

CALCULAGRAPHS, SPRING DRIVEN

DESCRIPTION

1. GENERAL:

1.1 This section describes the spring driven type calculagraph which is used, in general, to obtain a record of the time connections are established and their duration. This instrument is also used to record the time at which certain connections, such as call orders, delayed switches, etc., in toll offices, are established.

1.2 This type of calculagraph consists of a high grade 8 day clock movement, driven by double main springs, and with which are associated three stamping dials. A view of the instrument is shown in Fig. 1 and a view of the recording mechanism is shown in Fig. 2.

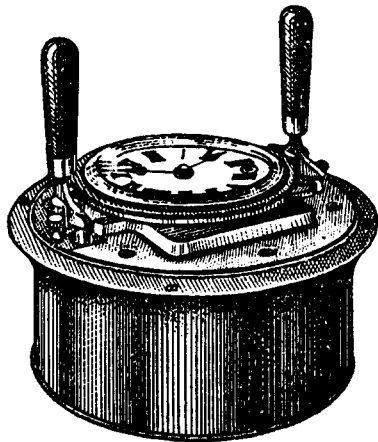


FIG. 1—VIEW OF CALCULAGRAPH

1.3 The three stamping dials are arranged as shown in Fig. 3.

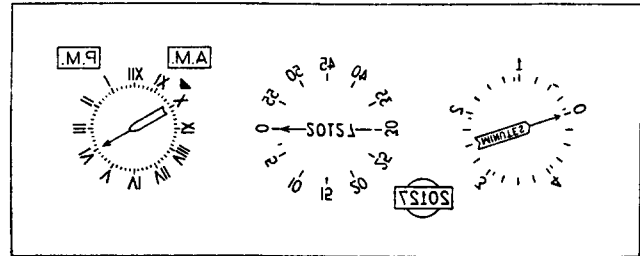


FIG. 3—VIEW OF STAMPING DIALS

The left dial is driven by gears from the minute hand pinion and gives a record of the time of day. The complete mechanism for stamping this record consists of an arrow driven by gears, rotating at the same speed as the minute hand, a fixed circular stamp having the hours and minutes marked on it, and a ring rotating outside this fixed stamp carrying a triangular pointer to stamp the hour. This ring is driven from the minute hand pinion (cannon pinion) through a 12 to 1 reduction train of gears. The underside of this ring carries a pin which causes the movement of a triangular cam (known as the star wheel) every time the pin passes the 12:00 mark on the fixed circular stamp. This cam causes either the "AM" or the "PM" stamp to be printed when the right hand operating lever is pushed backward to record the time of day. From the foregoing it is seen that the

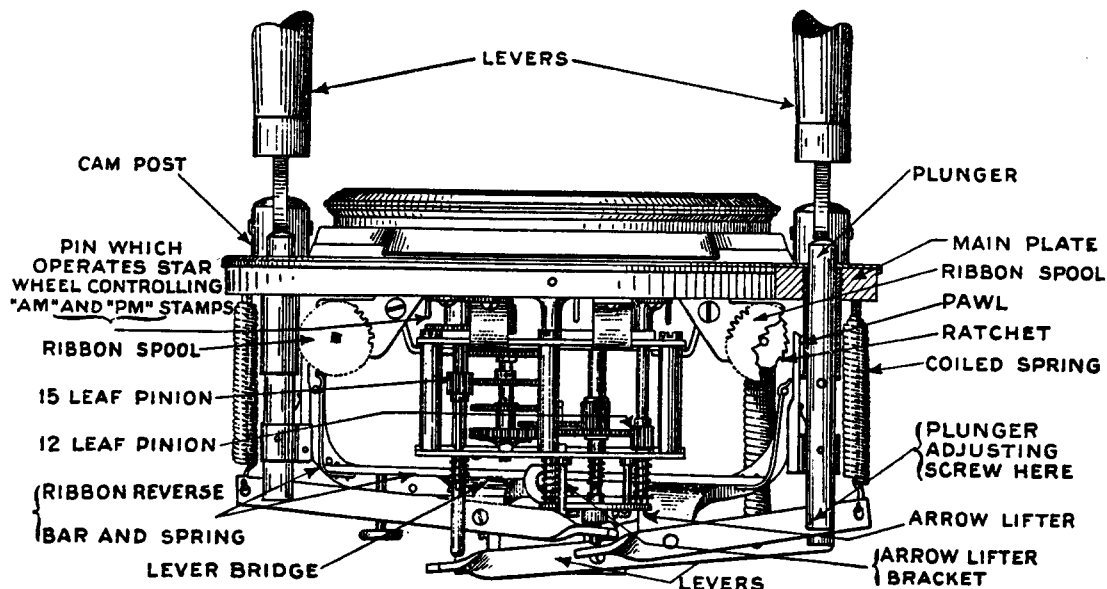


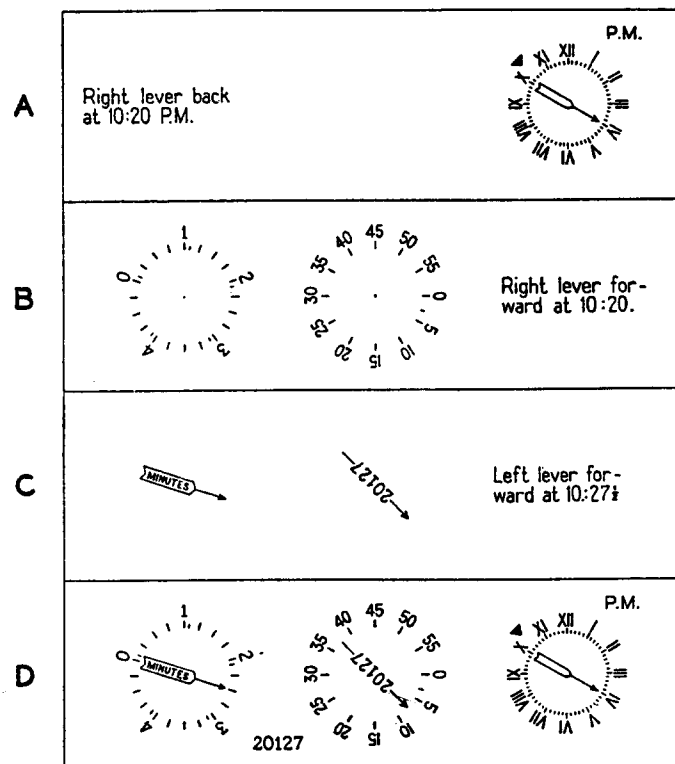
FIG. 2—VIEW OF RECORDING MECHANISM

time printed by the time of day stamp is determined by the time indicated on the clock dial, and that when the hands of the clock are set, the stamping dials are also set.

- 1.4 The right hand dial consists of a graduated ring, marked zero to four, divided into quarter minutes with a five second mark after each minute, and an arrow pointing to zero on the ring. This dial drives, through a 12 to 1 reduction gear, the center dial and arrow, which is similar to the right hand dial except that the ring is marked 0 to 55 by five minute intervals. These dials are so arranged that when the right hand operating lever is pulled forward, the dials are printed and when the left hand lever is pulled forward the arrows are printed. To secure the impressions, the toll ticket is inserted in the ticket slot indicated in Fig. 5. The left edge of the ticket is placed against the guide and shoved along from left to right until it rests against the right end of the ticket slot.
- 1.5 An example of the impressions is shown in Fig. 4.

printing the arrows. These dials are driven from a fast moving wheel of the clock movement through a spring, which allows the stamping dials to remain stationary for between one and two minutes while the operating lever is held down, without stopping the calculagraph. As these dials are driven from the clock movement, and not from the minute or hour hand gears, it is readily seen that their position is not affected by setting the hands of the clock, and hence, the clock may be set without impairing the accuracy of the elapsed time record.

- 1.7 In order to obtain a record from these dials, an ink ribbon is held over them. This ribbon is wound onto either of two spools, which are located, one at the right of the right hand dial, and one at the left of the left hand dial, shown in Fig. 2. A brake spring bears against each of these spools to prevent the ribbon unwinding too rapidly and becoming loose. On each of these spools is a ratchet wheel with which a pawl, associated with one of the elapsed time operating levers, normally engages. One or the



**Complete Impression of Stamping Dials
Showing Elapsed Time of $7\frac{1}{2}$ Minutes.**

Note: D consists of A, B, and C combined on one ticket, showing that call started at 10:20 A. M. and continued for $7\frac{1}{2}$ minutes.

FIG. 4—IMPRESSIONS OF STAMPS

- 1.6 The position of the printed arrows with reference to the printed dials as shown in Fig. 4 indicates the time interval which elapsed between the time of printing the dials and the time of

other of these pawls is kept from engaging its associated wheel by means of springs on the ribbon reversing bar, which on the older calculagraphs, is moved up or down by turning an

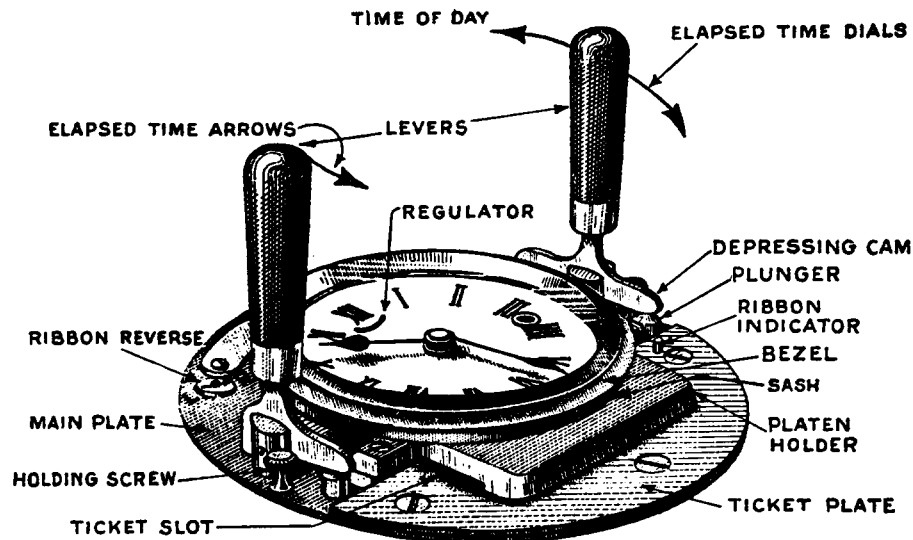


FIG. 5—TOP VIEW OF CALCULAGRAPH

arbor located at the rear of the figure "X" of the clock dial. An arrow on the manual ribbon reversing device, together with the letters "L" and "R" stamped on the main plate as shown in Fig. 5, indicates which operating lever will cause its associated pawl to engage the ratchet wheel of the ribbon spool, and hence, indicates the direction in which the ribbon will move. On the older calculagraphs a ribbon indicator is mounted over the right hand ribbon spool, to show the amount of ribbon wound thereon. When the top of the indicator is flush with the ticket plate of the calculagraph, no ribbon remains on the right hand spool. When the top of the ribbon indicator projects about a quarter inch above the ticket plate, all the ribbon is on the right hand spool. On some of the older calculagraphs, a groove is provided in the ribbon indicator, and when this groove appears above the ticket plate, the top of the indicator will be a quarter inch above the plate, thus indicating that all of the ribbon is wound on the right hand spool. On other instruments, a fixed post is placed directly behind the ribbon indicator. This post projects a quarter inch above the ticket plate, and when the top of the ribbon indicator is flush with the top of this post, it indicates that all the ribbon is on the right hand spool.

- 1.8 On the newer instruments, and on those which have been modified to include this feature, the direction of travel of the ribbon is reversed automatically when the amount of ribbon on either ribbon spool reaches a definite radial depth as the ribbon winds onto the spool in question. When the ribbon has reached this depth, all but approximately ten inches of the ribbon has been wound on this spool and the direction of travel of the ribbon is reversed. This is done automatically as follows: A wing is mounted on each of the elapsed time stamping plungers, and when the associated ribbon spool is nearly full, it bears against the ribbon. As the depth of the ribbon on the spool increases, the wing is moved outward and a lever attached to the lower end of the wing moves inward, nearer to the end of a projecting plate fastened to the ribbon reversing bar, which functions in the manner previously described to reverse the direction of travel of the ribbon. When all but approximately ten inches of the ribbon is wound on one spool, the end of the lever attached to the wing on the associated elapsed time plunger will engage with the plate on the end of the ribbon reversing bar when the plunger is depressed, thus depressing the end of the reversing bar and changing the direction of travel of the ribbon.