

Aug. 27, 1957

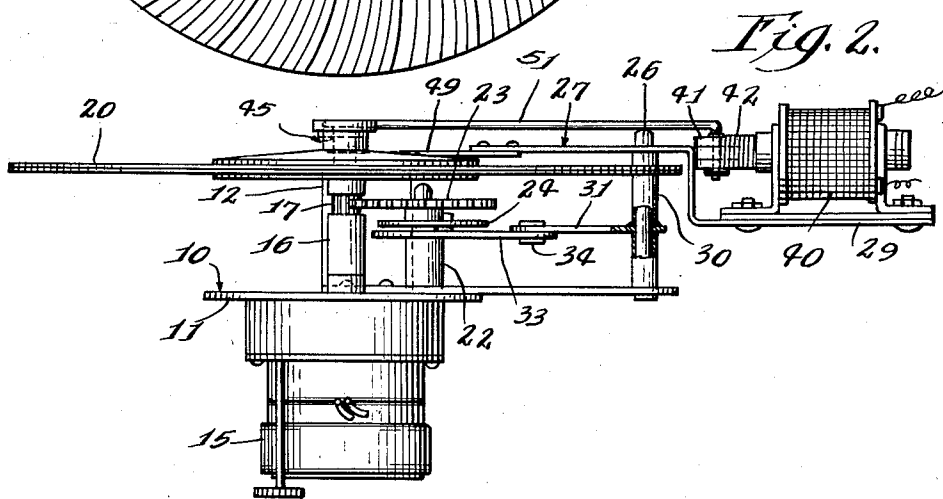
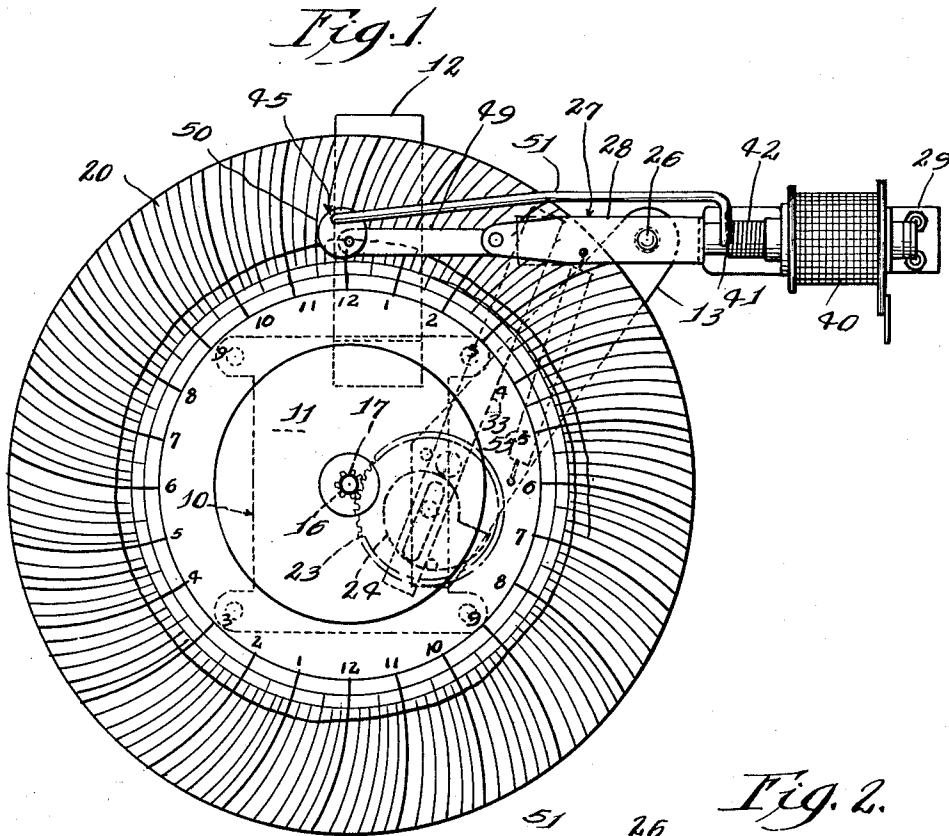
M. C. BROD

2,804,366

RECORDING APPARATUS

Filed June 30, 1954

2 Sheets-Sheet 1



Inventor.
Meyer C. Brod.

By. Labl, Baker, York, Jones & Rothman
Attorneys.

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2 Sheets-Sheet 2

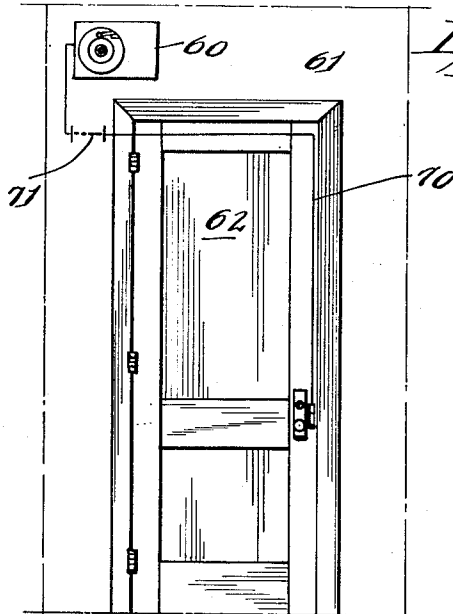


Fig. 3.

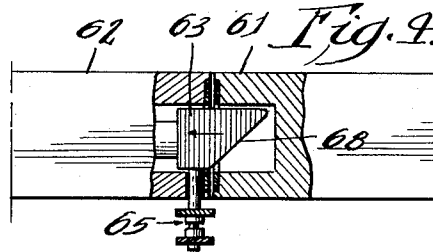


Fig. 4.

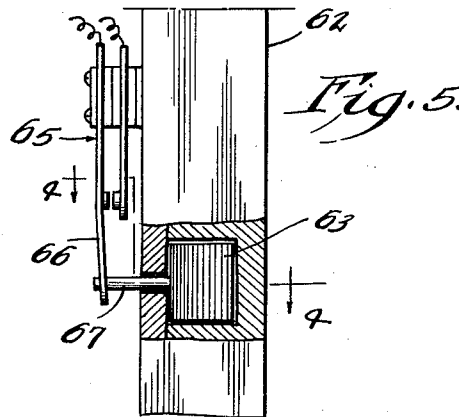


Fig. 5.

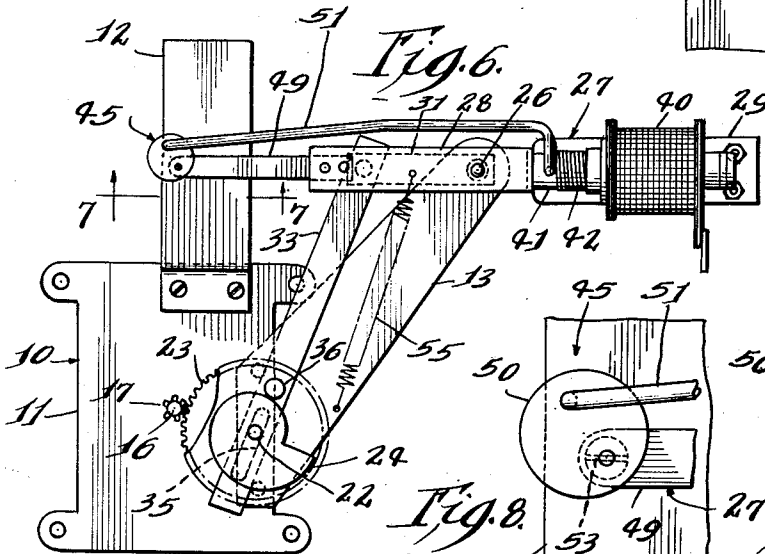


Fig. 6.

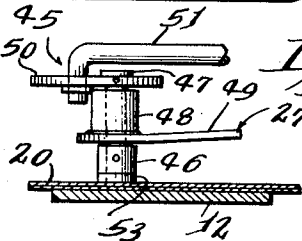


Fig. 7.

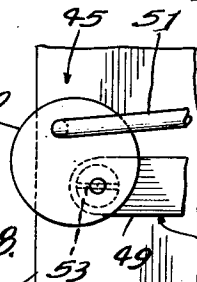


Fig. 8.

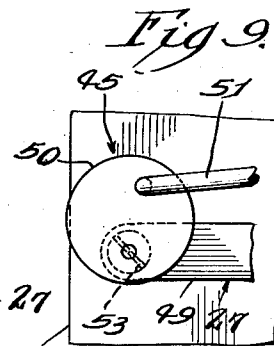


Fig. 9.

Inventor.
Meyer C. Brod.

By. Zabel, Baker, York, Jones & Rothman
Attorneys.

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2,804,366

RECORDING APPARATUS

Meyer C. Brod, Chicago, Ill.

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2 Claims. (Cl. 346—121)

My invention relates to a recording apparatus for making a record of the instances a switch is opened and closed, the indications being recorded along a time axis.

In the illustrated embodiment of the invention the apparatus is designed to indicate the clock times a switch is opened and closed, the switch being associated with the lock of a door. Thus, the apparatus makes a record of the times of day a door is unlocked and locked, the apparatus having capacity for making recordings over an extended period such, for example, as a week. The invention, of course, has utility in applications other than the particular one here illustrated.

One object of my invention is to provide a small size apparatus for recording accurately on a time axis instances of the opening and closing of a switch.

Another object of my invention is to provide such an apparatus which is capable of recording instances of the opening and closing of a switch over an extended period of time, such as a week, without intermediate attention.

Another object is to provide a recording apparatus which may be positioned at a convenient and remote location with respect to the associated door or other device.

Still another object of my invention is to provide an apparatus of this character which is comparatively simple in construction, foolproof in operation and capable of long, useful life.

Other objects, advantages and details of the invention will be apparent as the description proceeds, reference being had to the accompanying drawings which illustrate one embodiment of the invention. It is to be understood that the description and drawings are illustrative only and that the scope of the invention is to be measured by the appended claims.

In the drawings:

Fig. 1 is a front elevational view of a recording apparatus embodying my invention, the record element being designed to rotate at the rate of one revolution per twenty-four hour day;

Fig. 2 is a side view of the apparatus shown in Fig. 1.

Fig. 3 is a diagrammatic view illustrating the installation of my recording apparatus in connection with a door, the apparatus functioning to record the times of day the door is unlocked and locked;

Fig. 4 is a sectional view on line 4—4 of Fig. 5 illustrating diagrammatically a switch actuated by the door lock;

Fig. 5 is an elevational view, partly in section, further illustrating the switch shown in Fig. 4;

Fig. 6, like Fig. 1, is a front elevational view of the apparatus, the record element being removed for clarity;

Fig. 7 is an enlarged sectional view on line 7—7 of Fig. 6; and

Figs. 8 and 9 are enlarged, fragmentary views showing the recording stylus in its two alternative positions.

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Referring now to the drawings, my recording apparatus comprises a support 10 which, with its associated elements, is mounted in a suitable housing (not shown). As here shown, support 10 includes an I-shaped plate 11, an upwardly extending backing plate 12 and an upwardly and outwardly extending lateral arm 13, the backing plate 12 and the lateral arm 13 being mounted on or integral with I-shaped plate 11.

A clock motor 15, preferably electric, with associated reduction gearing is mounted on I-shaped plate 11, as best shown in Fig. 2. Clock motor 15 drives a main shaft 16 at a predetermined rate, such for example, as one revolution per twenty-four hour day. Other rates, of course, are possible, but this rate is convenient for making recordings on a daily time axis. Shaft 16 carries gear teeth 17 which cooperate with elements presently to be described.

A disk 20 having time graduations thereon is mounted in a removable manner on the end of shaft 16. As shown in Fig. 1, disk 20 is graduated to show twenty-four hours, namely 12—12 in the A. M. and 12—12 in the P. M., the individual hours being subdivided to show ten minute intervals. As best shown in Figs. 1 and 7, disk 20 is backed up by backing plate 12.

Support 10 carries a stub shaft 22 which is parallel to and spaced from main shaft 16. A gear wheel 23 and a cam 24 are rotatably carried on stub shaft 22, the gear wheel and cam being ganged together to rotate in unison. Gear wheel 23 meshes with and is driven by gear teeth 17 in main shaft 16.

A pivotal stub shaft 26 is mounted on lateral arm 13 of support 10.

An elongated member 27 comprising an arm 28, a bracket 29 for an electromagnetic device, a tubular bearing 30 which receives stub shaft 26 and a link 31 is mounted in a pivotal manner on support 10. As mentioned, the pivotal relationship is provided by tubular bearing 30 and cooperating pivotal stub shaft 26.

A driving link 33 is pivoted at one end by means 34 to the free end of link 31 of elongated member 27. The other end of driving link 33 is provided with an elongated slot 35 through which extends stub shaft 22. Driving link 33 has mounted thereon a cam follower 36 in effective relation with cam 24.

Referring to Fig. 6, as cam 24 rotates in a clockwise direction, cam follower 36 will be moved in a radially outward direction from the cam center of rotation. Driving link 33 will move in a corresponding direction with the result that elongated member 27 in turn will be pivoted on pivotal stub shaft 26 in the clockwise direction.

If the recording apparatus is designed to record on a time axis most conveniently related to the days of a single week, the gearing is such that main shaft 16 makes one revolution per twenty-four hour day and cam 24 makes one revolution per week. With these relations, a week is started with elongated member 27 oriented at its counterclockwise limiting position. During the week elongated member 27 moves in response to cam action in a clockwise direction at a uniform rate, its position at the end of the week being the limit of its travel in clockwise direction.

An electromagnetic device such as solenoid 40 is mounted on bracket 29 of elongated member 27, the electromagnetic device having a moving part 41 which is actuated by the device against the action of a return spring 42.

The left hand end of elongated member 27, looking at Figs. 1, 2 and 8, carries a stylus assembly 45. Details of one form of stylus assembly are shown in Figs. 7—9.

Stylus assembly 45 includes a stylus 46 which is biased

against disk 20 and which is effective to make recordings on disk 20. Stylus 46 is so arranged that a writing characteristic thereof is altered in response to actuation of solenoid 40.

As here illustrated, stylus 46 includes a shaft 47 which is journaled in a bearing 48 (Fig. 7) mounted at the left hand end of elongated member 27. The said end of elongated member 27 may comprise a leaf spring element 49 or equivalent which is effective to bias stylus 46 against disk 20.

As here shown, the inscribing or writing end of stylus 46 is wedge-shaped. Thus, stylus 46 is capable of making a wide or a narrow line depending on its angular orientation with respect to the direction of relative movement between the stylus and recording disk 20. The stylus shaft 47 carries a crank arm 50, and a rod 51 extends between crank arm 50 and moving part 41 of the electromagnetic device.

When solenoid 40 is not energized, its moving part 41 occupies the extended position shown in Fig. 6, the extended position being established by return spring 42. Rod 51 has such length that wedge end 53 of stylus 46 inscribes a narrow line on disk 20 as the record disk rotates. This orientation of the wedge end of stylus 46 is shown in Fig. 8.

When solenoid 40 is energized, moving part 41 and associated rod 51 move to the right as shown in Fig. 9. This movement correspondingly rotates the wedge end 53 of stylus 46 so that the stylus inscribes a wide line. Thus a writing characteristic, width of line, of the stylus is changed due to solenoid action.

A spring 55 (Fig. 6) extends between lateral arm 13 of support 10 and link 31 of elongated member 27 to provide bias between cam 24 and cam follower 36.

Figs. 3, 4 and 5 illustrate in diagrammatic form the application of my recording apparatus to a door, the apparatus being intended to indicate the clock times when the door is unlocked and locked.

A recording apparatus 60 (Fig. 3) constructed as above described is mounted on room wall 61 adjacent a door 62. Door 62 is provided with a lock bolt 63 (Figs. 4 and 5). A switch 65 having a spring arm 66 is mounted on door 62 into engagement with bolt 63.

When the door is locked, as shown in Fig. 4, cam action between bolt 63 and pin 67 maintains the switch in open condition. When the door is unlocked, bolt 63 moves in the direction of the arrow in Fig. 4 and pin 67 is opposed by the inclined front 68 of the bolt. Pin 67 is allowed to move inwardly in response to the action of spring arm 66 and the switch assumes a closed condition.

Switch 65 is connected in series by conductor 70 (Fig. 3) with solenoid 40 and an electrical source (not shown). Conductor 70 is shown broken at 71 to illustrate that it may extend to any convenient and remote location for apparatus 60.

Thus, with the system above described, when the door is locked the switch 65 is open and solenoid 40 is not energized. During the period the door is locked stylus 46 inscribes a narrow line on rotating disk 20. When the door is unlocked, switch 65 closes and solenoid 40 is energized. Moving part 41 of solenoid 40 is at that time effective to rotate stylus 46 to an orientation which

results in the inscription of a wide line. The recording point where the line changes from narrow to wide or wide to narrow indicates with reference to the graduations on disk 20 the precise time when the door has been unlocked or locked, respectively.

As will be understood, stylus 46 inscribes a spiral line on disk 20, the line spiralling from the inside out. One spiral revolution represents one twenty-four hour day and, with the cam 24 above described, the apparatus is designed to record a week of days before it is necessary to replace a disk 20. An inscribed disk 20 thus constitutes a permanent record of the clock times during a week of the unlocking and locking of a door or other switch actuating device with which the apparatus is associated.

From the above description it is thought that the construction and advantages of my invention will be readily apparent to those skilled in the art. Various changes in detail may be made without departing from the spirit or losing the advantages of the invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A recording apparatus comprising a support, a clock motor mounted on said support, a main shaft driven by said motor, gear teeth on a portion of said shaft, a disk having time graduations thereon mounted on said shaft, a stub shaft on said support, an associated gear and cam on said stub shaft, said gear meshing with said gear teeth, an elongated member pivoted on said support, a link pivoted at one end to said member and having an elongated slot in the other end, said stub shaft passing through said elongated slot, a cam follower on said link and engaging said cam whereby cam action is effective to pivot said member, a solenoid mounted on said member, a spring biased stylus on said member in effective relation with said disk and means whereby solenoid action alters a writing characteristic of said stylus.

2. A recording apparatus comprising a support, a clock motor on said support, a main shaft driven by said clock motor at a predetermined rate, a disk having time graduations thereon mounted on said shaft, an elongated member pivoted on said support, cam means driven by said main shaft for pivoting said elongated member, an electromagnetic device mounted on said member, a stylus in effective relation with said disk, said stylus having a wedge-shaped writing end and being mounted for axial rotation on said member, a crank arm on said stylus and a link extending between said crank arm and a moving part of said electromagnetic device whereby action of said moving part is effective to rotate said stylus and thereby produce a wide or narrow line on said disk depending on stylus orientation.

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