No. 871,434. PATENTED NOV. 19, 1907.

E. A. OAKES & P. A. COONEY.

RECORDER.

APPLICATION FILED JULY 26, 1906.

2 SHEETS—SHEET 1.

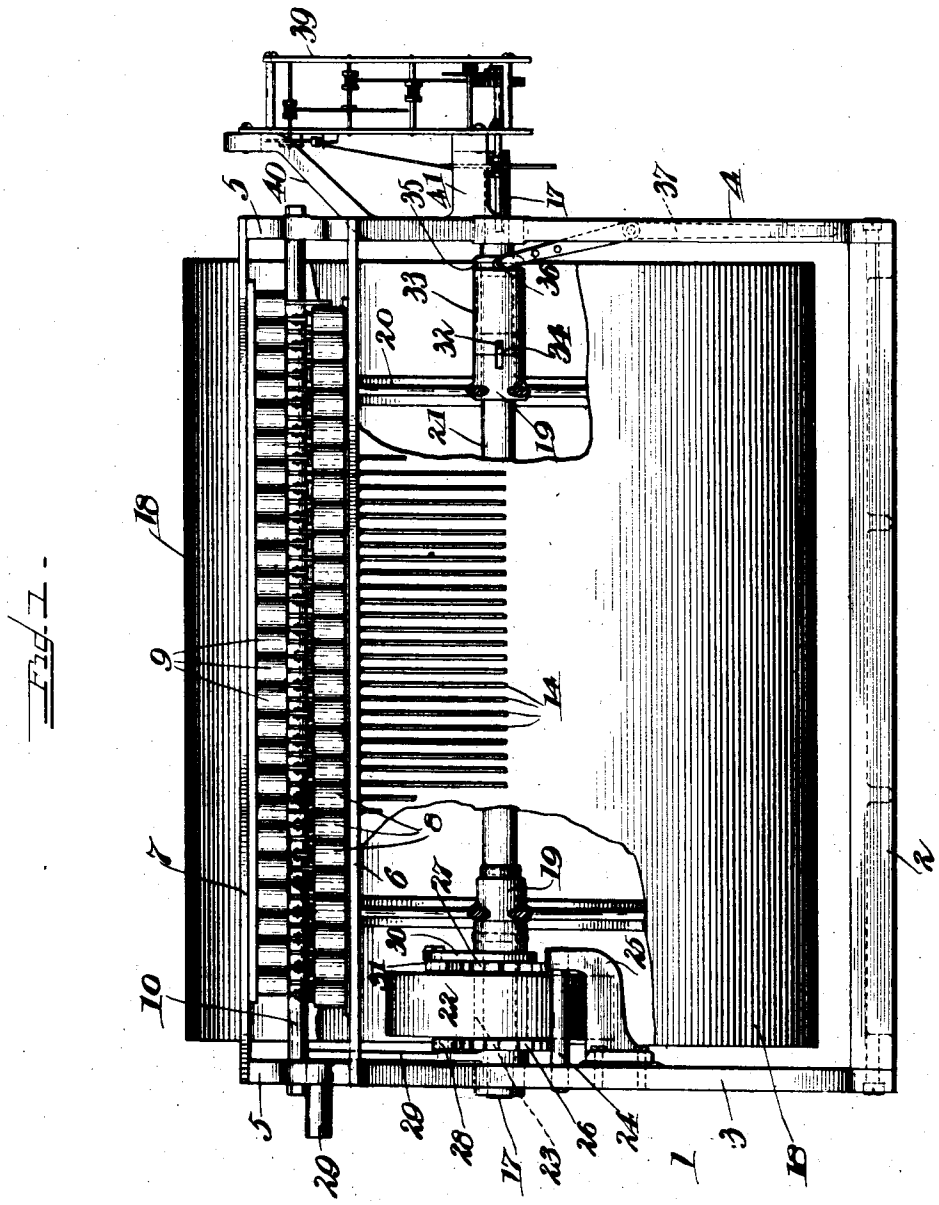


Fig. 1.

Witnesses—
W. L. Sherman
George L. Chindahl

Inventors—
Ernest A. Oakes
Peter A. Cooney
By Rustem L. Miller
Atty.

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2 SHEETS—SHEET 2.

Fig 2.

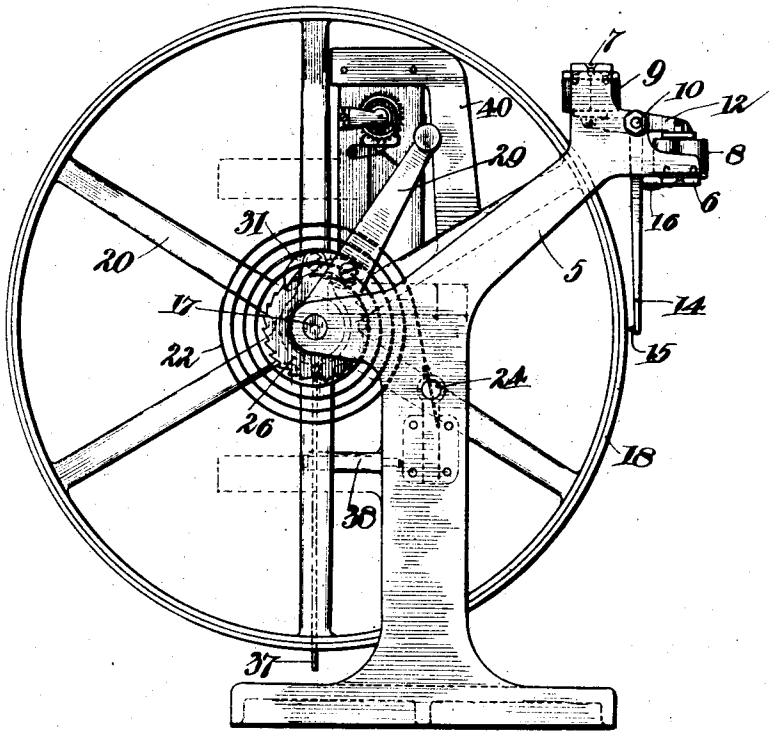


Fig 4.

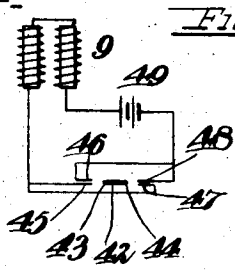


Fig 3.

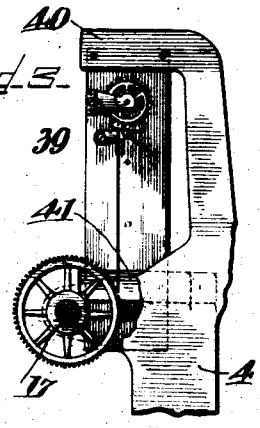
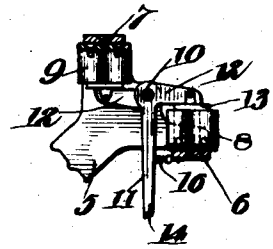


Fig 5.



Witnesses.

V. L. Sherman

George L. Chindahl

Inventors.

Ernest A. Oakes

Peter A. Cooney.

By Luther L. Mills

Atty.

UNITED STATES PATENT OFFICE.

ERNEST A. OAKES AND PETER A. COONEY, OF CHICAGO, ILLINOIS.

RECORDER.

No. 871,434. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed July 26, 1906. Serial No. 327,880.

To all whom it may concern:

Be it known that we, ERNEST A. OAKES and PETER A. COONEY, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Recorders, of which the following is a specification.

It is often desirable in a factory or other institution, for various reasons, to have a record of the exact number of hours each piece of apparatus, machine tool, or other machine in the factory is in operation during each day, the length of time each machine is idle, and the time of day when the operation of any machine is started and stopped.

This invention refers to an automatic mechanism for producing such a record. As will be understood from the accompanying drawings and description, the various machines are electrically connected with the recording mechanism, and the starting and stopping of each machine is duly registered upon a properly ruled sheet spread upon the recorder drum.

In the accompanying drawings, Figure 1 is a front elevation, partly in section, of a recorder embodying the features of our invention. Fig. 2 is an end elevation of said recorder. Fig. 3 is a fragmental detail view of the escapement mechanism. Fig. 4 is a diagram illustrating the manner in which the recorder is connected with one of the machines whose operation it is desired to record. Fig. 5 is a detail sectional view through the series of electro-magnets.

The embodiment herein shown of our invention comprises a supporting frame 1 formed of the base 2 and the side members 3 and 4. Arms 5 projecting forwardly and upwardly from said side members are connected by two bars 6 and 7, to each of which bars is secured a plurality of horseshoe electromagnets 8 and 9. The electromagnets 8 are arranged with their poles extending upwardly and the row of electromagnets 9 with their poles extending downwardly. Upon a fixed shaft 10 extending between the arms 5 is pivotally supported a number of bell-crank levers 11, one for each of the electromagnets 8 and 9. One arm 12 of each of said bell-crank levers has attached thereto an armature 13 and the other arm 14 is provided at its lower end with a suitable marking device 15, such as a pencil or pen point or tracing device. Said marking devices are arranged to bear upon the periphery of a cylindrical drum to be later herein described and are normally held out of contact with said drum by means of coiled springs 16 extending between the lever-arms 14 and the bar 6.

It will be noted that the two coils constituting each electromagnet are arranged one behind the other for the sake of compactness in arrangement, and that the two series of electromagnets 8 and 9 are located out of alinement with each other so that the bell-crank levers 11 for both series of electromagnets may be supported upon the same shaft.

Upon a shaft 17 rotatably supported in the side members 3 and 4 is loosely mounted a cylinder 18 supported upon said shaft by means of the hubs 19 and the spoke-arms 20, said hubs being rigidly mounted upon a sleeve 21 surrounding the shaft 17. The cylinder 18 is provided with any suitable means (not herein shown) for securing a sheet of paper upon its periphery, upon which sheet the marking devices 15 are arranged to bear. For rotating the cylinder 18 we provide a coiled (clock) spring 22, the inner end of which spring is attached to a spring barrel 23 rotatably mounted upon the shaft 17, the outer end of said spring being fixed to a pin 24 supported in the end member 3 and a bracket 25 fixed to said end member. Upon the spring barrel 23 are fixed two ratchets 26 and 27, one at each side of the spring 22. The teeth of the ratchet wheel 26 are adapted to be engaged by a pawl 28 carried by a winding crank 29 rotatably mounted upon the shaft 17. During the operation of the recorder the pawl 28 is held out of engagement with its ratchet wheel 26. An arm 30 is rigidly mounted upon the shaft 17 adjacent to the ratchet wheel 27, said arm carrying a pawl 31 adapted to engage the teeth of said ratchet wheel.

One end of the sleeve 21 upon which the cylinder 18 is mounted projects beyond the adjacent hub 19, and there has fixed to it a pin 32. Upon the shaft 17 adjacent to the pin 32 is a clutch collar 33 having a notch 34 in one of its ends adapted to receive the pin 32, said collar being splined to said shaft and therefore rotatable with the shaft as well as longitudinally slidable upon it. In one end of the collar 33 is a peripheral groove 35 adapted to receive studs 36 upon the forked upper end of a clutch lever 37. Said

lever is pivotally supported upon a stud 38 projecting from the side member 4, and affords means for sliding the clutch collar 33 longitudinally on the shaft 17 to engage and disengage said collar and the pin 32.

The rotation of the shaft 17 is controlled by means of an escapement mechanism 39 of any common or preferred form. Said mechanism is supported upon arms 40 and 41 formed upon the side member 4.

Each of the electromagnets 8 and 9 is included in an electrical circuit with a circuit-opening and closing device arranged to be actuated by the apparatus, machine or mechanism whose time of operation is to be recorded, the circuit being arranged to be closed when the machine is placed in operation and opened when the machine is stopped. The precise manner of actuating the circuit-opening and closing device will depend, of course, upon the character of the particular machine or apparatus, but in most cases the device will be arranged to be actuated by the operation of the starting and stopping mechanism of the machine. Fig. 4 is a diagrammatic illustration of one method of including the starting and stopping mechanism of a machine in the recorder circuit.

42 is a lever for operating the reversing clutch of a machine. Said lever carries two contact blades 43 and 44, the blades 43 being adapted to enter between two spring blades 45 and 46, and the blade 44 being adapted to lie between two spring blades 47 and 48. The blades 45 and 47 are electrically connected with one end of the winding of the electromagnet, and the blades 46 and 48 with the opposite end of the winding.

49 is a battery or other suitable source of electrical energy.

If desired the recorder may be inclosed within a suitable casing (not herein shown), which casing may be provided with glass-covered sight openings through which the operation of the marking devices and the record made by them may be observed.

In practice, each machine, apparatus, or mechanism in the factory, whose operation it is desired to record, is electrically connected with one of the electromagnets 8 and 9 of the recorder in such a way that a circuit will be closed through the electromagnet when the machine is placed in operation, and so that the circuit will be opened when the operation of the machine ceases. The cylinder 18 is provided upon its periphery with a blank sheet or chart suitably ruled and inscribed to indicate the twelve working hours of a day or any desired portion thereof. The coiled spring 22 is wound up by a succession of partial rotations of the crank 29, and the escapement mechanism started, thus rotating the cylinder. The marking devices 15 are normally held out of contact with the chart upon the cylinder 18 by means of the coiled springs 16, but when one of the machines connected with the recorder is placed in operation an electric circuit is closed through one of the electromagnets, and the armature 13 for said electromagnet attracted, thereby throwing the marking device associated with said electromagnet into contact with the chart upon the cylinder 18. The marking device 15 is thus held in contact with the chart so long as the machine is in operation. The cylinder 18 meanwhile rotates and the marking device traces a line upon the chart. The latter having been placed upon the cylinder 18 so as to bring the time division of said chart corresponding with the time of day that the recorder was started directly beneath the row of marking devices 15, it will be seen that the line traced by an actuated marking device will begin at a time division on the chart corresponding with the time of day when the machine was placed in operation, and will end when the machine is stopped, the circuit opened, and the marking device raised from the paper. A record is thus obtained of the time of day when each machine in the factory is placed in operation and stopped, the length of time the machine is used, and the intervals, if any, during which the machine was idle.

When the record sheet is to be removed, the cylinder 18 is unclutched from the shaft 17, the sheet removed and a new sheet substituted therefor, said new sheet occupying the same position upon the cylinder as the former sheet did, the cylinder 18 manually rotated onward to the extent that the shaft 17 has rotated in the meantime, and said cylinder connected with the shaft by means of the clutch 32 33.

We are aware that various changes can be made in the construction and arrangement of the parts and circuits of the apparatus herein shown and described. Said embodiment is largely illustrative, and is capable of modification to adapt it to use with various types of machines and apparatus. We therefore desire to have it understood that we do not limit ourselves to the precise details herein shown and described.

We claim as our invention:

1. In a recorder, in combination, a supporting frame; a chart-supporting drum mounted in said frame; means for supporting a plurality of electromagnets in said frame; said magnets being arranged in a plurality of rows and the magnets of one row staggered with relation to those of the other row a shaft; a plurality of bell-crank levers on said shaft, there being one lever for each electromagnet, one arm of each lever extending horizontally, and the other vertically, the horizontal arms of alternate levers extending in opposite directions; an armature upon the horizontal arm of each lever; a marking device upon each vertically extending arm;

and means tending to move said levers to withdraw said marking devices from said drum, and said armatures from said electromagnets.

2. In a recorder in combination, a supporting frame, a shaft mounted ther in; means for driving said shaft; a sleeve upon said shaft; a drum upon said sleeve having a hub; a pin upon said sleeve; a clutch collar splined to the shaft adjacent said pin and provided with a notch adapted to be engaged by said pin; and means for moving said notched collar into and out of engagement with the said pin.

3. In a recorder in combination, a supporting frame, a shaft mounted therein; means for driving said shaft; a sleeve upon said shaft; a drum upon said sleeve having a hub; a pin upon said sleeve; a clutch collar splined to the shaft adjacent said pin and provided at one end with a notch adapted to be engaged by said pin, and having at the other end a peripheral groove; and a clutch lever engaging in said groove.

ERNEST A. OAKES.
PETER A. COONEY.

Witnesses:
L. L. MILLER,
GEORGE L. CHINDAHL.