Call Offices. The term *call office* refers to any installation provided primarily for the casual telephone user. If an attendant is available, arrangements can be made for him to collect the appropriate fee and if necessary to set up the required call. By far the majority of call offices are unattended and are equipped with *coin-collecting boxes* (C.C.B.) which are designed to receive the appropriate coins and ensure that the correct fee is inserted. Coin-collecting boxes may be of two types; *postpayment* boxes in which the fee is demanded and checked by the operator after the desired connexion has been set up, and *prepayment* boxes in which the fee must be desposited before the exchange can be called. With postpayment coin-collecting boxes, the operator must give special attention to the line until the called party has replied and until the coins have been inserted and counted. Moreover, the postpayment principle is difficult to adapt to an automatic area. Prepayment coin-collecting boxes are therefore fitted in all C.B. and automatic areas. Postpayment boxes are restricted to local battery manual systems (C.B.S. Nos. 1, 2, and 3 or magneto) and where call office facilities are required on an extension from a private branch exchange.

Prepayment C.C.B.s. The standard Post Office prepayment coin-box consists of a pressed steel case, parkerized and stove enamelled as a protection against corrosion, and divided into two compartments. The top portion houses the mechanism (Fig. 262) and the lower portion forms a cash box, independent access being provided by two separate locks. On the top of the box three slots are provided and marked "Penny," "Sixpence," and "Shilling," respectively. The size of each slot is such as to prevent the use of coins of a larger size than that marked opposite the slot. If smaller coins are inserted they are rejected by the coin gauges and returned to the caller. The coins after insertion are held in suspension in a pivoted container which is controlled mechanically by two press buttons A and B. On a successful call, the depression of button A deposits the coins in the cash-box beyond the further control of the caller, and auxiliary contact springs set up the necessary circuit conditions for speech. If the call cannot for any reason be completed, the depression of button B returns to the caller any coins held in the container.

The insertion of coins in excess of the local fee as required on junction and trunk calls, etc., is checked by the controlling operator by means of gong signals. Each penny inserted strikes a wire gong once, each sixpence inserted strikes a bell gong

once, whilst each shilling strikes the same bell gong twice. The gong signals are made audible to the operator by means of a small microphone fitted inside the bell gong. The whole mechanism of the coin-box is hinged to facilitate maintenance and the electrical connexions are made by means of a carried out automatically. In the one-button type, the A button is eliminated by the provision, in series with the line, of a polarized relay, which responds to a reversal of line current when the called party answers. The operation of this relay releases the pivoted coin container which moves to

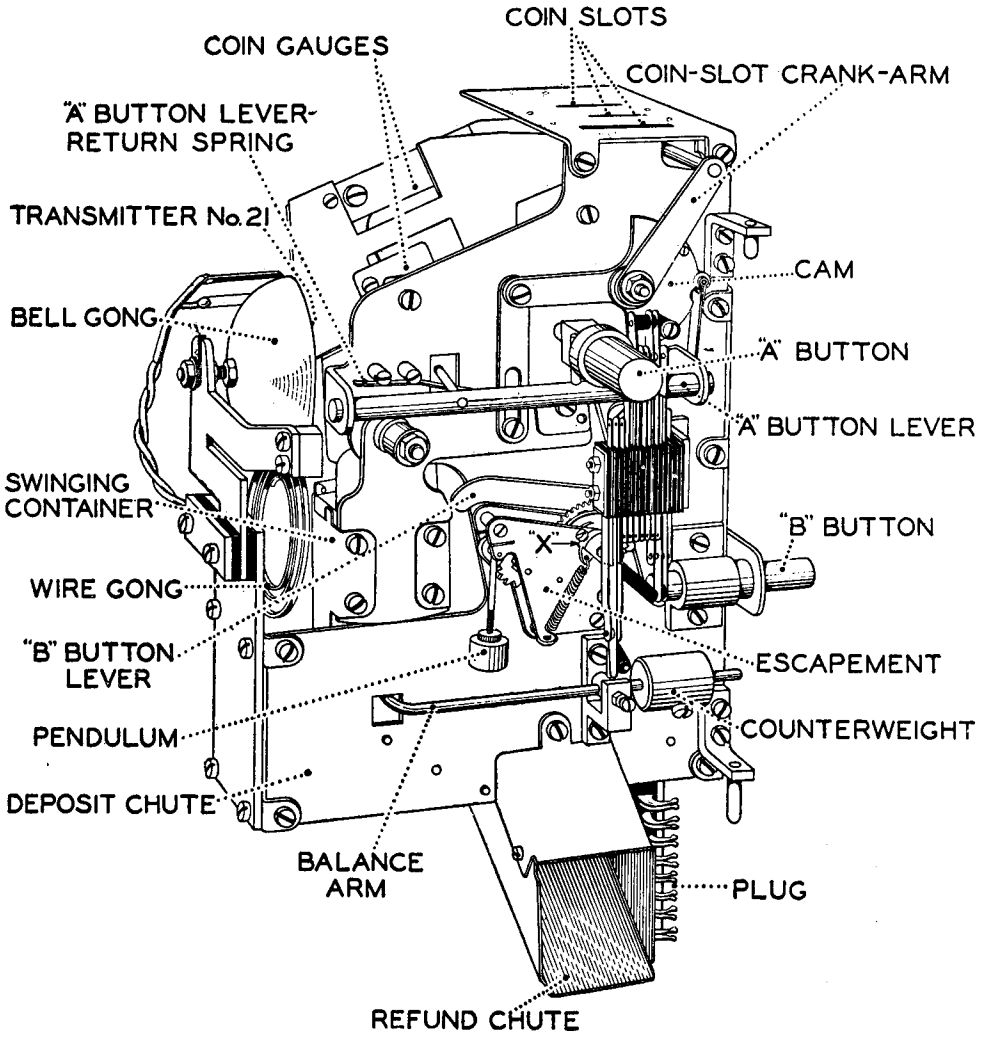


FIG. 262. PREPAYMENT COIN-BOX MECHANISM
Box, Coin Collecting No. 14.

special plug and jack. The same coin-box is used in both manual and automatic areas but in the former case an auxiliary relay unit is required.

Single Button and Buttonless C.C.B.s. The Post Office has standardized the two-button type of prepayment coin-box. C.C.B.s have, however, been designed and have been used to some extent abroad where the A and B button functions are deposit the coins in the cash-box. The B button is retained to swing the coin container to the refund chute for ineffective calls.

In the buttonless type of coin-box the B button is also eliminated by mechanically coupling the pivoted coin container to the receiver switch-hook. The mechanism is arranged so that when the receiver is replaced, the coin container is swung to

the refund chute thereby returning any coins not previously deposited in the cash-box.

Prepayment C.C.B. on Automatic System. The circuit arrangements of a coin-box installation connected to an automatic exchange are shown in Fig. 263. In the normal condition the speaking and bell circuits are similar to an ordinary telephone, but the impulsing contacts of the dial are short-circuited by contact springs *CB*2 and *D*9/0. When the digits 9 or 0 are dialled the short circuit is removed at ***D*9/0** by a special cam fitted to the dial (see Chap. VIII). This enables calls to be made to the operator or emergency calls (when the facility is provided) to 999 without the prior insertion of coins.

When a local number is required, the first penny inserted operates the three ***CB*1** contacts, thus short-circuiting the speech transmitter and removing the short circuit from the coin-box transmitter (CBX). A 200 Ω non-inductive resistance is also placed in shunt with the receiver to degrade reception and to

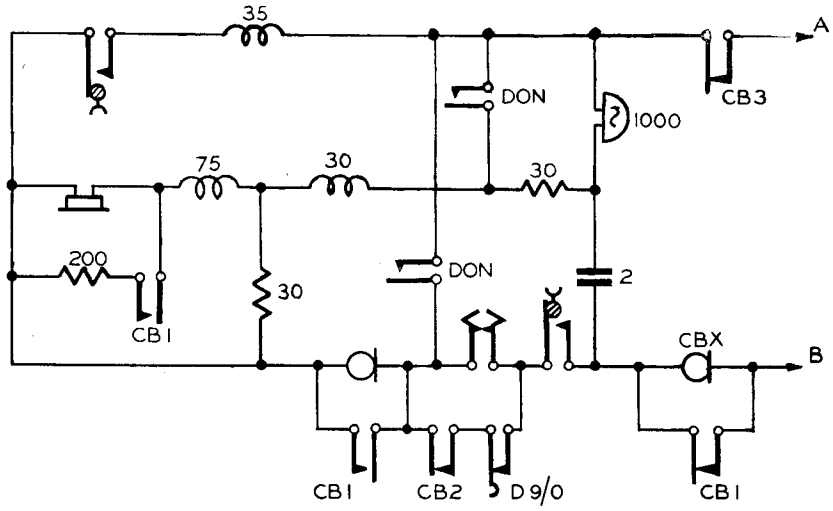


FIG. 263. PREPAYMENT CALL OFFICE CIRCUIT IN AUTOMATIC AREA

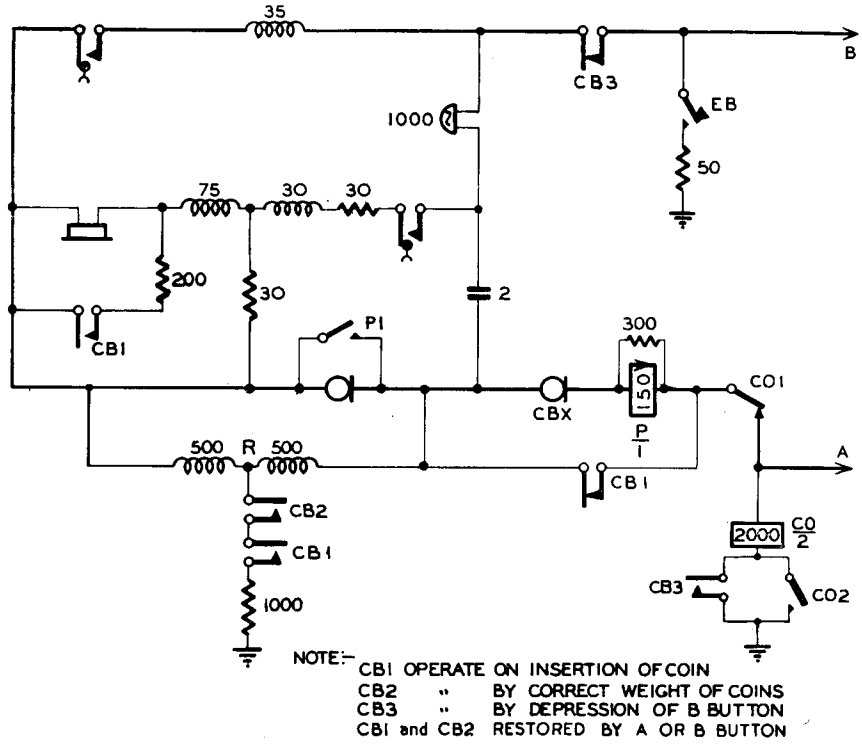


FIG. 264. PREPAYMENT CALL OFFICE CIRCUIT IN A C.B. AREA

prevent the receiver from being used as a transmitter to produce false gong signals. The first penny comes to rest on the balance arm, but does not operate it. The weight of the second penny added to the first moves the balance arm which in turn operates contact ***CB*2** and removes the short circuit from the dial impulse springs. The caller is now able to dial the number required. When the called subscriber answers, the caller depresses button A which deposits the coins in the cash-box and restores contacts *CB*1 and *CB*2. Conversation can now proceed. If the call is ineffective, the caller recovers his money by pressing button B. This operation restores contacts *CB*1 and *CB*2 as when button A is depressed but also opens contact ***CB*3.** The latter are kept open for

a period of about 7 seconds by means of a clockwork escape mechanism and so ensure that any connexion set up is released.

Prepayment C.C.B. on Manual System. Additional equipment (Fig. 264) is required when a prepayment C.C.B. is used in a manual exchange therefore in circuit, and the caller can pass his request to the operator and the latter can hear the gong signals of any excess fee. The second winding of retard R ensures that both lines are approximately balanced to avoid noise at this stage. Special connecting circuits are provided at the

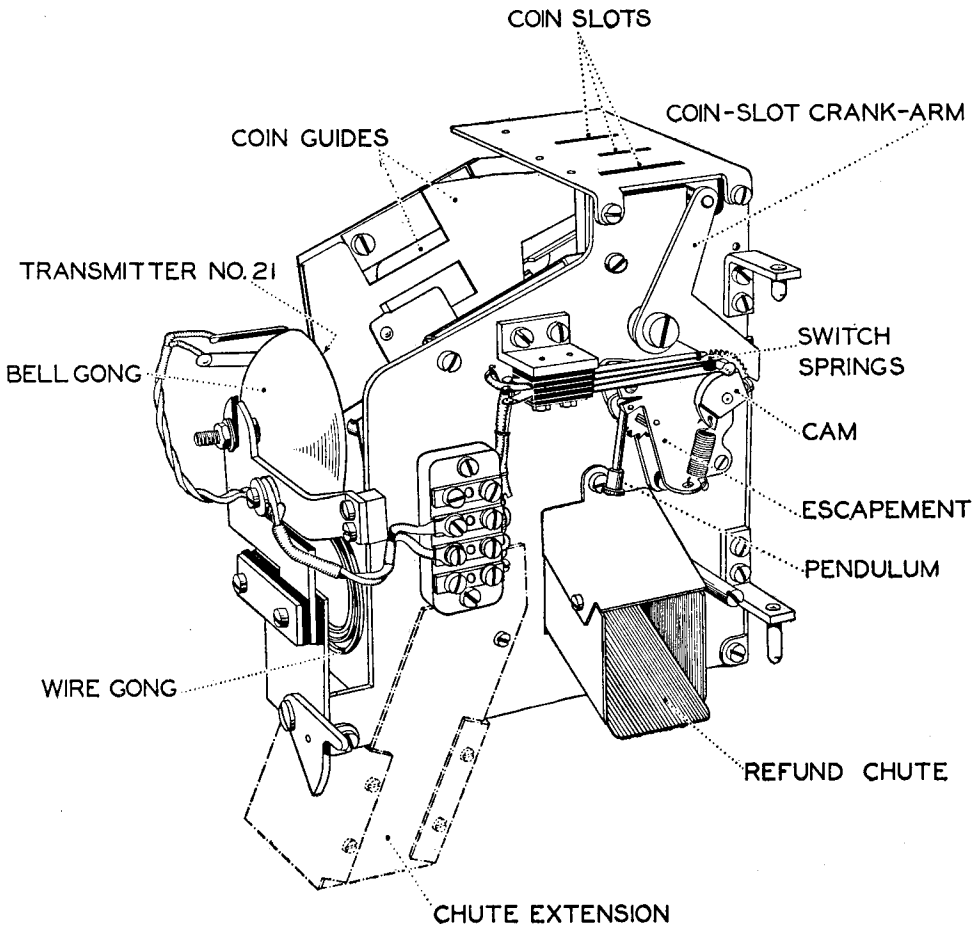


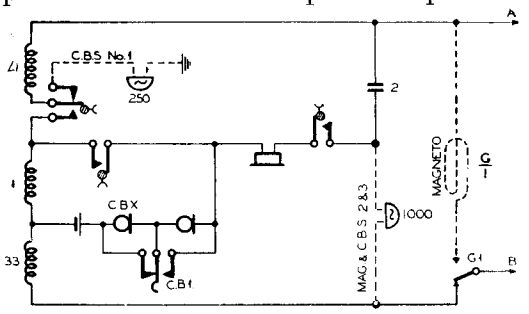
FIG. 265. POSTPAYMENT COIN-BOX MECHANISM
BOX, COIN COLLECTING NO. 16.

area due to the need for the caller to speak to the operator before the call can be established. The line termination of a C.C.B. line at the exchange, is, as will be seen later, modified to receive an earth calling signal instead of the usual loop. The insertion of the two pennies operates contacts ***CB*1** and ***CB*2** and a high resistance earth calling signal via one 500 Ω winding of retard R is applied to the B-line. The polarized relay P is so connected that when the operator answers, the direction of the current in the line does not operate the relay. Both the coin-box and speech transmitters are exchange (see Chap. XVI) which, when connexion is made to the called party, reverse the current in the call office line. This reversal operates P, which in turn short-circuits the speech transmitter at ***P*1**. When the caller hears his correspondent he presses button A, which deposits the coins and by short-circuiting P at $CB1$ cuts out the polarized relay and coin-box transmitter. At the same time, the short circuit is removed from the speech transmitter at $P1$. Conversation can now proceed.

If the call is ineffective the depression of button B returns the coins to the caller and operates

contacts ***CB3***, which gives a clearing signal to the operator. If the call has been extended, one contact of ***CB3*** applies earth to relay *CO* which operates and locks via its own contact (***CO2***) to the battery on the *A*-line. The line is now disconnected at ***CO1*** thereby giving a continuous clearing signal until the operator takes down the connexion and releases *CO*.

Emergency calls can be obtained, without the insertion of coins, by the momentary operation of the emergency button (*EB*). A low resistance earth (instead of the usual high resistance earth) is applied to the *B*-line which operates a special relay



NOTE CONTACTS C.B.1 OPERATE AS COIN IS INSERTED

FIG. 266. TYPICAL POSTPAYMENT CALL OFFICE CIRCUIT

at the exchange to give a distinctive flashing signal to the operator.

Postpayment Call Office Circuit. It is not practicable to utilize the C.B. prepayment C.C.B. circuit in any area where local battery transmission exists, owing to the insufficiency of line current to operate relays *P* and *CO*. It is, moreover, undesirable at the smaller exchanges to provide special cord circuits for coin-box lines. The postpayment coin-collecting box (Fig. 265) is based on the same general design as the prepayment type but the absence of A and B button mechanisms and the associated switching springs makes the unit much simpler. Only one spring set is associated with the box. The contacts are operated when any coin is inserted, and an escape mechanism retains the contacts in the operated position for several seconds, i.e. until the coin has passed the coin-box microphone.

A typical postpayment call office circuit is shown in Fig. 266 which indicates the several alternative connexions required for C.B.S. Nos. 1, 2, or magneto working. An outgoing call is made in the usual way and, when the operator has obtained the required subscriber, she requests the caller to insert the necessary fee. As each coin is inserted contacts ***CB1*** operate to remove the short circuit from the C.C.B. transmitter whilst the coin hits the appropriate gong. These same contacts also short-circuit the speech transmitter during this period to avoid interference with the gong signals and to prevent the production of bogus signals.

Call Office Equipment. It is important that the lay-out of equipment in a public call office should

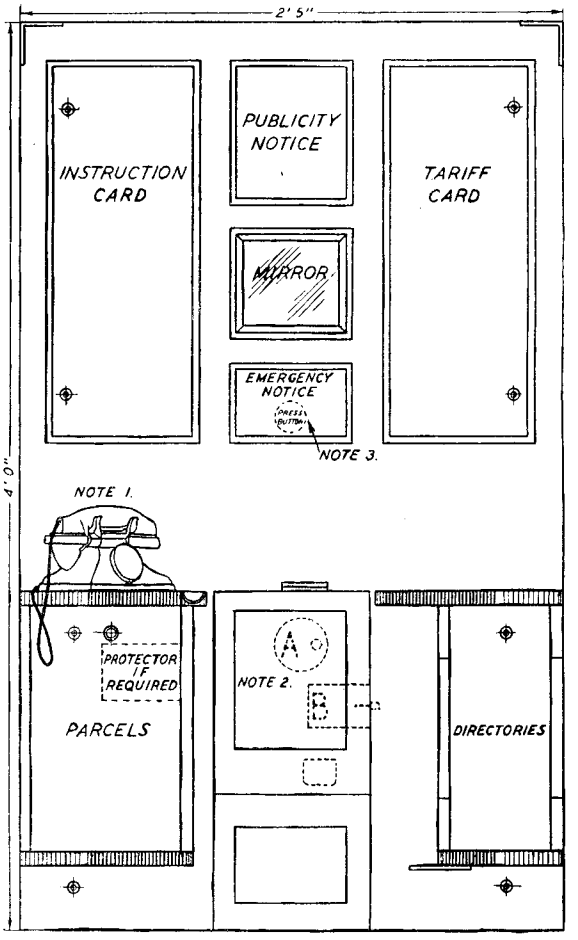


FIG. 267. LAY-OUT OF CALL-OFFICE EQUIPMENT

Note 1. Type of telephone depends on local exchange system.
Note 2. Prepayment or postponement C.C.B. as required.
Note 3. Emergency button required only on C.B. system.

be both convenient and attractive. The very neat and pleasing assembly shown in Fig. 267 has now been standardized for all new call offices. The base of the assembly is a plywood board faced with thin black bakelite sheet. The wallboard is in two parts. The upper part accommodates the various instruction cards, etc., and a bevelled mirror which are mounted in stainless steel frames. In C.B. areas, the emergency call press button is also mounted on the upper part of the wallboard. The centre of the lower part of the wallboard is occupied by the coin-collecting box which is framed on the left and

right by receptacles for parcels and directories respectively. The tops of the receptacles are of the same bakelite faced plywood as the wallboard and, with the top of the coin-box, form a continuous shelf. The stainless steel fitments of the receptacles provide places for a cigarette or pipe and an umbrella.

The instrument is of the microtelephone type

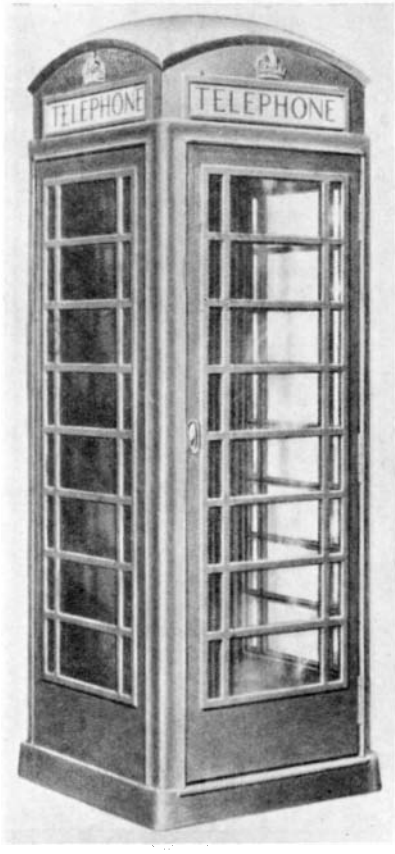


FIG. 268. STANDARD TELEPHONE KIOSK
Kiosk No. 6.

and is screwed to the top of the parcels receptacle. The cord is of the tough rubber-covered type and passes behind the wallboard to the coin-box. The induction coil, bell, relays, etc., are mounted on a metal base-plate which is placed at the rear of the coin-box mechanism. The protector and batteries when required are enclosed at the rear of the parcels receptacle behind an ebonized wood partition.

Kiosks and Cabinets. Apart from certain special cases, call offices may be installed either in existing premises by the provision of indoor cabinets or in the open by erecting suitable kiosks for the accommodation of the telephone apparatus. Cabinets provide little scope for standardization due to the different accommodation available in various offices and to wide variations in the decorative schemes. Indoor cabinets are usually of hardwood construction, although special sound-absorbing material such as prepared cork has been used for the walls of telephone cabinets. In the design of a suite of cabinets one of the major problems is to provide sufficient sound insulation coupled with the maximum degree of ventilation.

Originally telephone kiosks were of wooden construction although reinforced concrete and cast-iron assemblies have been extensively used. Reinforced concrete kiosks (P.O. Kiosk No. 3) until a few years ago were standard for urban areas. Experience has shown that concrete is difficult to obtain in standard quality and the component sections are somewhat fragile.

The standard Post Office kiosk (Kiosk No. 6) is illustrated in Fig. 268. It was designed by Sir Gilbert Scott and has been approved by the Royal Fine Arts Commission. It is constructed of some eighteen cast-iron piece parts. All parts are of the best grey cast-iron and considerable care is taken to ensure that all joints are carefully faced and fitted and all screw holes are accurately drilled to template before the assembly leaves the manufacturer's premises. To suit all conditions of use, the kiosk is made in four types, known as A, B, C, and D. All models are identical in construction except for the position of the door. The door itself is of teak and is glazed to match the side units of the kiosk. Restraining straps are fitted to prevent strain on the hinges and a special type of door closing spring is provided which gives, by means of an oil check action, a rapid closure of the door up to approximately 1 in. of the closed position and a very slow final movement which prevents slamming or shock to the kiosk assembly. The whole kiosk is painted Post Office red and the total weight without apparatus is some 13 cwt.

Kiosk Lighting. Electric light is normally provided in street kiosks whenever public supply mains are available. In some cases arrangements are made with the appropriate lighting authority for connexion to be made to the street lamp circuit so that the kiosks are automatically lighted at the same time as the street lamps. This scheme is not practicable where local time switch control of the street lights is in operation, and in these circumstances individual Venner time switches are fitted in the kiosks. A typical Venner time switch is illustrated in Fig. 269. This particular model is spring-driven, and is electrically wound every 8 h by means of a small electric motor. To guard

against stoppages due to failure of the power supply the clock is provided with three days spring storage, and should such a failure occur the clock winds itself fully immediately the supply is resumed.

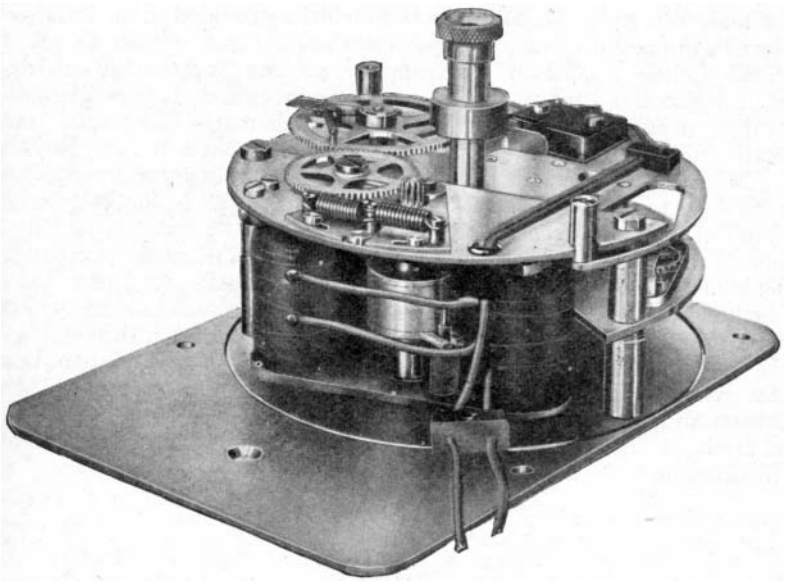


FIG. 269. MECHANISM OF VENNER TIME SWITCH

Another type of time switch incorporates a synchronous motor and this type is being increasingly used where time-controlled a.c. supply mains are available. The solar dial (Fig. 270) is a device that automatically corrects for the lengthening and shortening of the days throughout the year. It is generally adjusted to switch on the kiosk light one hour after sunset and to extinguish the light one hour before sunrise. In the British Isles ten different types of solar dial are provided to cater for the variations in solar time at different latitudes.

Lamp Calling Telephones. In certain circumstances the provision of a lamp calling signal at the telephone instrument is very advantageous. Except in special circumstances, the circuit is arranged so that the ordinary magneto bell also operates in addition to the lamp calling signal. The equipment required consists of a relay which will respond to the ringing current sent out from the exchange with a mercury tube contact to control a mains energized lamp. There are several different schemes. On an automatic system "discontinuous indication" is often adopted. With this arrangement the lamp flashes in response to the ringing current and is eventually extinguished when the ringing ceases, i.e. when the called party answers or when the calling subscriber abandons the call. In manual switching systems the relay which responds to the ringing current is arranged to lock in the operated position when it is energized. The signal lamp therefore remains alight until the locking circuit is broken either by the operation of the cradle switch when the telephone is answered or by the operation of a separate release press button associated with the relay switch.

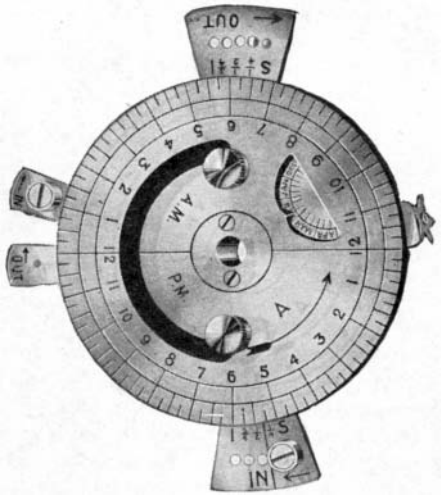


FIG. 270. VENNER SOLAR DIAL