *c* is a pawl

f adapted through gravity to engage successively the teeth of the ratchet wheel b . Below the end of the arm c' is mounted in suitable bearings, a screw g connected to which and the said arm is a spring g' , by means of which sufficient power is developed to actuate the ratchet b through the pawl f and thereby rotate all of the dials. A lock nut g^2 is provided to enable said screw to be set when the spring has been properly tensioned in assembling.

Mounted in suitable bearings in the partition B are a plurality of dial holders each of which has mounted below it on said partition, a carrier for a marker or stylus and means whereby the same is actuated. Inasmuch as each of these dial holders, carriers, markers and actuating means is a duplicate of every other, a detailed description of but one of them will be entered into. The number of these dial holders and their appurtenances is immaterial, and may be increased indefinitely in proportion to the number of machines in the factory or shop. Each holder carrying a record dial for one machine. An index card B' is positioned adjacent to each holder, designating what machine the dial contains a record of, thus facilitating the preparation and placing of the record dial each day. Each dial support or holder, comprises a face plate h a pin h' eccentrically of the face thereof, and a rearwardly extended shaft h^2 carrying a bevel gear h^3 . The shaft h^2 also has a screw threaded end h^4 projected forwardly of said holder to facilitate the placing of a dial sheet thereon, a thumb nut h^5 holding said dial sheet against said holder.

Carried on the back of the partition B are a plurality of counter shafts i , i' , i^2 , i^3 , positioned respectively behind a row of holders, which shafts are driven in unison by means of a perpendicular shaft i^4 and bevel gears thereon, indicated at i^5 and i^6 gears as i^6 on the end of each shaft i , i' , i^2 and i^3 , power being applied to one of said shafts, as i , through a worm wheel j thereon in mesh with the worm a' . The worm wheel j in the form shown has seventy two teeth. Each shaft i , i' , i^2 , and i^3 has a plurality of bevel gears i^7 thereon, equalizing in number the holders in that row, said gears respectively being one half the diameter of and in mesh with a gear h^3 , thus rotating each dial holder once to two rotations of the transmission gearing.

Carried by the holder h is a removable stiff paper dial k toward the edge of which are graduations dividing said dial into twelve equal parts as on the dial face of a clock or watch, and sub-dividing each said part into twelve equal sections, the peripheral travel of said dial being such that five minutes must elapse during a movement of the dial equaling the space between said sub-

dividing lines. This dial has a central opening therethrough adapted to pass over the projecting end h' , and an eccentric opening therethrough adapted to pass over the pin h' . The diameter of the dial k is considerably greater than that of the face plate h , an arrangement which results in a yielding contact of the dial and the marker or stylus, and permits the dial to be placed on and removed from the holder without bringing same into rubbing contact with the said marker or stylus. The graduations on said dial are not straight radial lines, but extend in a slight curve away from the direction of rotation of the dial, the simultaneous movement of the marker or stylus and of the dial in different directions, resulting in a record line the direction of which will accord with that of the graduations. Each dial also carries data thereon, as shown in Fig. 3 of the drawings, making it suitable for use as a permanent record after being removed from its support or holder, the blank on said dial being properly filled in in part before it is placed on said holder, and in part at the end of a day's run.

Below substantially the vertical diameter of the dial k , is a bracket carrying a magnet m of ordinary construction. One end of the core of said magnet has an angular extension m' projecting above and beyond the bracket supporting said magnet, and the other end has secured thereto one end of an angular spring metal arm m^2 serving as a yielding support for the carrier m^3 for the marker or stylus. The free end of the arm m^2 has a pendant stop m^4 adapted to pass under and engage the extension m' and thus limit the movement of the carrier m^3 under said spring.

We preferably use a fairly high tension circuit for actuating the magnets m and to simplify the wiring of the apparatus, we employ feed wires as n a running respectively from the opposite poles of a dynamo F and connected by a branch wire as n' , and a' to one terminal of each magnet, and to a contact p forming a part of, or actuated by, the form cylinder or bed of a printing press, or a movable part of a work carrier or tool, or other part of a machine indicated at G which is movable only when the machine is running. The other terminal of each magnet m we connect by an individual direct wire as g to the contact as p' opposed to the contact p , thus providing individual circuits for each magnet. We prefer to use a dynamo circuit because when a number of dials are used, such a circuit is both more reliable and more economical. The marker or stylus is a capillary tube s , the rear end of which is enlarged to form a fountain sufficiently large to make a record covering several days without refilling.

The operation of the herein described re-

corder is substantially as follows: The casing A and the apparatus carried thereby is located in the office of a factory or shop, and wired as described so as to place each magnet *m* in circuit with a machine as G and the solenoid *d* in circuit with its battery and the relay E. The clock mechanism C is so arranged that the relay E is actuated in the usual and well known manner every two seconds to close the relay circuit and energize the solenoid *d*. As the solenoid is energized, the tendency of the core *d'* to center itself relative to the winding, draws the arm *c*² downward away from the stop screw *d*⁰, to an extent limited by the plug *d*⁴ and the cushion *d*⁵, the way *d*⁵ having sufficient clearance to compensate for the slight arc described by said arm, and the formation of an air cushion beneath said core being prevented by the vent opening therethrough. The cushion *d*⁵ minimizes the force of the impact and avoids the noise thereof. This movement not only draws the pawl *f* back into engagement with the next tooth of the ratchet wheel *b*, but through the arm *c'* tensions the spring *g'*. The relay circuit is then opened and the solenoid *d* deenergized, permitting the spring *g'* to raise the arm *c*² into engagement with the stop screw *d*⁰; and thus rotating the ratchet wheel *b* through the pawl *f* on the arm *c*, to the extent of one tooth. The vent hole in the core *d'* prevents any suction on said core. The stop *d*⁰ may be raised or lowered as required to confine the throw of the arm *c*² under the tension of the spring *g'* to that necessary to give a feeding movement to the pawl of exactly the length of one tooth. The tension on the spring *g'* may be varied by means of the set screw *g* to that required to actuate the said ratchet wheel without imposing unnecessary work on the solenoid *d*. The lever *c*, *c'* *c*² turns freely on the shaft *a*. It will be observed that the leverage of the arms *c'* *c*² is so proportioned as to have the solenoid on the longer leverage, and that the power is applied to the shaft *a* on a long leverage through the pawl *f*. This operation is repeated every two seconds and as the ratchet wheel has one hundred and fifty teeth, it will make one complete rotation every five minutes. This movement through the worm *a'*, worm wheel *j* and the transmission gearing described is transmitted to the dial holders, and as the worm wheel *j* has seventy two teeth and the intermeshing gears between the transmission gearing and the dial holders are as 1 to 2, said worm wheel will make one complete rotation in six hours and each dial holder, in twelve hours. It is necessary therefore, to renew the record dial every morning. To do this it is merely necessary to remove the thumb nut *h*³, and then bend the lower edge of the dial away from the carrier *m*³ and

slip it off the projecting end *h*⁴ and the pin *h*⁵. A new dial *h* is positioned on the face plate *h* of the dial holder, by a reversal of this action, the springiness inherent to the paper causing it, when released to fly out against the marker or stylus in said carrier. If it be found that the graduations on the dial directly beneath the marker or stylus *s*, do not indicate the exact time of day, the ratchet wheel *b* and the transmission gearing actuated thereby, may be turned by means of the angular head of the shaft *a* and a suitable key, to properly position all of the dials. The pin *h*⁵ insures all dials being similarly placed on the holders.

The marker or stylus *s* being always in engagement with the dial *h*, and the ink feeding therefrom through capillary action it will normally draw a narrow line across the various graduations through the movement of the dial relative thereto, thus indicating the duration of the period when the machine is idle. When the press or other machine starts, however, the circuit from the dynamo F is closed through the form cylinder, or bed or other working part of the machine actuating the contacts *p p'* thus energizing the magnets *m*. The extension *m'* of the core of said magnet attracts the free end of the spring arm *m*² drawing it downward to complete the magnetic circuit, and causing a substantially vertical movement of the carrier *m*³ and its marker or stylus *s*, with a resultant vertical line on the dial, or a substantially vertical line. As the contacts *p p'* are separated through the continued operation of the machine G, the circuit is opened and the carrier *m*³ and its stylus or marker *s* immediately rises under the tension of the spring arm *m*², the stop *m*⁴ engaging the under side of the extension *m'* thus confining the action of the said arm within well defined limits insuring a good clean, regular and neat record, and preventing undue vibration of said arm. This return movement makes a second substantially vertical line on the dial. Owing to the slight rotary movement of the dial at all times, and the substantially vertical movement of the marker or stylus *s*, the lines will, as heretofore stated be on a slight backward curve, modified somewhat by the small arc described by the marker or stylus. This operation is repeated with each operation of the machine, and as such operations are rapid, the substantially vertical lines will overlap with the result that the operation of the machine will be recorded by a substantially continuous wide line on the dial. Hence the dial will show in thin lines those intervals during a day when a machine was idle, and in heavy wide lines, when it was running. Not only does the recorder provide a complete accurate daily record of every machine connected therewith but it presents a continu-

ing record which may be consulted at any time to determine the exact conditions in the factory or shop.

The arrangement and construction of the holder face plate *h* and the dial *k*, with relation to the marker or stylus *s* is such as to avoid the necessity for a platen for said dial, and insures sufficient pressure on the stylus point to insure the proper distribution of the ink fed without likelihood of the closure of the stylus bore. The use of ink avoids any necessity for the presence of springs or other pressure producing means on the marker or stylus, and no such wear occurs on said stylus as would be the case were a pencil or other similar marker employed.

This recorder is particularly adapted for use in connection with various types of printing presses, in which the contacts *p* may be attached to the form cylinder shaft, but it is also capable of use with any type of machine wherein said contact may be attached to or actuated from a part of the machine which is movable only when the machine is running.

It is not our intention to limit the invention to the precise details of construction heretofore described and shown in the drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what we claim as new and desire to have protected by Letters Patent is:

1. In a time recorder, the combination of a dial holder, time operated means rotating same, a marker or stylus, mounted adjacent to said holder and continuously bearing on a record dial, a carrier therefor, a spring metal arm supporting said carrier, a magnet mounted so as to bring said arm within its field whereby said arm will be tensioned by said magnet and will automatically return to normal when the magnet is disengaged, and will cause such movement of said marker or stylus as to vary the character of the record made thereby, and opposed contacts adapted to be actuated by the operation of a machine, said contacts and said magnets being in circuit.

2. In a time recorder, the combination of a dial holder, time operated means rotating same, a marker or stylus mounted adjacent to said holder and continuously bearing on a record dial, a carrier therefor, a spring metal arm supporting said carrier, a magnet mounted so as to bring said arm within its field whereby said arm will be tensioned by said magnet and will automatically return to normal when the magnet is disengaged, and will cause such movement of said marker or stylus as to vary the character of the record made thereby, means limiting the movement of said spring arm under tension, and opposed contacts adapted to be actuated

by the operation of a machine, said contacts and said magnet being in circuit.

3. In a time recorder, the combination of a dial holder, time operated means rotating same, a magnet mounted adjacent to said dial holder, an angular extension to one end of the core thereof, a spring metal arm attached to the other end of said core, a pendant stop arm carried by said spring-arm and adapted to engage said extension and limit the movement of said arm under tension, a carrier supported by said arm, a marker or stylus, carried thereby, adapted to be in continuous engagement with the record dial, whereby movement of said marker or stylus will vary the character of the record made thereby, and opposed contacts adapted to be actuated by the operation of a machine, said contacts and said magnet being in circuit.

4. In a time recorder, the combination of a dial holder, a shaft adapted to rotate same, a gear shaft, a ratchet wheel thereon, a rocking lever having three arms, a pawl carried by one of said arms, and adapted to engage said ratchet wheel, a spring acting on another of said arms, an electroreceptive device mounted below another of said arms, and adapted to actuate said lever, time operated means whereby said electroreceptive device is alternately energized and deenergized, means limiting the action of said spring, transmission gearing between said dial holder shaft and said gear shaft, whereby the rotation of said holder is timed, a marker or stylus, electrical means adapted to actuate same mounted adjacent to said dial holder, and opposed contacts adapted to be actuated by the operation of a machine, and said contacts and said electrical means being arranged in circuit.

5. In a time recorder, the combination of a dial holder, a shaft adapted to rotate same, a gear shaft, a ratchet wheel thereon, a rocking lever having three arms, a pawl carried by one of said arms, and adapted to engage said ratchet wheel, a spring acting on another of said arms, a solenoid positioned below the other said arm, a movable core therein, connections between said core and said last mentioned arm, time operated means whereby said solenoid is alternately energized and deenergized, an adjustable stop limiting the action of said spring, transmission gearing between said dial holder shaft and said gear shaft, whereby the rotation of said holder is timed, a marker or stylus, electrical means adapted to actuate same, mounted adjacent to said dial holder, and opposed contacts adapted to be actuated by the operation of a machine, and said contacts and said electrical means being arranged in circuit.

6. In a time recorder, the combination of a dial holder, a shaft adapted to rotate same, a gear shaft, a ratchet wheel thereon, a

rocking lever having three arms, a pawl carried by one of said arms and adapted to engage said ratchet wheel, a spring acting on another of said arms, a solenoid, a movable core therein having a vent opening there-through, a plug closing the bottom of said spool whereby the movement thereof is limited, connections between said core and another of said arms, time operated means whereby said solenoid is alternately energized and deenergized, means limiting the action of said spring, transmission gearing between said first mentioned shaft and said gear shaft, a marker or stylus, means adapted to actuate same mounted adjacent to said dial and opposed contacts adapted to be actuated by the operation of a machine, said contacts and said last mentioned means being in circuit.

7. In a time recorder, the combination of a dial holder, a shaft adapted to rotate same, a gear shaft, a ratchet wheel thereon, a rocking lever having three arms, a pawl carried by one of said arms and adapted to engage said ratchet wheel, a spring acting on another of said arms, a solenoid, a movable core therein having a vent opening there-through, a plug closing the bottom of said spool, a cushion on said plug whereby the movement of said core is limited, connections between said core and another of said arms, time operated means whereby said solenoid is alternately energized and deenergized, means limiting the action of said spring, transmission gearing between said first mentioned shaft and said gear shaft, a marker or stylus, means adapted to actuate same mounted adjacent to said dial, and opposed contacts adapted to be actuated by the operation of a machine, said contacts and said last mentioned means being in circuit.

8. In a time recorder, the combination of a plurality of dial holders, each having a face plate thereon, a record dial of flexible material having graduations thereon, removably mounted on, and extending radially beyond said face plate, time operated means

actuating all said holders simultaneously, a marker or stylus mounted adjacent to, and beyond the edge of each said holder, a plurality of electrical means each adapted to actuate one said marker or stylus, and a plurality of pairs of opposed contacts each pair adapted to be actuated by the operation of a machine, each said pair of contacts being arranged in circuit with one of said electrical means.

9. In a time recorder, the combination of a plurality of dial holders, a plurality of shafts adapted to rotate said holders, respectively, a gear shaft, means carried thereby, whereby said shafts may be manually rotated, a ratchet wheel on said gear shaft, a rocking lever having three arms, loosely mounted on said shaft, a pawl carried by one of said arms adapted to engage said ratchet wheel, a spring acting on another of said arms, electroreceptive device mounted below the other of said arms and adapted to actuate said lever against the tensions of said spring, time operated means whereby said device is alternately energized and deenergized, means limiting the return action of said spring, transmission gearing between said gear shaft, and each of said other shafts whereby all of said dial holders are rotated simultaneously, a marker or stylus mounted adjacent to each said holder, a plurality of electrical means each adapted to actuate one of said markers or styluses, and a plurality of pairs of opposed contacts, each pair adapted to be actuated by the operation of a machine, each said pair of contacts being arranged in circuit with one of said electrical means.

In witness whereof, we have hereunto affixed our signatures, this 8 day of August, 1906, in the presence of two witnesses.

WARREN L. GREEN.
WILLIAM S. EATON.

Witnesses:

W. S. ROSE,
GEO. H. DANFORTH.