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ELECTRIC RECORDING SYSTEM.

APPLICATION FILED DEC. 18, 1902.

NO MODEL.

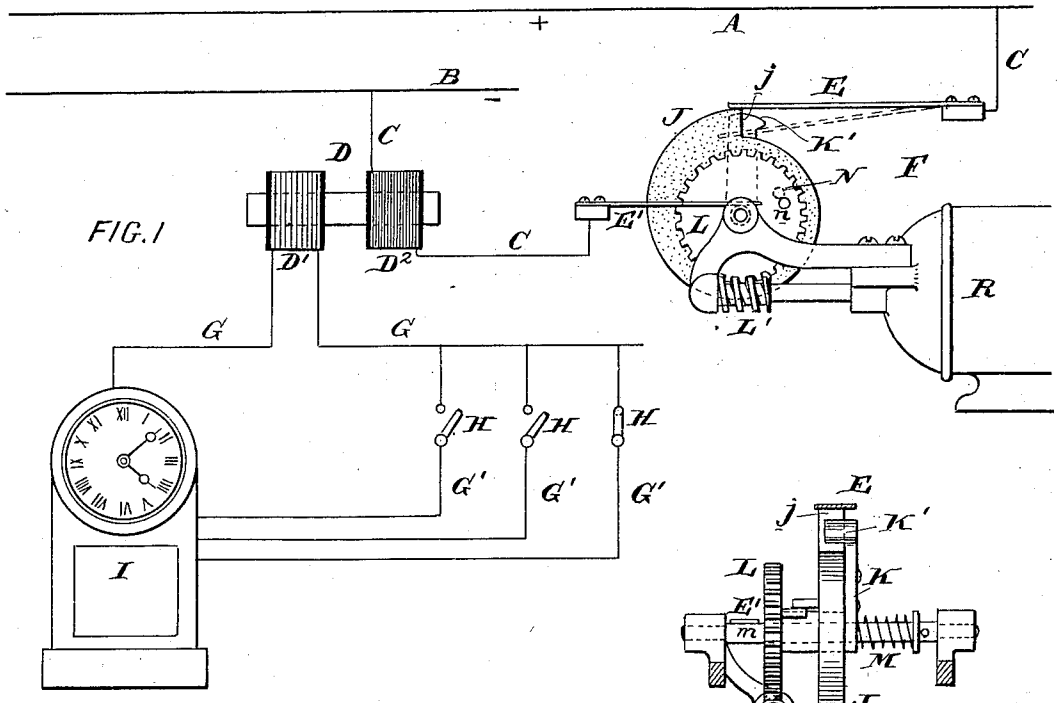


FIG. 1

FIG. 2

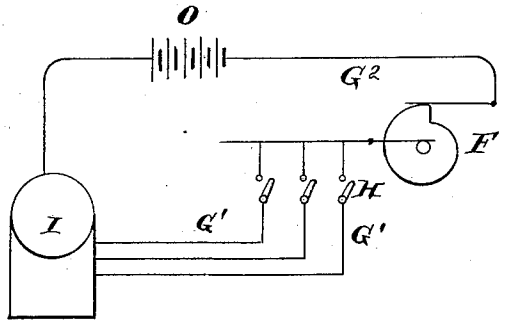


FIG. 4

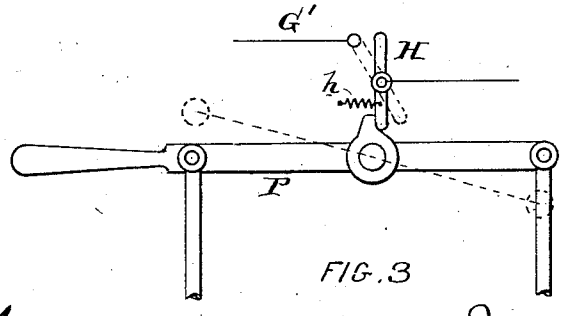


FIG. 3

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JOSEPH C. HUSS AND GEORGE W. SCHILLING, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC RECORDING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 726,301, dated April 28, 1903.

Application filed December 18, 1902. Serial No. 135,803. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH C. HUSS and GEORGE W. SCHILLING, of the city and county of Philadelphia, Pennsylvania, have invented an Improvement in Electric Recording Systems, of which the following is a specification.

Our invention has reference to electric recording systems; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of our invention is to provide a system of electrically recording both time and duration of manipulations, preferably manual, where accuracy of operation is essential. In one use of our invention, as an example, the record is made of the times of opening and closing of certain valves in metallurgical operations and also the time during which said valves remained open and closed, thereby placing a guard over the workman to insure his careful attention to his duties, a failure in the performance of which might cause irreparable injury to the product.

In carrying out our invention in its preferred form and where the source of electrical energy is the usual incandescent electric-lighting mains we provide a normally open branch circuit across the mains, including the fine-wire winding of a step-down transformer or induction-coil and an automatic switch for closing and opening the circuit at stated intervals, combined with a local circuit, including the other or low-resistance coarse-wire winding of the induction-coil or transformer, and containing a series of branch circuits, including in common an electrical recording-clock, and each further containing switches under the control of the workman whose involuntary acts are thereby to be transmitted to the recording-clock or device of registry. The opening or closing of said individual switches by the workmen does not of itself actuate the registering devices; but if closed when the automatic circuit-closing switch comes into operation to close the primary circuit then an induced current is produced in form of a momentary impulse through the workmen's circuits and switches to record on the recording-dial of the recording-clock or device of registry the closing and time of closure of the said switches. In some cases, the source of electric energy being a small dynamo or battery of low tension, the step-down transformer may be omitted, in which case the automatic circuit making and breaking switch will operate upon the local circuit.

Our invention also comprehends details of construction which, together with the features above enumerated, will be better understood by reference to the drawings, in which—

Figure 1 is a diagram illustrating our invention. Fig. 2 is a side elevation of one form of automatic switch adapted for use of our invention. Fig. 3 is an elevation of one of the hand-controlled local switches adapted to our invention, and Fig. 4 is a diagram of a modified form of circuits embodying our invention.

A and B are the positive and negative main-line conductors leading from any ordinary source of electric energy, usually an electric-lighting plant, and said circuits usually carry a potential difference equivalent to one hundred and ten volts. C is a branch circuit across the said main-line conductors or leads A and B and is normally open between the contact-terminals E E'. This circuit C includes the fine-wire winding D^2 of a step-down transformer D. The coarse-wire winding D' of the step-down transformer is in circuit with a local circuit G, which contains a series of branches G', leading to the electromagnetic devices of the recording or registering clock I, which may be of any of the usual constructions now in use as watchmen's clocks. Each of the local circuits G' is provided with a switch H, adapted to be closed or opened by the manipulations of the workmen. Usually these switches are arranged upon a part of the machine or apparatus being operated by the workman, and his acts are thereby involuntarily recorded, and an accurate record as to time is thus registered as a check upon his work.

In Fig. 3 we have shown a valve-lever P, adapted to be rocked at stated intervals to open and close valves (not shown) of a furnace, and combined therewith we provide one of the switches H, which is shown as adapted to open the circuit G' by the action of a spring

h and to close the circuit by the action of the lever P. In this way the raising of the left-hand end of the lever P closes the recording-circuit G′, and when the switch F closes the circuit over the contacts E E′ an induced electrical impulse is sent over the circuit G′ to energize the electrically-actuated recording device of the clock I. It is immaterial to our invention what the form of the local switches H may be, as they would be made to suit the particular character of device or machine to which they were applied. Ordinarily the workman would have no control over the switch H independently of the machine he was required to operate.

The step-down transformer is employed to reduce the potential of current in the local circuits below that in the line conductors A B; but where this current is already sufficiently low the transformer need not be made to reduce the tension, or, if desired, it may be omitted, as indicated in Fig. 4.

In case where the source of current was low in tension, as when taken from a battery O or other source of low potential, the circuit G^2 may include the source of energy, the automatic switch F, the recording-clock I, and the local circuits and switches H.

Any suitable circuit device may be employed for terminal contacts E E′, that shown being excellently adapted for the purpose. It consists of a cam J, of insulating material, having secured to it a metal arm K, provided with a rearwardly-extending cam-shaped pointed nose K′. It is journaled upon a shaft *m* and pressed by a spring M against a worm-wheel L, which is secured to the shaft. A pin *n* on the worm-wheel acting on a pin N of the cam J causes its rotation. The worm-wheel is driven at a uniform speed by worm L′ and motor R, which may be electric or otherwise, as preferred. The worm-wheel and shaft are in connection with the terminal spring E′ of circuit C, and the other terminal, E, presses upon the periphery of the cam J, of insulating material. This cam has an abrupt shoulder *j*, over which the spring-terminal E drops onto the metal arm K. The spring action of the terminal E presses upon the nose K′ of the arm K and projects the cam and nose forward, so as to cause the terminal E to quickly break the electric circuit with the nose K′. This action separates the pins *n* and N. The cam J then slows down its movement, and the worm-wheel L in advancing brings its pin *n* once more into contact with the pin N and continues to rotate the cam. Every revolution of the cam J produces a contact between E and K′ and then a quick breaking of the circuit. The quick break in the circuit C causes a better action of the static transformer D and generates a more positive and powerful induced current in the coarse wire of the coil D′ thereof.

Any other form of automatic circuit closing and opening switch may be used in lieu of that shown, as the particular form of this device is immaterial to our invention. There are numerous switches now on sale in the market which may be excellently adapted for use with our invention.

Each of the circuits G′ and its switch H may lead to a different place or machine and be under the control of separate workmen, and hence in this way the special requirements of a whole works may be kept under close watch.

The recording instrument is usually made in clock form; but it is evident that it need not employ the clock-face, although it is essential that some form of clock-movement be employed. These instruments, as is well known, usually indent a constantly-rotating disk of paper subdivided into radial divisions corresponding to the hours. If a switch H is kept closed, then the paper would receive a series of closely-arranged indentations, one being formed for each time the circuit C is closed through the terminals E and E′.

We do not confine ourselves to the details shown, as they may be modified in various ways without departing from the spirit of the invention.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of a source of electric energy, a recording device, one or more local circuits including the recording device, one or more switches in the local circuits adapted to be closed or opened under manual control and capable of normally remaining closed or open, and means for automatically causing a continuous series of electric impulses in frequent succession to be produced in the local circuits, said impulses being created from the source of electric energy and producing a series of successive records during each closing of the switch to indicate the time the switch is closed or open.

2. The combination of a source of electric energy, a recording device, one or more local circuits including the recording device, one or more switches in the local circuits adapted to be closed or opened under manual control and capable of normally remaining closed or open, a static transformer having one coil in circuit with the source of electric energy and the other with the local circuits, and means for automatically causing a continuous series of induced electric impulses to be produced in the local circuits consisting of a circuit-interrupting device for controlling the current passing to the static transformer and causing inductive impulses to be made in frequent succession.

3. The combination of a source of electric energy, a recording device, one or more local circuits including the recording device, one or more switches in the local circuits adapted to be closed or opened under manual control and capable of remaining normally open or closed, and means for automatically causing

a continuous series of impulses to be produced in the local circuits consisting of induction devices for producing series of induced current impulses in frequent succession and energized by the source of electric energy.

4. The combination of a source of electric energy, a recording device, one or more local circuits including the recording device, switches in the local circuits adapted to be closed or opened under manual control, a static transformer having one coil in circuit with the source of electric energy and the other with the local circuits, and means for automatically causing induced electric impulses to be produced in the local circuits at stated intervals consisting of a rotating part, a cam of insulating material, a circuit-closing metallic nose on the cam, a spring-contact leading from the source of energy and pressing upon the cam or nose as the case may be according to their positions, and loose contacts for driving the cam and nose by rotating part and so that the spring may force the cam and contact forward more quickly than its normal speed to make a quick break over the nose, and thereby induce a momentary induced current in the local circuits.

5. The combination of a source of electric energy, a device for disclosing the electrical condition of local electric circuits, one or more local electric circuits leading to distant places and including the device for disclosing their electrical condition, switches in said local circuits for closing or opening them under manual control and capable of remaining normally open or closed, and means controlling the current from the source of electric energy for automatically causing short electric impulses to be produced in the local circuits at stated intervals.

In testimony of which invention we hereunto set our hands.

JOSEPH C. HUSS.
GEORGE W. SCHILLING.

Witnesses:
R. M. HUNTER,
R. M. KELLY.