

Jan. 30, 1923.

1,443,732

B. G. COOK,
RECORDING DEVICE.
FILED Nov. 8, 1920.

2 SHEETS-SHEET 1

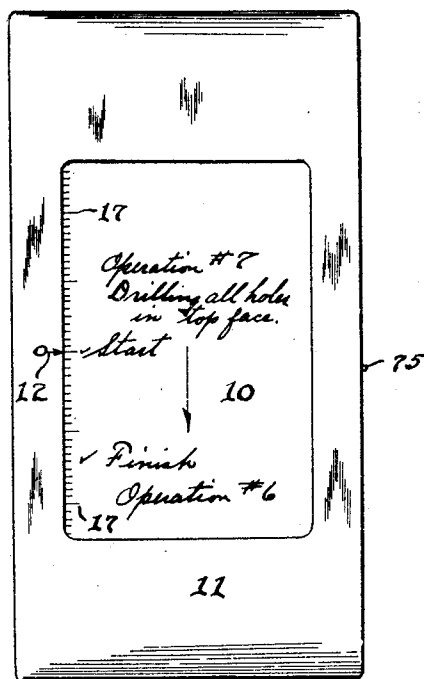


Fig - 1

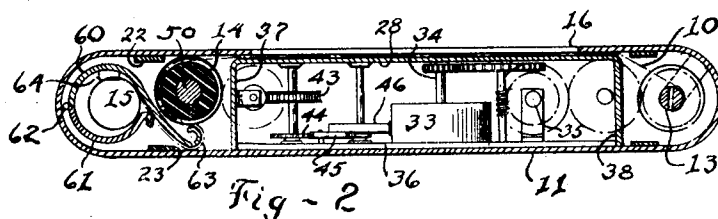


Fig - 2

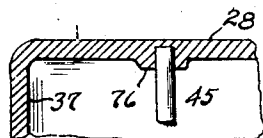


Fig - 7

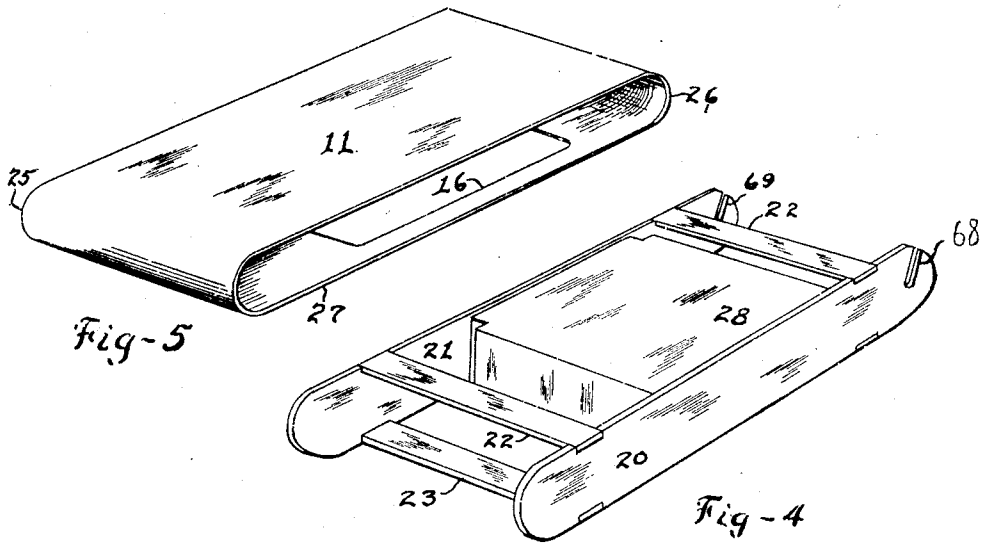
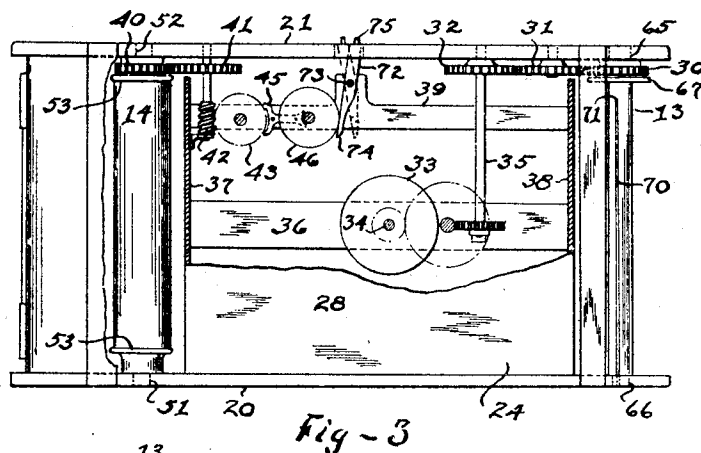
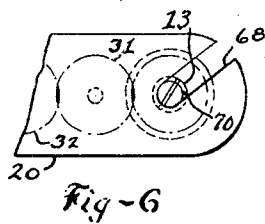
Inventor
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2 SHEETS-SHEET 2



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UNITED STATES PATENT OFFICE.

BYRON G. COOK, OF LAKEWOOD, OHIO.

RECORDING DEVICE.

Application filed November 8, 1920. Serial No. 422,441.

To all whom it may concern:

Be it known that I, BYRON G. COOK, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Recording Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to recording devices, and is particularly adapted for use in time study work.

In time study work it has been customary to record the time required for a given operation by observing, on a stop watch, the interval between the starting and stopping of the operation, and by making the proper entries in a note book. Under this system much time is lost by handling the stop watch and by reason of the fact that only one operation or component part thereof may be observed at one reading. To make a complete time study of a complicated mechanical operation, wherein the individual motions overlap one another in point of time, it is necessary for the operator to repeat the entire operation and to separately time each individual part thereof. After the record is completed an additional chart is usually made to show the time relation between the several parts of the operation, where upon unnecessary duplication is encountered and considerable time is lost. Furthermore, the use of a stop watch often creates a distracting influence upon the workmen and the influence is detrimental, in so far as the workman is apt to vary the speed of the particular operation, intentionally or otherwise, and a standard is set which is inaccurate.

An object of my invention is the provision of means adapted for use in time study work whereby accurate and permanent records of observations may be made without the use of a stop watch.

Another object is the provision of a device which will permit a complete time study of a complicated operation, without necessitating a repetition of any part thereof, and which will enable production of a complete time study chart during a single observation period. One of the advantages of a complete chart is that an accurate analysis may be made of any time study problem.

One can thereby readily ascertain the extent with which one operation overlaps another in point of time.

Still another object is the provision of recording means that may be operated without creating a distracting influence upon workmen, and which will therefore produce an accurate chart on which an average rate may be set for a given operation.

I accomplish the above objects by providing a record sheet having graduations at definite intervals designating periods of time and I provide means for moving this sheet at a uniform rate past a stationary mark. That portion of the sheet adjacent the stationary mark is exposed to view whereby suitable notations pertaining to the work observations may be written thereon. Furthermore, I provide means for holding the chart, which means is of such character that the chart may be quickly removed and readily replaced after the completion of each time study observation.

The means for accomplishing the above and other objects will be more fully set forth in the following description which relates to the drawings, and the essential characteristics will be set forth in the claims.

In the drawings Fig. 1 is a plan of a time study device embodying the features of my invention; Fig. 2 is a longitudinal section thru the device, shown in Fig. 1; Fig. 3 is a plan partly in section of a device having the outer casing removed; Fig. 4 is a perspective showing the frame construction; Fig. 5 is a perspective showing the exterior casing; Figs. 6 and 7 are details of frame construction.

Broadly speaking, my invention comprises the mounting of a movable chart within a convenient casing and the provision of means for moving the chart at a uniform rate past a stationary point. Any convenient means for moving the sheet at such a speed may be employed to carry out my invention, and consequently I do not wish to limit myself to the specific mechanism which will be hereinafter described.

Designating the parts shown in the drawings by the use of reference characters, 10 represents a time study sheet or chart, which is held in a casing 11, and is caused to move past a stationary point 12, at a uniform rate, by mechanism contained within the casing.

The means for moving the chart may comprise a clock mechanism suitably geared to a winding roll 13 at one end of the casing, while the means for causing movement at a uniform rate may comprise a retarding mechanism connected to a feed roll 14 at the other end of the casing. Suitable means are provided at each end of the casing to facilitate the insertion of a new roll and removal of a used roll.

The time study sheet or chart comprises a roll 15, which is adapted to be held at one end of the casing and to be passed across the aperture 16 in the casing 11 and then to be wound upon the winding roll 13. The time study chart 10 has sufficient width, that characters or notes may be conveniently written across the face thereof; at the same time the entire device may be small enough to be readily carried in the operator's pocket. The length of the chart may be an arbitrary amount to enable notes to be taken on time study work requiring one or more hours. Furthermore, I prefer to have the chart of such size, that it may be folded and conveniently filed in a 3"x5" card index.

Along the marginal edge of the chart I provide a series of characters 17, periodically spaced, and arranged to designate intervals of time, and I have found that an arrangement having ten units per minute is suitable for time study work, so that one of the units is caused to pass the stationary point every six seconds. Since the chart moves slowly across the window or aperture, the operator has sufficient time to make any notations on the exposed surface of the chart, whereupon a complete finished report of any time study problem is thereby attained during one observation period.

The means for holding the time chart may comprise an interior frame having longitudinal members 20, 21 connected by transverse members 22, 23 and the gear casing 24.

The longitudinal members must have sufficient thickness to provide a rigid structure for supporting the feed and winding roll, together with the gearing for the driving mechanism. The shape of the inner frame is complementary to the outer casing 11, and is adapted to be held therein, either by a spring latch connection, or by a tight fitting engagement between the abutting surfaces.

The outer casing 11 preferably comprises a structure having rounded ends 25, 26, whereby the casing may be conveniently carried and be free from any sharp projections. One side of the casing 27 is open, so that the inner frame may be inserted therein, while the opposite side may be closed, to act as an abutting surface for one of the longitudinal members on the inner frame.

The moving elements, which I have employed for operating the time study chart, may be classified into a driving mechanism, and a retarding mechanism. The driving mechanism is preferably geared to the winding roll 13, thru the spur gears 30, 31, 32, by a spring motor within the casing 33. Suitable gearing connects the shaft 34, on which the spring motor is mounted, with the shaft 35, on which the spur gear 32 is carried. The lower end of the motor shaft may be supported within the gear box 24, upon a bracing member 36, which extends from one side 37 of the gear casing to the other side 38, while the upper end thereof is free to rotate in the top of the gear casing.

The retarding mechanism is preferably mounted, as indicated, in the gear box 24, and connected thru suitable gearing to the feed roll 14, and is operable independently of the driving mechanism. The gearing which I have shown comprises spur gears 40, 41, which operate the worm 42 and worm wheel 43. An escapement wheel 44 is mounted on the same shaft on which the worm wheel is carried, and an escapement member 45 actuated by a balance wheel 46 is employed to limit the speed at which the feed roll may move.

As shown in Fig. 5 the window 16 may be cut in one of the flat surfaces of the outer casing, and this window is so positioned, with reference to the inner frame, that the upper surface 28 of the gear box 24 will be positioned directly beneath the window, thereby providing a writing table. To facilitate the insertion of the motor and gearing, the gear casing may be a U-shaped member having the closed end 28, for the table, and the legs 37, 38, for end supports. The lower ends of the supports may be connected with the reinforcing members 36, 39, to support one end of the gear shafts.

The feed roll 14 is preferably constructed of rubber and is mounted on a shaft 50, the ends 51, 52, of which are journaled in the longitudinal members 20, 21, of the frame. Paper guides 53 are mounted on each end of the feed roll and are spaced apart an amount sufficient to permit the paper to move without skewing across the surface of the roll. When the paper chart is positioned over the feed roll across the table and wound upon the winding roll 13, then a constant tension is placed upon the paper by the driving mechanism. The chart is prevented from slipping by the friction between the feed roll and the paper, whereupon the chart is allowed to move only at a predetermined speed, which is regulated by the size of the escapement mechanism.

A convenient manner for holding the supply roll 15 comprises a two-part housing, one part 60 thereof, being rigid with the longitudinal members 20, 21, of the frame, and

the other part 61 thereof being hinged at 62 and spring pressed upwardly toward the stationary part 60. The spring for urging the movable part upwardly may be an axial spring mounted in any well known manner upon the hinge 62. The lower portion 63, of the stationary part 60, is rounded upwardly to provide a convenient guiding surface for the paper chart, and to effect a backward bend upon the paper, whereby any tendency toward wrinkling and bending are overcome. This roll housing may be stamped from sheet metal and may be provided with suitable tongues 64, which are adapted to be welded to the longitudinal members of the inner frame.

The winding roll 13 may be journaled at 65, 66, to the longitudinal members of the inner frame and be held therein by the tension, exerted by the driving mechanism upon the chart. The gear 30 is rigid with the roll 13 and is carried preferably intermediate one of the longitudinal members of the frame and the paper guide 67. The end of the members 20, 21, are slotted as at 68, 69, to provide for removably securing the roll to the frame. To enable the paper to be readily removed from the roll 13, I provide a slot 70 which extends longitudinally of the roll, from one end thereof to a point 71 near the other end thereof. This slot or kerf is adapted to receive the end of the chart and to hold it while the mechanism is in operation. After a roll is completely wound, then it may be removed from the frame and the paper slipped from the end.

A convenient means for stopping the time study chart comprises the lever 72, which is pivoted at 73, and which has one end 74, thereof adapted to abut the periphery of the balance or fly wheel 46. A tongue 75 extends outwardly thru the longitudinal member 21 so that the lever may be manually moved into or out of engagement with the balance wheel. The lever is shown in engagement with the wheel, in which position the chart is prevented from moving. The position shown in dotted lines, however, represents the position wherein the chart is free to move across the upper surface of the gear casing.

In Fig. 7 I have shown a portion of the gear casing with one of the operating shafts mounted therein. It will be noted that the shaft extends only part way into the top of the casing and that a boss 76 is provided to give sufficient metal for permitting a hole to be drilled into the casing and the shaft to be supported therein. The purpose for such a construction is to prevent oil or lubricating material from entering the table top and discoloring the time study chart. Furthermore, such a construction provides a smooth surface so that notes may be effectively made upon the paper.

The operation of my invention is as follows:—

Assuming that the casing 11 is removed from the inner frame, then to insert the roll the operator opens the movable part 61, of the feed roll housing, against the tension of the spring in the hinge 62 and inserts the roll 15. The end of the roll is carried around the curved portion 63 of the housing 60, then over the feed roll 14 and across the upper surface of the gear casing 24. The end is then inserted into the kerf 70, on the wind roll 13, and is wound manually, a few times, before the roll is slipped into the notches 68, 69, and engaged by the gear 31.

After the winding roll is inserted into position, the spring motor is wound, and the outer casing is fitted over the inner frame, in such manner, that the window 16 is in registration with the upper surface of the gear casing, and consequently with a portion of the chart. The lever 72 is then moved out of engagement with the balance wheel 46 by manually moving the tongue 75, which extends beyond the frame, whereupon the chart is set in motion and the device is ready for use.

From the foregoing description it will be seen that I have provided a time recording device suitable for carrying out time study work without the use of a stop watch. My device, being capable of housing a time study chart in roll form, provides for a complete chart in one observation period. After the observations have been made, the completed chart may be quickly removed from the roll and a new one readily inserted within the device.

Having thus described my invention, I claim:—

1. A recording device comprising a frame having a size convenient to be concealed in the hand, a table positioned near the middle of the frame, a casing complementary to the frame and arranged to closely embrace the walls thereof, said casing having an aperture in registration with said table, a chart having characters periodically spaced thereon, means beneath the table for moving the chart, and means whereby the frame may be moved relatively to the casing for inserting a new chart.

2. A recording device comprising a casing having a size convenient to be concealed in the hand, and having an aperture extending through the top thereof, a frame substantially complementary to the casing and adapted to be inserted therein, a table carried by the frame and positioned directly beneath the aperture, a chart extending lengthwise of the frame, intermediate the table and the aperture, a feed roll at one end of the frame, a winding roll at the other end thereof, means beneath the table and intermediate the rolls for moving the chart at

a uniform rate, and means whereby the frame may be removed as an entity from the casing for replenishing a used chart.

3. A recording device having in combination a casing having an aperture in one side thereof, a frame adapted to be inserted within said casing and to be closely embraced thereby, a table comprising a U-shaped member having the intermediate portion thereof in registration with said aperture, a chart movable across said table, supply and winding rolls spaced on opposite ends of the table, a guide roll adjacent the supply roll, means geared to the winding roll for moving the chart, and other means geared to the guide roll for controlling the speed of the chart.

4. In combination, a frame having a size convenient to be concealed in the hand, and comprising a pair of side members substantially similar in form and positioned parallel to each other, a continuous casing in close fitting engagement with the frame, said casing having one side thereof open whereby the frame provides a closure for the casing, a supply roll and winding roll carried at opposite ends of the frame, a chart passing from one roll to the other and lengthwise of the frame, a spring actuated mechanism geared to one of the rolls for moving the chart, and escapement mechanism geared to another roll at the other end of the frame for regulating the chart speed.

5. In a device of the character described, the combination with a continuous casing having a size convenient to be concealed in the palm of the hand, a frame complementary thereto and slidably mounted therein, a chart adapted to be moved intermediate the frame and the casing, and longitudinally thereof, a supply drum and winding drum positioned at opposite ends of the frame, said frame having notches extending obliquely and outwardly therefrom whereby the drum may be lifted from the frame, and spring actuated means intermediate the drums, and geared to one of them, for moving the chart at a uniform rate of speed.

6. In a time recording device, the combination with a one-piece casing comprising a substantially flat member having one side thereof open, and having a size convenient to be concealed in the palm of the hand, a frame in close fitting engagement with the interior of the casing, one side of the frame

forming a closure for said casing, a chart movable longitudinally of the frame, a supply roll and winding roll therefor, a supply roll compartment comprising a hinged member so arranged that the chart passes between the free end of the hinged portion and body portion of said compartment, a guide roll adjacent the compartment, a spring actuated mechanism geared to the winding roll for moving the chart, and escapement means geared to the guide roll for maintaining the chart speed at a uniform rate.

7. In combination, a frame having a size convenient to be concealed in the hand, a casing closely embracing the frame and comprising a closure therefor, a supply roll mounted at one end of the frame and a winding roll mounted at the other end thereof, and removably secured thereto, a chart extending between the rolls and longitudinally of the frame, a table carried by the frame and extending beneath said chart spring actuated, mechanism connected with the winding roll for moving the chart, and independent mechanism connected with the chart for permitting it to be moved at a uniform rate.

8. In combination, a casing having a size sufficient to be concealed in the palm of the hand, a frame having substantially parallel side members which are complementary to the interior of the casing, one of said members comprising a closure for the casing, a chart, a winding roll at one end of the frame, a supply roll at the other end thereof, each of said rolls being carried by the frame, a supply roll compartment comprising an elongated guide, a hinged cover therefor, and means for pressing the free end of the cover into engagement with the guide, whereby pressure is exerted on a chart passing therebetween.

9. A recording device comprising two complementary casings, one slidably mounted within the other and each having a size convenient to be concealed in the hand, a paper strip within the inner casing, means for moving said strip, and means whereby characters may be manually written on the strip while it is being moved.

In testimony whereof, I hereunto affix my signature.

BYRON G. COOK.