THE JOURNAL OF THE
ELECTRICAL HOROLOGY SOCIETY
CHAPTER #78 NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS
VOLUME XXI, #1, MARCH 1995

Fellow Horologists:

This, our first issue of 1995, includes the customary dues reminder, which applies **only to those members with a dues notice included herein.** Just as some of us forget that the annual payment comes due at the end of each year, others do remember, and frequently make duplicate payments, having forgotten that they've already paid! Again, <u>if</u> a notice is included, you owe 1995 dues and this will be your final issue unless payment is made, otherwise, you're all paid up for the current year.

When necessary to communicate with Chapter 78 officers and committee people, a recap of their positions and areas of responsibility might be helpful...

President....... Martin Swetsky, FNAWCC }
Vice-President.. Dr. George Feinstein } Journal Editorial Team
Sec'y-Treasurer. Harvey Schmidt }
2nd Vice-Pres... H. Wm Ellison, Arranges for EHS programs at Regionals & National Conventions
Publicity Committee... Herb Freeland , Chapter Highlights and Public Relations

Additionally, Dues payments go to Harvey Schmidt and requests for previously published material reprints should be directed to the Chapter Historian, Dr. George Feinstein. (Addresses on MART pages.)

In addition to our ongoing ITR series which includes material covering early testing systems along with battery and synchronizing information, we include a reprint of a NATIONAL SELF-WINDING catalog. This is especially interesting as a follow-up to Journal issue #4 of 1994 in which we published copies of the patents, and letters from SHELBY S. BESORE, the clock's inventor. You may recall the level of frustration exhibited by Mr. Besore when he was unable to realize any profit from the fruits of his labor, and offered to swap the patents for "a yaller dog". It appears that a factory was built, the clocks manufactured and brought to market, but by whom? Did Mr. Besore find a backer, sell the patent rights, or trade for the dog? Anyone with information that could fill in the gap between the letters of June 28, 1915, and the construction of the manufacturing facility, of unknown date, would find a welcome for the material, and appreciation from the membership.

Thanks to David Lee for his contribution of this material... David is a frequent and generous contributor to the journal.

Martin Swetsky, FNAWCC, President
Harvey Schmidt }
Dr. George Feinstein } Co-Editors

Engineering Bulletin

No. 8 International Time Recording Co., of N. Y. ENDICOTT, N. Y. September 1, 1919

Devices Suitable for Testing Electric Time Systems and How to Use Them

By J. W. Bryce, Supervising Engineer

J. W. BRYCE

No attempt will be made in the short space in this bulletin to treat this matter at all exhaustively, but the writer will try to describe a few simple methods by which wiring, magnets, batteries, etc., may be tested for faults, etc.

In order to get results that are at all reliable and from which information may be gained by which trouble may be corrected, a reliable voltmeter and an ammeter must be available. With this instrument and an elementary knowledge of electricity much information about the condition of the apparatus and wiring may easily be had.

For example, by its means the resistance of a magnet may be readily found, etc. The writer does not claim that the methods outlined will result in perfect accuracy, but it will give results in a simple way and with results sufficiently accurate for ordinary commercial use. In fact, the degree of accuracy obtained will largely depend upon the care, skill and knowledge of the user.

Fortunately, a reliable portable ammeter and voltmeter may be had combined in one instrument. For the particular uses we have in mind an instrument made by the Weston Electrical Instrument Company, of Newark, N. J., and known as model 280 Volt-Ammeter is strongly recommended. This instrument is made in a variety of ranges but that known as a triple range instrument is the one most useful. It has what is known as a 30 division scale and is calibrated to read volts 150-15-3 and amperes 30-3-1.5, which means that connected to one set of terminals it will read any voltage up to 150 and to another set any voltage up to 15 and to the third, 3 volts will move the needle clear over to the end of the scale. Similarly, three terminals are provided which give a full scale deflectionwith 30 amperes, 3 amperes and 1.5 respectively.

It will be apparent from the above that a little care will have to be erexcised in the use of such an instrument to prevent damaging it. It is built as delicately as a watch and as much care should be taken in handling it. It is intended for use on direct current circuits and must be connected to the proper polarity of the circuit to indicate. When nothing definite is known about a circuit the instrument should be connected to the 150 volt terminal first and the voltage of the circuit determined before any of the lesser scales are used. If this is not done, there is danger of ruining the instrument the **instant** it is connected. Generally, it is known whether the circuit is a standard 110 volt circuit or a 220 volt one, and needless to say, if it is 220 this instrument should not be connected.

Fig. 1 is a face view of the instrument described above.

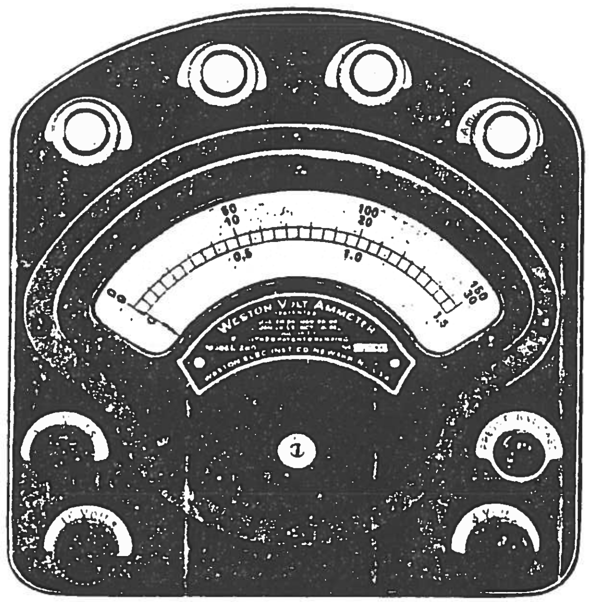


Fig. 1

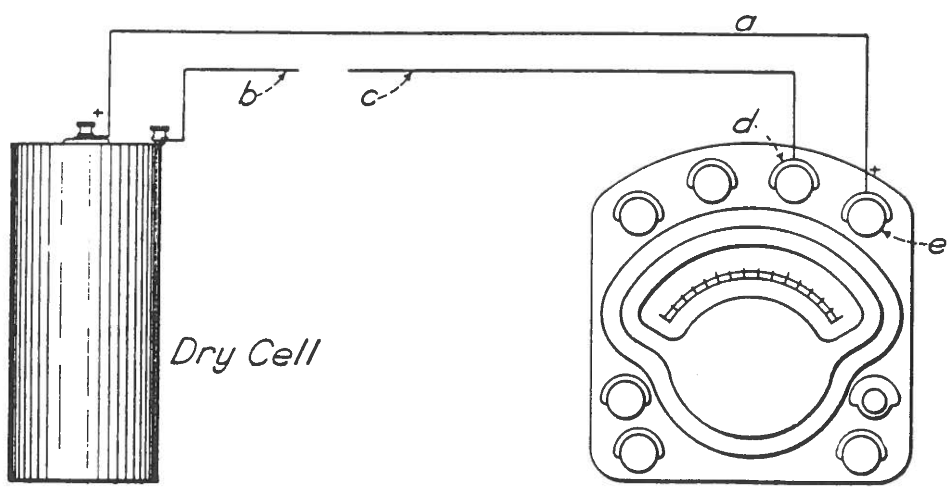


Fig. 2

TO TEST A DRY CELL

Let us first see how this instrument may be used to test battery cells. First of all let us use it for testing a dry cell. To do this wire "a" (see Fig. 2) should be connected from the positive terminal of the cell to be tested to terminal "e" of the instrument marked "Amps or Volts +" a wire "c" connected to terminal "d" of the instrument marked "30 Amps." If this wire "c" is now brought in contact with wire "b" attached to the negative terminal of the battery, a current will flow through the instrument and a deflection be obtained which is a direct measure of the condition and quality of the battery. If a cell gives anything less than 18 amperes it indicates either the cell is old or is made of inferior materials. The indication should be anywhere from 18 to 25 amperes. The contact should only be made just long enough to get a reading. Never connect a storage cell in this way as it will likely burn out the instrument.

It is useless to take a voltage reading of a dry cell, unless it is delivering some known amount of current at the time the reading is taken, because an old or exhausted cell will read full voltage or near it on open circuit.

TO TEST THE RESISTANCE OF A MAGNET

The instrument, magnet and source of steady direct current should be connected as shown in full lines in Fig. 3. It is suggested here that a wire first be connected as shown in dotted lines so that the voltage of the current source may be measured. If nothing is known about the magnet, wire "d" should be first connected with terminal "g," but if a low voltage is used and it is known that the magnet is not short circuited and approximately its resistance, it may be connected at "f". Let us assume, when the voltage of the current source was measured it was found to be 50 volts. Let us further assume when the magnet, etc., is connected as shown, we get a deflection of .2 amp., it follows from Ohm's Law that $R = \frac{E}{C}$ the resistance is 250 ohms. This is found by dividing electromotive force (E) 50 volts by the current (C) .2 ampere.

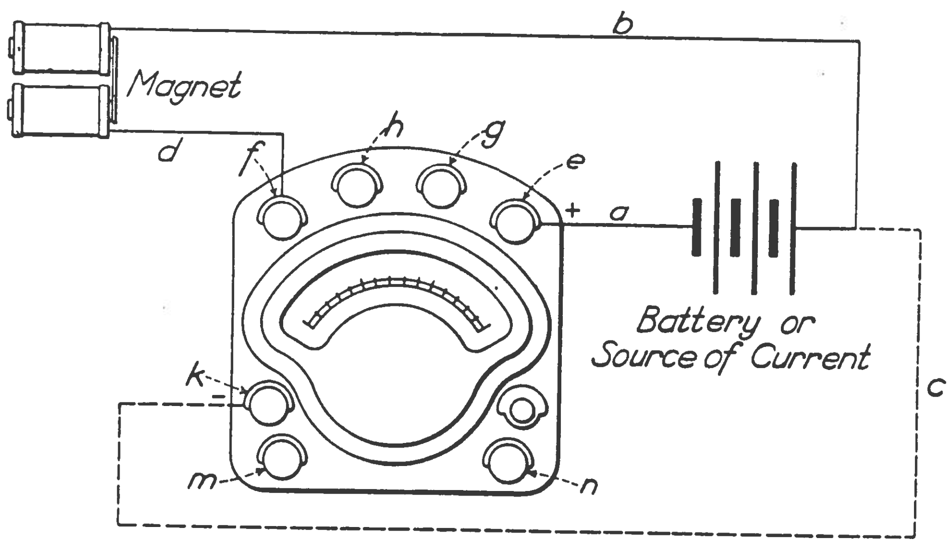


Fig. 3

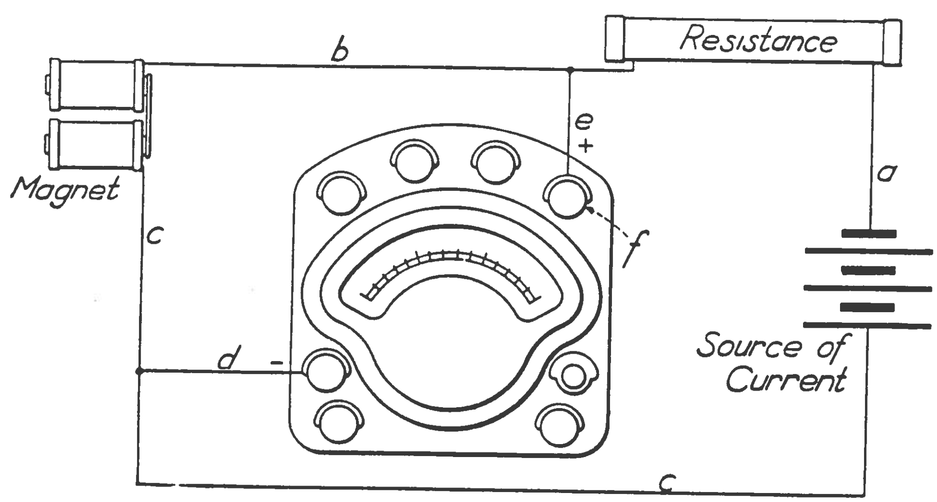


Fig. 4

TO ESTABLISH OR VERIFY SPECIAL CONDITIONS IN CIRCUIT

Referring to Fig. 4, suppose we want to have 24 volts on the magnet and the source of current is 50 volts. Suppose after installation we want to verify the conditions. It is simply necessary to connect the voltmeter as indicated in Fig. 4, and push the button marked "Press for Voltage." If the resistance is not correct and the voltage is much above or below the required amount, the correct resistance may be figured from Ohm's Law. In this case total voltage is 50, magnet is to have 24 ohms, so there is to be 26 volts across the terminals of the resistance. The current required by the magnet, we will assume to be .2 ampere as we have previously tested its resistance and found it to be, say, 120 ohms. Then it follows the resistance to be used in series will amount to $R = \frac{E}{C}$ 26 volts divided by .2 ampere—130 ohms.

TO TEST THE CURRENT REQUIRED BY A SYSTEM

It is merely necessary to insert the **ammeter** in series with the entire equipment. It should be connected to the terminals which are marked with amperes sufficient to carry the current safely just as is indicated in full lines in Fig. 3, connecting to terminals "f", "h," or "g," as may be required.

TO TEST THE VOLTAGE OF A SYSTEM

A wire should be connected to terminal "e" (See Fig. 3) and another to either "k," "m,"

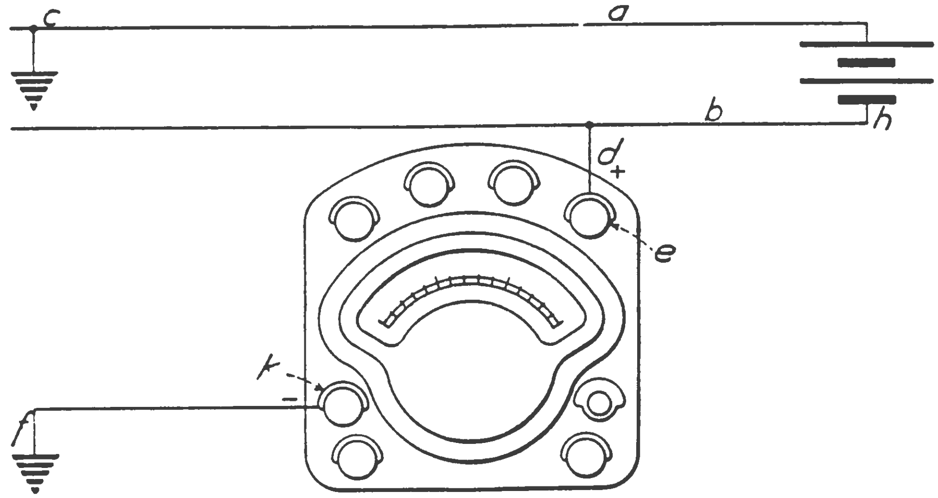


Fig. 5

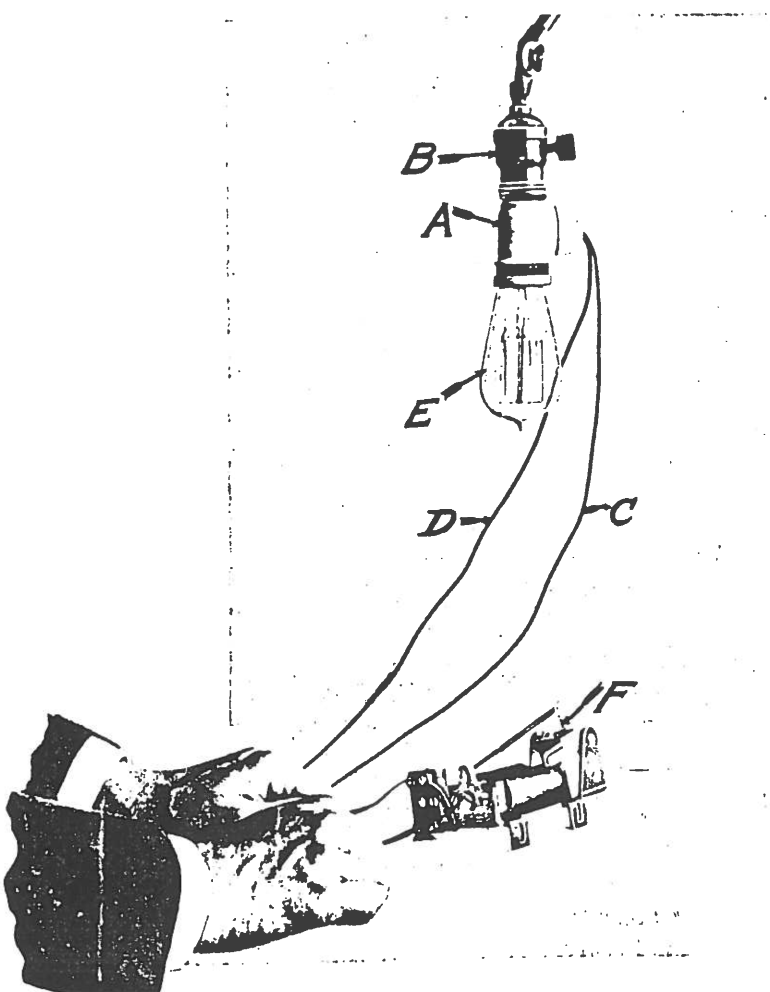


Fig. 6

or "n," preferably beginning with "k," as "n" connection is really intended for reading the voltage of an individual cell or across a very low resistance magnet.

The two wires mentioned, should now be connected to the feed wires at the point in the system where the voltage is required to be known.

It is to be noted that the **ammeter** connections are to be used in **series** with the equipment to be measured and the **voltmeter** connections are to be connected in **multiple** or parallel with the equipment.

HOW TO DETECT A GROUND

Referring to Fig. 5, assume "a," "b" are the main circuit wires of a time system. Connect a source of voltage, the higher the better, up to say 150 volts, across the wires "a" and "b," first disconnecting all apparatus. Connect to line "b" a wire "d" to terminal "e" of the voltmeter and connect terminal "k" by wire "f" with the earth or "ground." If the button on the instrument now be pressed a deflection will indicate a "ground" on wire "a." The resistance of the ground will be indicated by the amount of the deflection one gets on the voltmeter scale.

By varying the connections the opposite wire may be tested and similarly any other apparatus or parts of the system.

The regular lighting or power circuit must **not** be used for a test of this kind, as they are frequently grounded and a little reflection will show that one might easily be misled into thinking they had a fault on the particular circuit under test when it was really somewhere else.

Where the voltmeter described is not available, a simple method of testing for grounds in apparatus especially, is shown in Fig. 6. "B" is an ordinary lamp socket (A. C. or D. C. will do) into which is inserted a Hubbell **series** plug (manufacturers Cat. No. 5736). "E" is an ordinry incandescent lamp. With current "on" at the socket, it is necessary to bring the wires "C" "D" into contact to cause the lamp to light. Now, if the magnet shown at "F" is suspected of being grounded, touch one of the wires to one of the **terminals** of the magnet and the other to the core or framework. The lamp should not light. If it does, the magnet winding or the terminals are in contact with the core or framework. Note that if D. C. is used for testing the continuity of the winding it may be tested this way provided the resistance of the magnet is not too high. In other words it may be tested for open circuit.

It is also well to know that if A. C. is being used both terminals will have to be tested individually and successively, as the inductive reactance of all these magnets likely to be encountered will be high and on A. C. will act like a very high resistance. For example, a magnet of say 20 ohms actual resistance may easily have an inductive reactance on an average A. C. commerical circuit of over a thousand ohms.

The diagram of the circuit of the apparatus shown in the photograph in Fig. 6 is shown in Fig. 7, where "a" and "b" indicate the 110 volt electric light lines and "c" and "d" the wires coming from the Hubbell Connector and "e" represents the electric light bulb. This method is more or less rough and ready and will not detect a "leak," but will show a bad ground. It is not to be compared with the use of the volt ammeter in furnishing information.

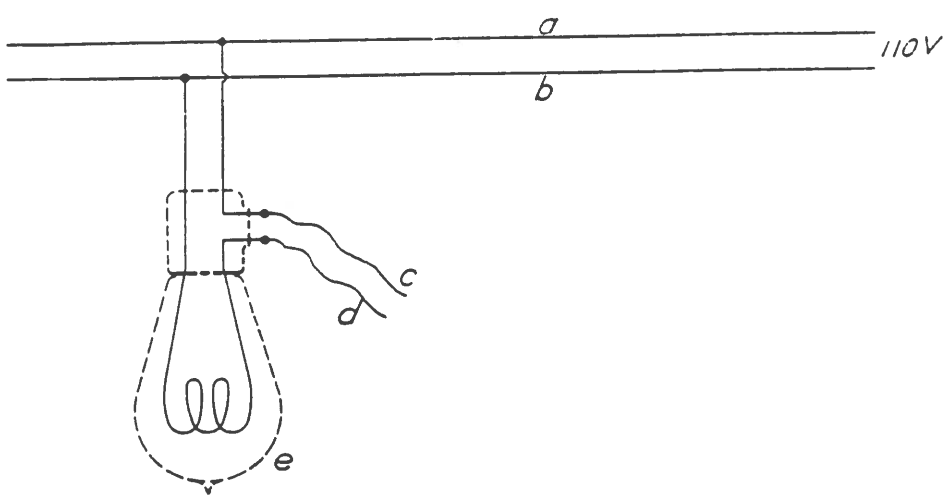
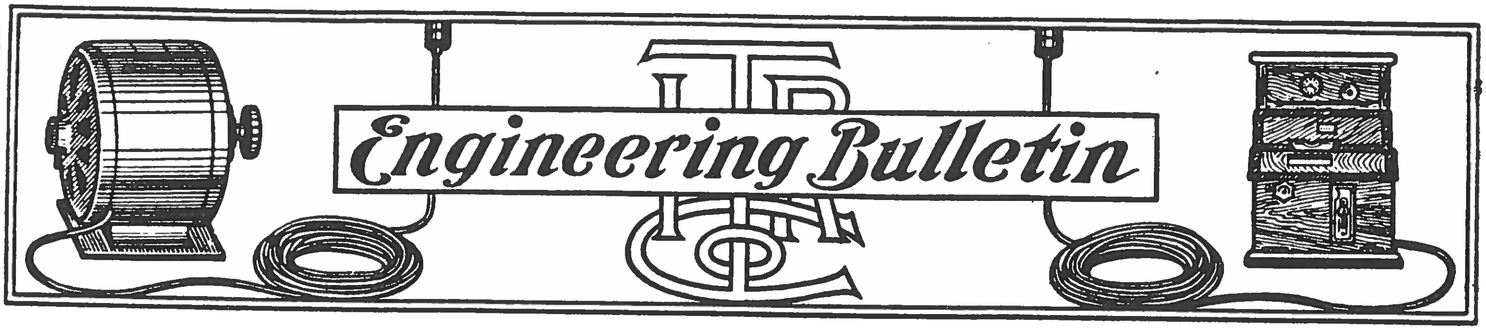


Fig. 7



No. 9 *International Time Recording Co., of N. Y.* **ENDICOTT, N. Y.** **September 15, 1919**

THE EDISON PRIMARY BATTERY FOR SMALL EQUIPMENTS

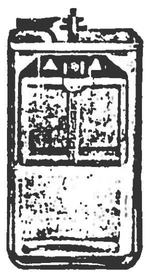


Fig. 1

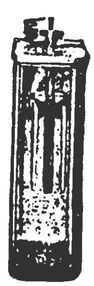


Fig. 2

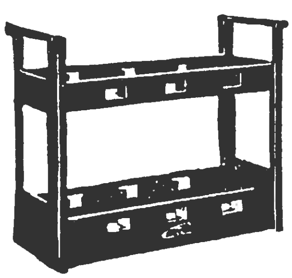


Fig. 3

By J. W. Bryce, Supervising Engineer

Due to the complication and expense in the installation of storage batteries in small equipments, it has been proposed to use primary batteries as the source of energy for them. Of all the primary batteries known at the present day and in commercial use, the Edison Primary battery is perhaps the best because of its ability to stand for long periods without deterioration and because of the steadiness of the current supplied by it.

In this bulletin the writer will endeavor to set forth some of the characteristics of this battery and give some general idea of its capacity and its limitations.

As a general rule it may be stated that electricity generated by chemical action in a primary cell is the most costly of all methods so far as actual cost of current is concerned but there may be reasons such as convenience, etc., that indicate the use of such primary cells.

It must also be remembered that the reason for the employment of these cells at all on clock systems, is to obtain an arrangement that is more convenient to set up and which eliminates the use of more highly insulated circuits and, therefore, more expensive circuits) and to escape the frequent recharging needed by a storage battery together with the expense of the charging equipment.

In these cases where an A. C. lighting current only is available for charging storage batteries, the use of a rectifier is imperative and as is well known these are expensive items.

If the matter is figured out, however, it will be found that if anything but a **small installation** of time recorders is contemplated the cost of storage batteries and their attendant devices will be less than the cost of installation and maintenance of primary batteries.

The Edison Battery is described very fully in publications of the manufacturer, Thomas A. Edison, Inc., Bloomfield, N. J. Extracts from one of these booklets follows:

"The Edison Primary Battery (assembled type) is the latest development of, and embodies all of the good features and many improvements over, the class of cells formerly known as the Edison Lalande, and latterly as the Edison-Bsco Battery, or in general, that class of primary cells belonging to the copper-oxide, zinc and alkaline electrolyte group. The elements or active materials of Edison Primary cells are the same as in the earlier types, but a remarkable gain in efficiency and effective capacity has been secured by better proportioning of active materials, and increased conductivity made possible by the improved method of suspension.

The distinctive features of the Edison Primary Cells (assembled types) are the careful selection, treatment and scientific proportioning of active materials; the effective means by which the plates are suspended in the electrolyte; the simplicity and ease of installation; the extreme care used to insure uniformity; and the visible indication of approaching exhaustion.

The copper-oxide and zinc plates are so proportioned and located as to obtain the greatest amount of energy with the least waste of active material.

ACTIVE MATERIALS

The copper-oxide plate with metallic copper surface serves the double purpose of electro negative plate (positive pole) and depolarizer. The plate is made of black oxide of copper (cupric oxide) formed under great pressure, and baked at high temperature, producing a plate of uniform structure, with all particles in forcible contact. As black copper-oxide in itself will not conduct electricity, a thin film of metallic copper is produced on the surface of the plate.

The zinc plates are made from the best and purest grade of zinc that can be obtained and are amalgamated with mercury. All metallic parts in contact with the zincs are also heavily amalgamated with mercury to prevent local action.

Earlier types of the cell had zinc of uniform thickness, resulting in a gradual reduction of the surface as the plates were dissolved and a corresponding decrease in efficiency. This has been overcome almost entirely by the improved construction. The zinc plates have reinforced ribs of sufficient thickness to retain the full surface area of zinc until the rated capacity has been discharged. When the rated capacity has been attained, holes appear in the lower panels, indicating that the cell is nearing exhaustion.

The electrolyte or solution is made by dissolving caustic soda (sodium hydroxide) in water, as directed. The soda furnished with Edison Cells and Renewals is a special grade of exceptional purity. Each can contains the proper amount of soda for one cell. The label on each can of soda indicates the type of cell for which it is intended. It is important that the proper grade and amount of soda be used in mixing up the solution. Ordinary commercial caustic soda is not suitable for use with these cells because of the wide variations in percentage of alkalinity and the impurities contained therein.

The oil supplied with these cells and renewals is of heavy mineral variety, particularly selected because it has no chemical action on the soda solution nor the frame. The object of the oil is to prevent evaporation and to keep the solution from exposure to the air, thus preventing the weakening of the solution by the formation of sodium carbonate. It is important that the proper oil be used, as many oils will be attacked by the caustic solution, forming a soapy material which does not protect the electrolyte from evaporation and carbonation.

HEAT RESISTING GLASS JARS

The glass jars furnished with Edison Primary Cells are made of special heat resisting glass, which has been developed especially for alkaline solution battery purposes, and have greater mechanical strength and uniformity in capacity than porcelain jars. They have been tested for more than five years under the most severe laboratory and service conditions. One of the most important advantages derived from the use of heat resisting glass jars is better inspection of the cells because of the jars being transparent. Cells with Heat Resisting Glass Jars are especially recommended.

Jars made with ordinary glass should not be used with these cells, because glass not especially prepared for the purpose will be attacked by the alkaline solution. Ordinary glass jars will break in service when subject to change in temperature, or for other reasons.

INDICATIONS OF EXHAUSTION

When a cell is exhausted, the zinc plates will have become thin and there will be holes in the lower part of the plates. The copper-oxide plate will be reduced to metallic copper except for a thin layer of black copper-oxide in the middle of the plate. The solution will also be exhausted, as it will have become saturated with the zinc dissolved from the zinc plates, and of no further value as electrolyte.

SELECTION OF CELLS

Edison Primary Cells have been developed in recent years, to such a high state of perfection, and the cost of primary battery power has been so much reduced thereby, that these cells are now used and are adaptable for many purposes, which heretofore were considered beyond the realm of primary cells.

Edison Primary Cells are equally suitable for open circuit (intermittent discharge) or closed circuit (continuous discharge.)

It is important in order to obtain the best results, that the proper number of cells be used to furnish the necessary working voltage and that the type selected be large enough to deliver the current required. In cases where the flow of current will be comparatively high (three to five amperes), or where the circuit will be closed continually at other than very low current rates, Edison Primary Cells of high capacity should be selected, since the larger types have very low internal resistance and long life, and will give the most satisfactory results at the lowest maintenance cost.

The open circuit or initial voltage of all Edison Primary Cells is .95 volt per cell; but in all cells, either primary or secondary, the initial or open circuit voltage is higher than the effective or working voltage on continuous or closed circuit. This high initial voltage is effective for work only when cells are discharged at an extremely low current rate, and in some cases such as the ordinary "dry cell" even at low rates of discharge, it is available only for intermittent contacts of short duration.

Edison Primary Cells are highly economical for open circuit work because of the high voltage available for intermittent contacts of short duration, and the absense of local action.

The closed circuit or effective voltage depends, in all cases, upon the frequency and duration of contacts, internal resistance of the cell and the rate of current discharge, the voltage dropping proportionately as the rate of current flow is increased. With the 500 ampere hour types of Edison Primary Cells, for example, the average voltage on continuous closed circuit, with current flowing at the rate of one-half ampere, is .65 volt per cell; at one ampere .62 volt per cell; at two amperes .58 volt per cell; at three amperes .55 volt per cell, and so on. Corresponding results will be obtained from the smaller types, the discharge rates at which the voltage of cells will be maintained as above, depending upon the size of the cell used. For intermittent contacts of short duration, or in cases where cells are kept on continuous closed circuit at low discharge with occasional short periods of discharge at high rates, the average voltage will be higher than on continuous discharge at high rates.

Edison Primary Cells are especially suited for continuous closed circuit work because of their low internal resistance and effective depolarization, the voltage at normal discharge rates being practically constant throughout the life of the cells."

It will thus be seen that in order to have a nominal 6 volt system it will be necessary to use ten cells of battery.

On a low voltage system of this kind it will be necessary to watch the conditions under which it is to be used, because if the distance is too great between any of the units or the wires are too small the voltage loss may be excessive and unsatisfactory action of the apparatus result.

As a guide to the size or ampere hour capacity of cells to order, the method of figuring is given below.

The first step in figuring current consumption is to take the amount required (in fraction of an ampere) by each piece of apparatus and add it together to get the total required by the installation, at each impulse.

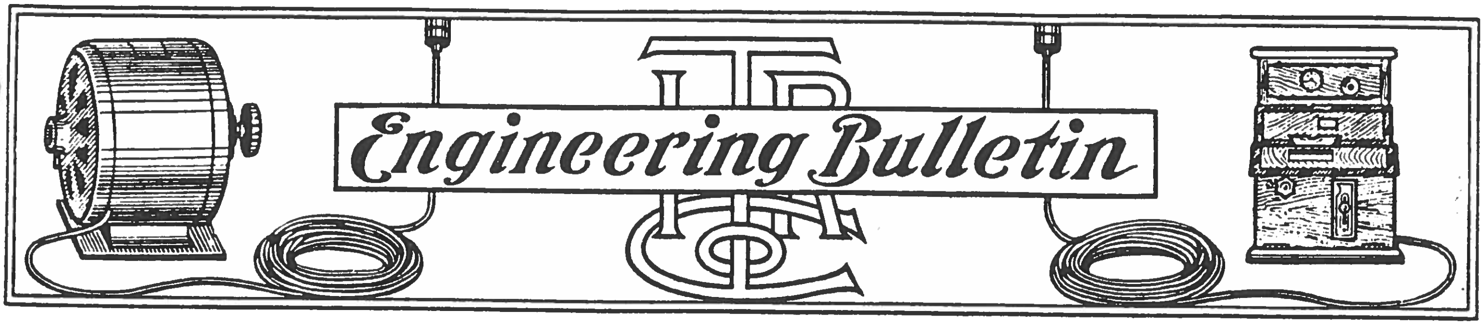
As a guide to the current requirements, several pieces of apparatus are listed below, together with current required at 6 volts.

Master Clock (Style A)	30 ohms	.2 Amp.
Cost Recorder	30 ohms	.2 Amp.
Card Recorder	18 ohms	.33 Amp.
Small Secondaries (up to 12″)	23 ohms	.26 Amp.
Program Device	13 ohms	.46 Amp.
Autograph	30 ohms	.2 Amp.

Assume, therefore, we put an equipment on a set of 10 of these cells that uses 1.5 amperes at each impulse, and that each impulse is of one second's duration, each minute of the entire day.

We have 1440 impulses therefore, per day or .4 of an hour per day total time current is being drawn from the battery. As 1.5 amperes is taken at each impulse, the ampere hours per day taken from the battery amount to 1.5x.4=.6 ampere hours per day. Now, as the capacity of the battery is, say, 250 ampere hours, (type S.252) the battery should run the equipment for 250÷.6=416 days, or something over a year on each charge.

By following the above plan the proper battery may be figured out to run different sized equipments and for different lengths of time. As pointed out above, however, by a comparison of prices, it will be found that storage cells become more economical and desirable when the equipment becomes more extended.



No. 10 — International Time Recording Co., of N. Y. — ENDICOTT, N. Y. — September 30, 1919

Combination Synchronized and Impulse Time Recording Systems

By J. W. Bryce, Supervising Engineer

Owing to the fact that at the time of writing, all models of recorders, etc., are not ready for commercial use for the synchronized system, it has become necessary to run a combination system which may be later altered to an entirely synchronized system. It is the purpose of this bulletin to describe how this may be done in the simplest manner. The method described is directed particularly to aiding in the change from the combination system to the entirely synchronized system.

It will be necessary to use storage batteries of course for the impulse system while the available electric light current either A. C. or D. C. is used for the operation of the synchronized part of the system. The synchronized part of the system will consist of the usual units, i. e., master clock type "S," master relay cabinet for synchronized system, and the synchronized recorders themselves. In addition to the master relay cabinet for the synchronized system, it will be necessary to provide what we have termed a "special adapter cabinet" which forms the connecting link in the system. This is shown in the diagram in Fig. 1 to which reference is now made.

The only change in arrangement of parts is to make a slight alteration in the wiring of the master clock contacts. Instead of wiring the contacts on the seconds shaft (see Fig. 2) directly to those on the center shaft of the clock they are brought out separately and connected in circuit with the battery and master relays of the impulse system. The "special adapter cabinet" is seen to contain two relays, (and should carry the same price as our distribution cabinet for impulse systems).

The effects of the arrangement shown in Fig. 1 is merely to substitute for the minute contact of the master clock, armature and contact of a relay.

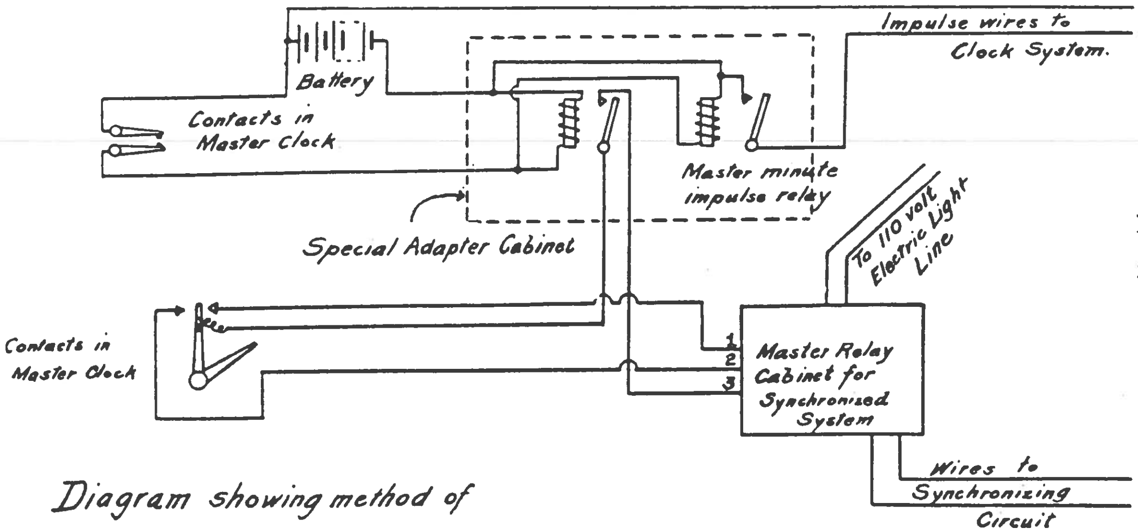


Diagram showing method of connecting whereby both synchronized and battery impulse systems may be controlled by Type "S" master clock without additional contacts in the clock

Fig. 1

It will not be necessary to go into a very detailed description of the operation of this arrangement, suffice it to say the contact shown at the top and left of Fig. 1, closes once every minute. Current flows from battery through these contacts and through the relays in the "special adapter cabinet." The relay to the left as shown in Fig. 1, closes contacts which function exactly like those shown in Fig. 2 at 16. The relay at the right in Fig. 1, in the "special adapter cabinet" acts as a master relay for the impulse part of the system.

No changes are made in the wiring of the synchronized system, therefore, for a description of its operation reference is made to Engineering Bulletin No. 4, dated July 1, 1919.

It must be thoroughly understood that the arrangement described in this bulletin is not recommended as a permanent and desirable arrangement but simply as an emergency measure to take care of users during the period before the production of certain devices for the synchronized system is complete.

The arrangement is not a desirable one for the reason that it makes the performance of the synchronized part of the system dependent on the proper functioning of the battery.

It is our opinion that it would be much better to keep the two systems entirely independent and operate each from its own master clock, but it may be desirable and even necessary to control both from one clock, which may be easily done by the above method.

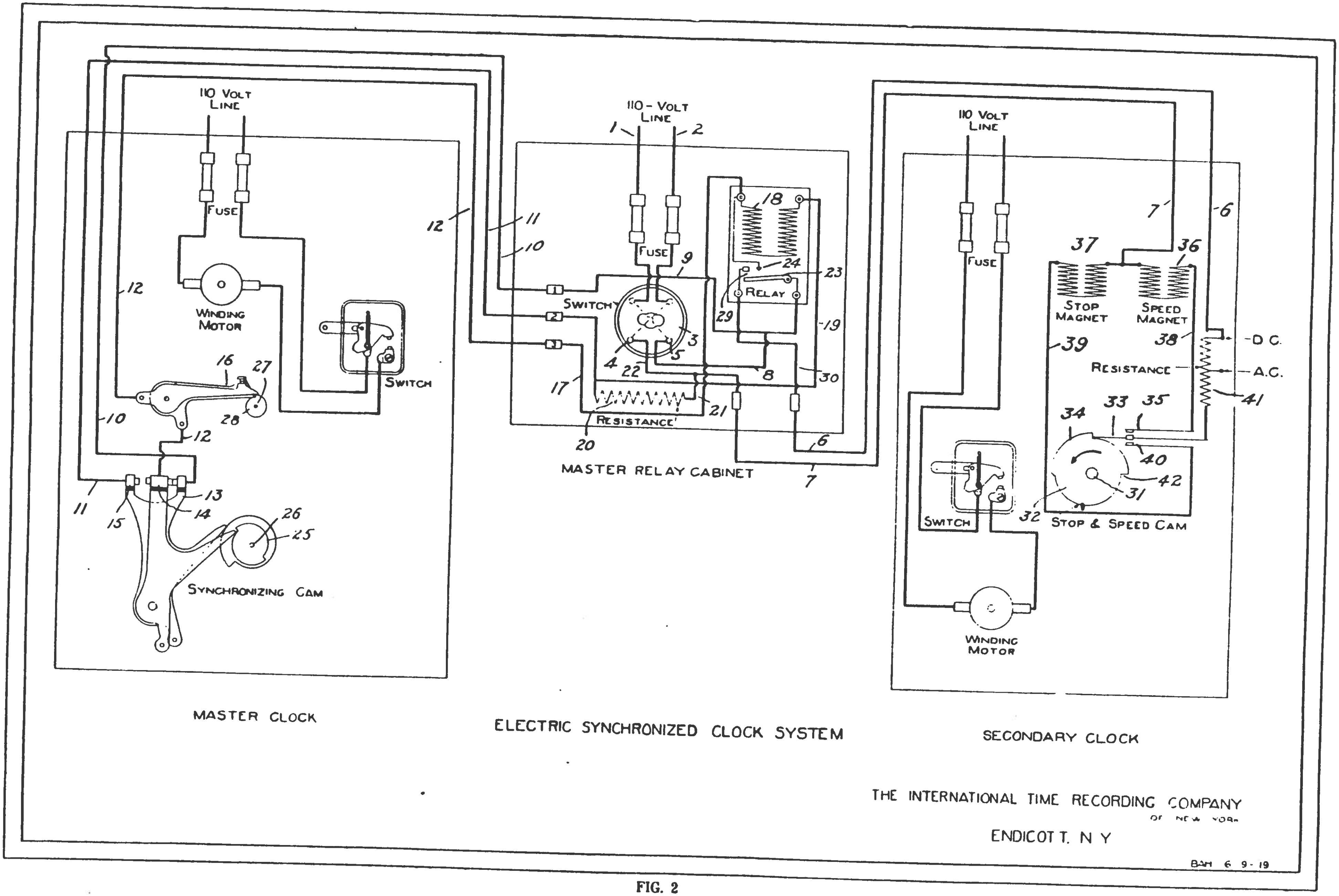
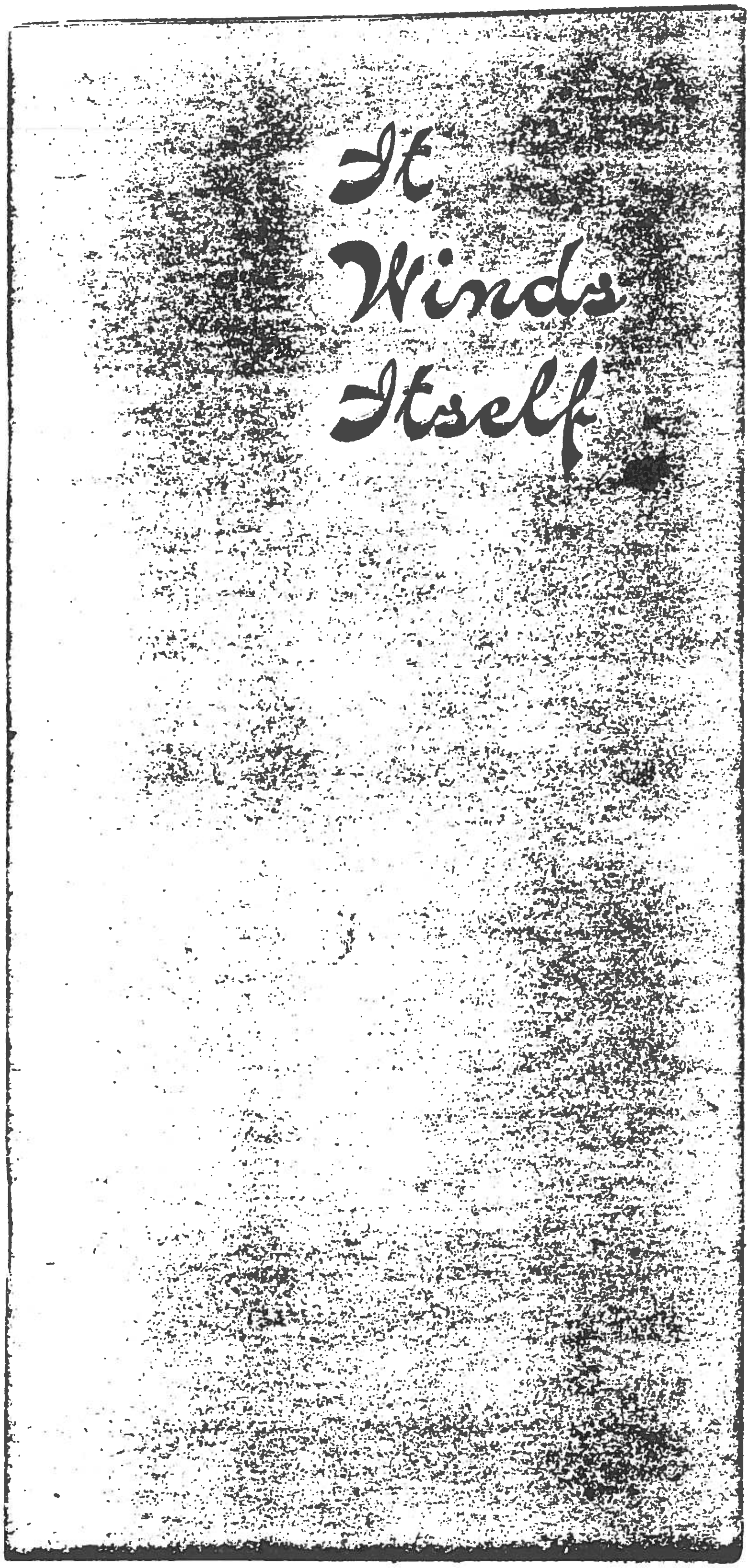
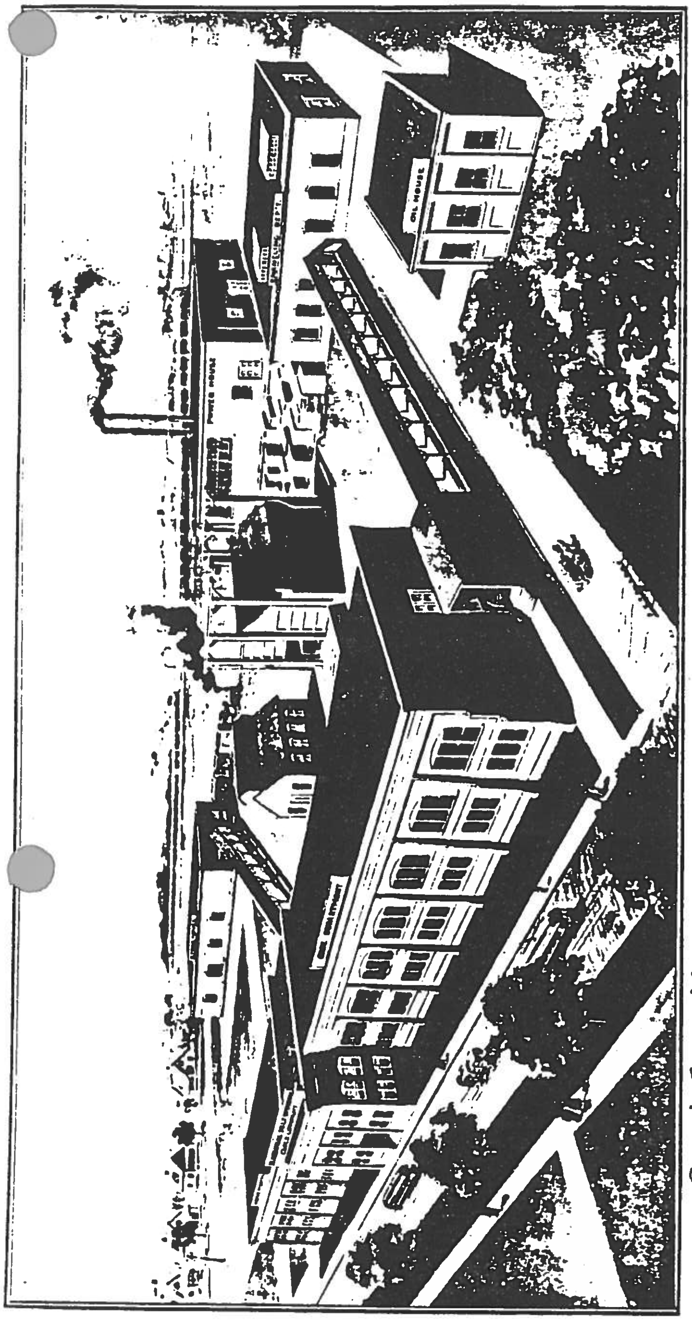

110 Volt Line
Fuse
Winding Motor
Switch
Synchronizing Cam
Master Clock
110 - Volt Line
Switch
Relay
Resistance
Master Relay Cabinet
Electric Synchronized Clock System
110 Volt Line
Fuse
Stop Magnet
Speed Magnet
Resistance
D C.
A.C.
Switch
Stop & Speed Cam
Winding Motor
Secondary Clock
The International Time Recording Company of New York
Endicott. N Y
BAH 6 9-19

FIG. 2


It
Winds
Itself


For
men
may
come
and
men
may
go
But
I
go on
forever

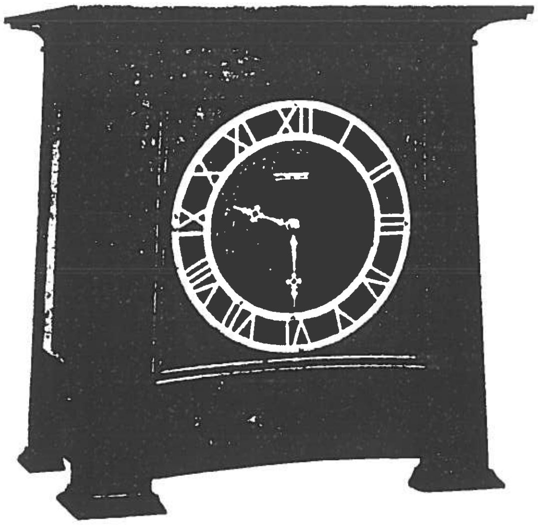


General offices and factory of the National Self-Winding Clock Company, Champaign, Illinois.

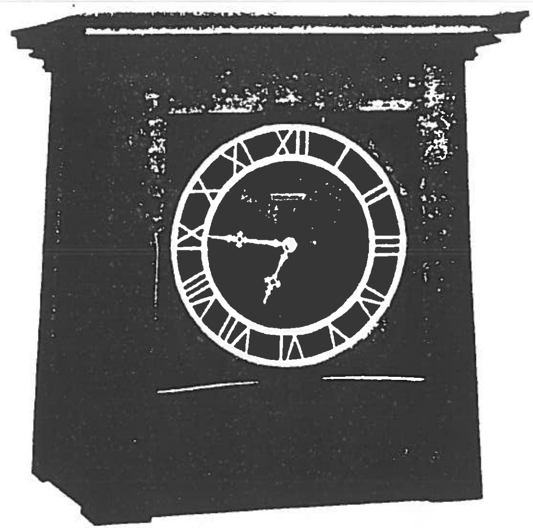
We present for your consideration a line of Self-Winding Clocks adaptable for use wherever accurate time is desired.

A clock for the home that winds itself, and strikes the hour and half-hour.

A clock for the office that winds itself.



Cabinet Style No. 6
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 6 inches
Finished in gold
Height 11¾ inches, width 11 inches
Golden oak case, Price $11.50
Mahogany case, Price $13.50

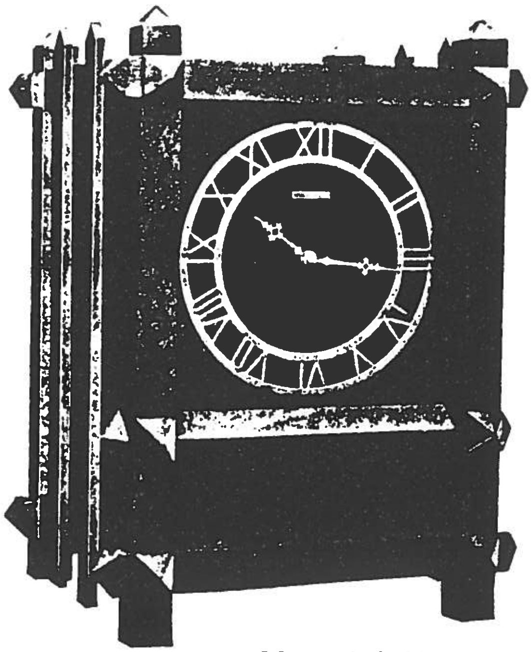


Cabinet Style No. 7
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 6 inches
Finished in gold
Height 12½ inches, width 11 inches
Golden oak case, Price, $11.50
Mahogany case, $13.50

The National Self-Winding Clock is wound automatically by an electric current from cells of a dry battery contained within the case and is the first successful self-winding clock movement ever made that is so simple and practical that any jeweler can take it to pieces, clean and oil if necessary, and put it together again; with as little delay as in the cleaning of an ordinary clock.

The electric mechanism never forgets the winding time—consequently the clock winds itself continuously without attention.

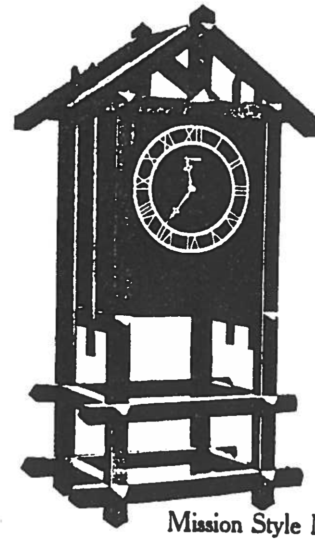
The National Self-Winding Clock is run by a spring electrically wound once in every seven to eight minutes. The device technically termed the "contact" (by means of which the electrical current is caused to act upon the magnets and wind the clock) is theoretically and practically perfect. It is a contact which instantly solders and unsolders the wire, thereby restoring at the time of contact, the full capacity of the wire and eliminating entirely the contact troubles, which have caused failures in all electric clocks up to the present time.



Mission Style No. 49
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 6 inches
Finished in gold
Height 13 inches, width 9¾ inches
Mission oak case
Price, $8.50

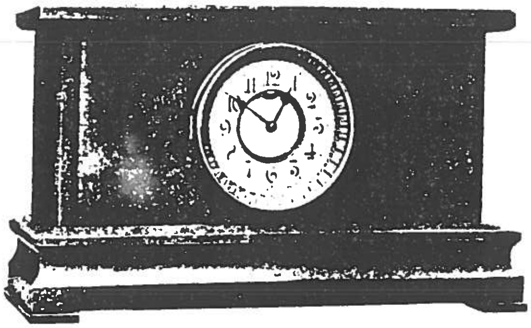
The time of winding is less than one-fortieth of a second in each seven to eight minutes—no wasted electrical energy can occur as the proper winding of the spring opens the circuit—thus making the life of the batteries many times longer than in those where the contact is limited by the motion of the train of the clock and contact is only broken when the movement of the clock breaks it.

The National Self-Winding Clock is so superior to old fashioned key-winding clocks that it will replace them as surely as the stem-winding watch displaced the key-winding watch. Aside from the great convenience of never having to wind, the time is more accurate than that of the key-winding clock, as the spring tension is as uniform as in weight clocks, on account of being wound every seven to eight minutes. Even tension in the out of date key-winding clocks is impossible with the spring wound once in seven or eight days, as the strong tension on such a spring when fully wound, causes the clock to gain during the first two or three days, and lose during the last three or four days.



Mission Style No. 48
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 6 inches
Finished in gold
Height 24 inches, width 13 inches
Mission oak case
Price, $9.50

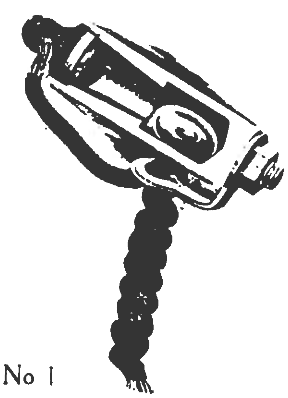
The National Self-Winding Clock is the only self winding, striking, mantle clock made in the United States, as there is sufficient power in addition to winding the clock, to also wind the striker for the hour and half hour.



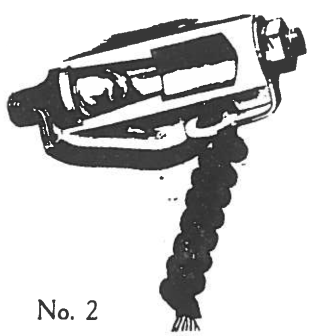
Mission Style No. 47
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Height 10½ inches, width 17¾ inches
Mission oak case
Price $10.00
Porcelain dial $1.00 extra

The National Self-Winding Clock is regulated through a slot in the dial, and once properly regulated will last a life-time without other attention than occasionally setting and replacing the batteries in twelve to eighteen months—one set of batteries have lasted 33 months.

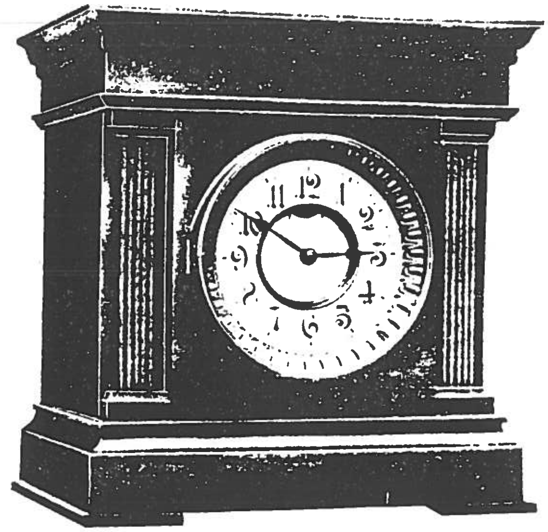
In Illustration No. 1 is shown the contact tube in position immediately after the clock has wound itself. In Illustration No. 2 the mercury is shown soldering the wire making the current complete and commencing the winding.



No 1

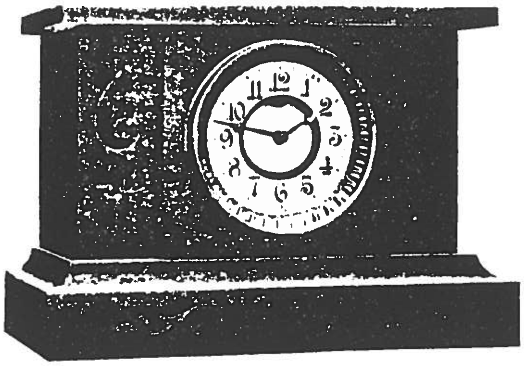


No. 2

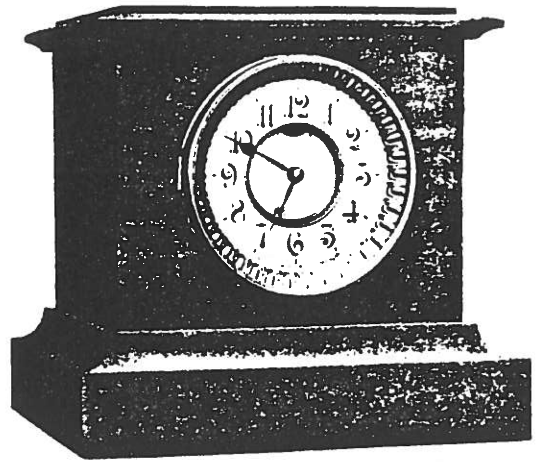


Style No. 4
Pendulum movement
Patent regulator
Hour and half-hour strike
Dial diameter 5½ inches
Arabic or Roman figures
Height 11⅜ inches, width 10¾ inches
Golden oak case, Price, $9.80
Mahogony case, Price $11.80
Porcelain dial $1.00 extra

The National Self-Winding Clock is made by the most expert clock makers it is possible for money to employ. The material used in every clock is of the very best grade, and the workmanship and finish, even to the minutest detail, is of the highest standard. Each and every clock receives a rigid inspection and thorough test. Thus assuring the purchaser a clock free from defects before leaving the factory.



Style No. 54
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 10 inches, width 14⅜ inches
Black enamel finish
Price, $9.25
Porcelain dial $1.00 extra

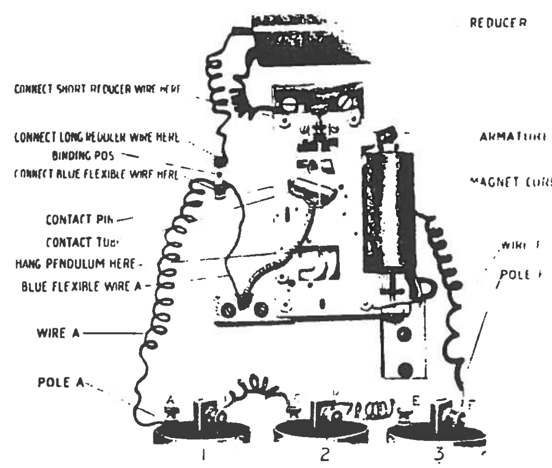


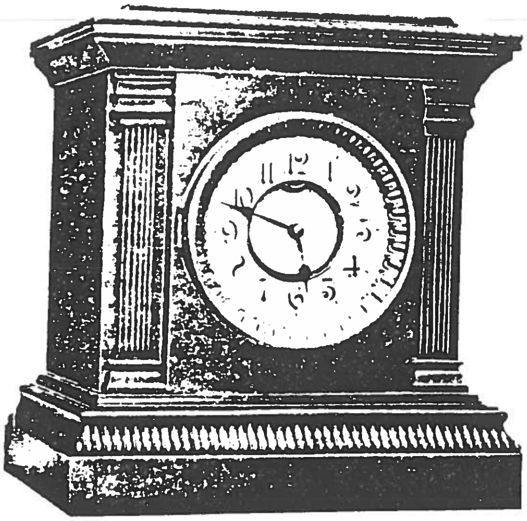
Style No. 50
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 10½ inches, width 11 inches
Black enameled finish
Price $8.50
Porcelain dial $1.00 extra

The Guarantee placed on the National Self-Winding Clock is so broad and liberal that the center of our catalog is a fitting place to set it forth.

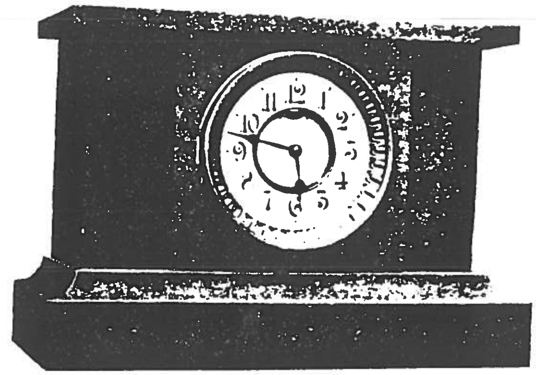
We guarantee The National Self-Winding Clock to be free from imperfections and will replace or repair, free of charge, within one year, any clock proving defective through material or workmanship.

We know how good the material and workmanship on these clocks really is. We know they will do all we claim for them. We back our confidence with the above guarantee.





Style No. 5
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 12¼ inches, width 11⅛ inches
Golden oak case, Price $9.40
Mahogony case, Price $11.40
Porcelain dial $1.00 extra



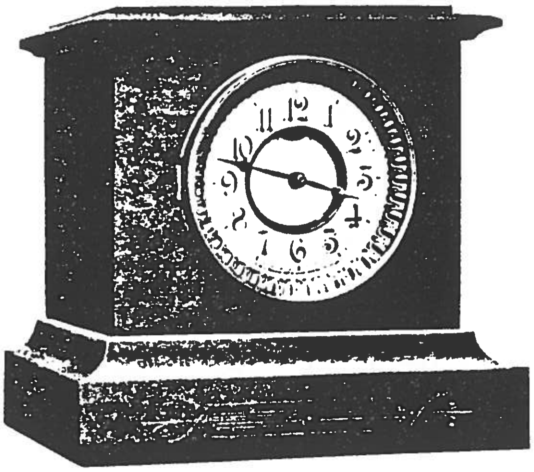
Style No. 51
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 10 inches, width 14⅜ inches
Black enamel finish
Price, $9.00
Porcelain dial $1.00 extra

The illustration on preceding page is an exact photograph of the movement and connections of a National Self-Winding Clock, showing the great simplicity of this wonderful invention. This illustration demonstrates how easy it is to connect the batteries.

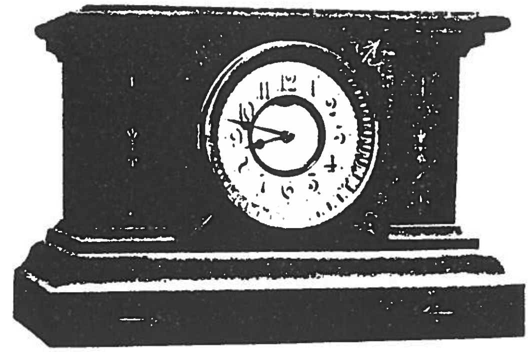
Our Pendulum movement is one of great simplicity, and with the many improvements we have embodied in perfecting the clock that winds itself, calls forth praise from jewelers everywhere.

The Synchronizing Movement has received special attention and we place upon pendulum clocks a synchronizing device of very novel and effective design. By means of this appliance the clock can be set automatically by a master clock or by telegraph key or push button.

The range of synchronization is one and one-half minutes each side of the hour. In this connection it should be observed that synchronizing is perfect to the second, the second and minute hands being brought to the exact hour together.



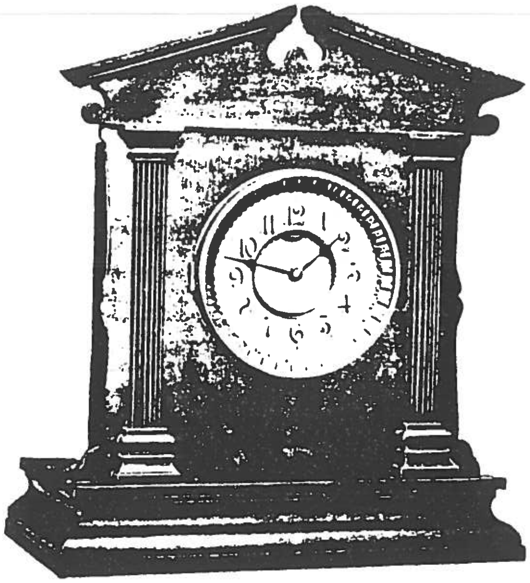
Style No. 53
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 10½ inches, width 11 inches
Black enamel finish
Price, $8.75
Porcelain dial $1.00 extra



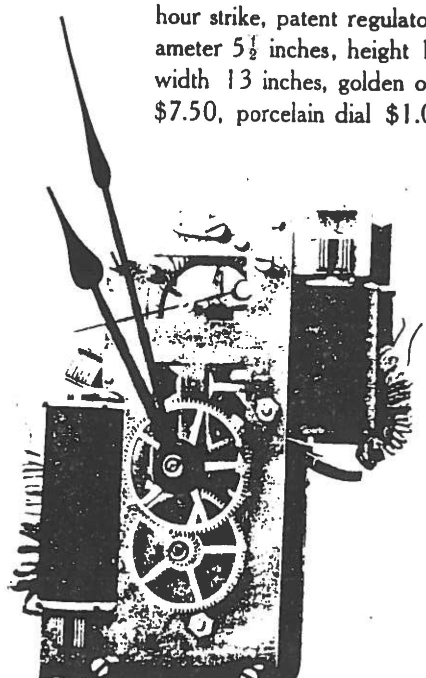
Style No. 55
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 10 inches, width 16¼ inches
Black enamel finish
Price, $11.25
Porcelain dial $1.00 extra

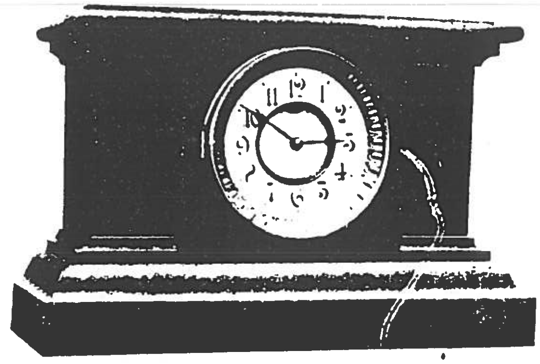
The Synchronizing clock is particularly adapted for service when it is desired to place a clock in a position where it cannot easily be reached. A wire running from the clock to a push button placed at any convenient point will enable a person to set the clock at any hour by merely pushing the button.

If more than one synchronizing clock is desired for service on one line, as in the case of railroads, telephone and telegraph companies, or for different rooms of schools, factories or office buildings, any number may be set at exactly the same time by means of our master clock. The master clock is so connected that at every hour it will set to exact time all the clocks which may be connected with it, over any distance. There will not be a fraction of a second's variation between the different clocks. The master clock will govern a clock on a line between New York and Chicago with the same precision as between different rooms in a school.



Cabinet Style No. 1
Pendulum movement, hour and half-hour strike, patent regulator, dial diameter $5\frac{1}{2}$ inches, height 15 inches, width 13 inches, golden oak, price $7.50, porcelain dial $1.00 extra.



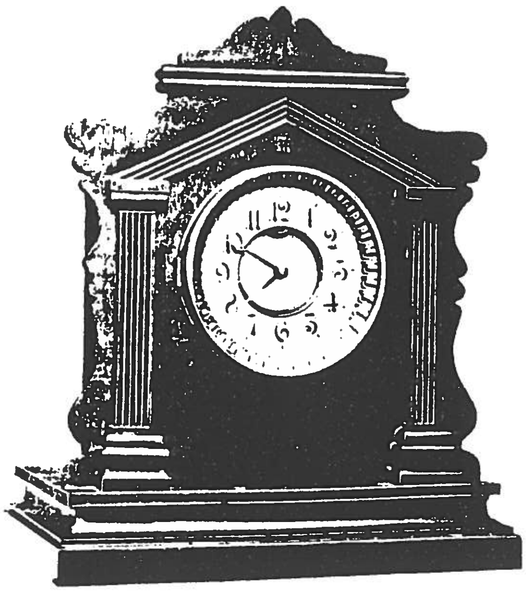


Style No. 52
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter $5\frac{1}{2}$ inches
Arabic or Roman figures
Height 10 inches, width $16\frac{1}{4}$ inches
Black enamel finish
Price, $11.00
Porcelain dial $1.00 extra

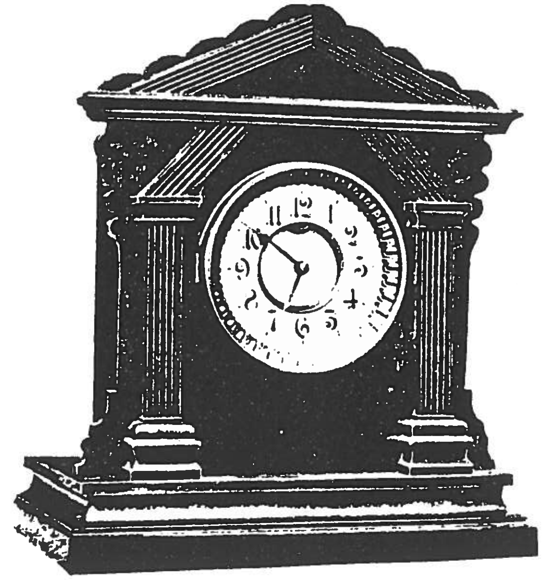
These Clocks are regulated as are other clocks, by the screw at the bottom of the pendulum ball, unscrewing and lengthening the pendulum should the clock run too fast, reversing if too slow. In setting the hands of a clock provided with a synchronizer, never turn backward, but always forward to any desired extent.

Particular attention is called to this synchronizing clock system, as distinguished from the so-called minute jumper system.

In the minute jumper system there is one master clock which makes a contact every sixty seconds. This contact causes the moving forward of the minute jumpers which may be connected with the master clock wire. These minute jumpers are not clocks, but simply a pair of magnets, with a wheel and dial works. Should a break occur in the wire connect-



Cabinet Style No. 2
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Arabic or Roman figures
Height 15 inches, width 13 inches
Golden oak case
Price $7.50
Porcelain dial $1.00 extra



Cabinet Style No. 3
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 5½ inches
Height 15 inches, width 13 inches
Golden oak case
Price, $7.50
Porcelain dial $1.00 extra

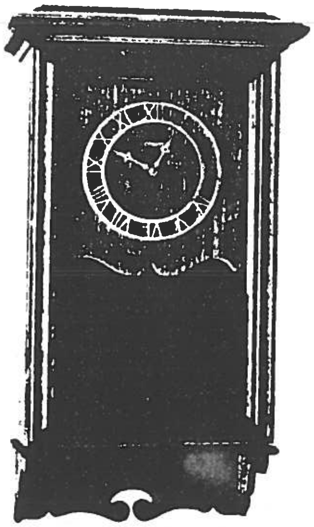
The old way

ing the minute jumper to the master clock all the clocks of the system would immediately stop. A minute jumper when disconnected is not an independent clock, and will not continue to run if disconnected from the master clock.

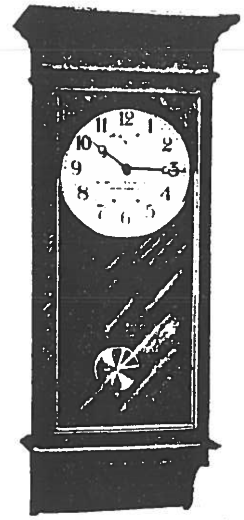
If you have to disconnect one of the minute jumpers in the system, unless you reconnect the wires immediately, you will stop the entire system, and you cannot change your minute jumper from one position to another and have it run, without connecting it to the master clock.

The new way

As distinguished from the minute jumper system, each clock in the synchronizing clock system is an independent time piece, and will run in any position and wherever any other ordinary clock will run. Take it down from one wall, hang it on another and if properly hung it will run in either position—no need to connect it to the master clock to keep itrunni ng—therefore, if by accident the wires connecting the system with the master clock are broken, the clocks in the system continue to run, keeping accurate time if they have been closely regulated.



Hanging Clock No. 123
Pendulum movement
Hour and half-hour strike
Patent regulator
Dial diameter 6 inches
Finished in gold
Height 22½ inches, width 12½ inches
Golden oak case
Price $9.00



Office Clock No. 82
80 beat Pendulum Movement
Time only
Dial diameter 12 inches
Arabic figures
Golden oak case
Height 3 feet 10 inches, width 19 inches
Price $16.50

In case of a breakage of the connecting wire to the master clock, all of the clocks in the system will continue to keep accurate time, and can be reset to exact time after the wires have been repaired, when the first signal is sent over the repaired wire, even if a week's time has elapsed between signals.

The use of these synchronizing clocks is becoming widespread as is evidenced by the fact that they are in the service of the Penn. R. R., the C. B. & Q. R. R., the Long Distance Telephone Co., the U. S. Steel Co., and many others.

Our synchronizing systems are simple
In operation,
Easy to install,
Uneffected by electrical storm or
Atmospheric changes—
Requires no attention—
Accurate and inexpensive.

— MART —

All MART Ads are FREE, Send copy to the attention of the Editor:
Harvey Schmidt, 75-80 179th St., Flushing, NY 11366. Limit 3 lines.

WANTED: **HOROLOGICAL LITERATURE**, Repair info, Catalogs, etc. for the Journal
PORTESCAPSecticon Clock or Movement. Antique Watch & Clockmaker's Tools & Machinery.
(718) 969-0847 Harvey Schmidt, 75-80 179th St., Flushing, NY 11366

Junker **EARLY BATTERY CLOCKS**, Movements, Parts, etc, send details.
Martin C. Feldman, 6 Stewart Pl., Spring Valley, NY 10977

STANDARDELECTRIC Master Clock, 120 Beat, Eye Brow or Square Case. Also Slave Clocks in Eye Brow Case's. David Lee, P. O. Box No. 171, Knox, NY 12107

ITR, STROMBERG, STANDARD, & SWCC Movements and Parts for Master Clocks. Also Wood Cased Slaves. Call or send photo (914) 997-5670
Mitch Janoff, 3 Stratford Ave., White Plains, NY 10605

STANDARD ELECTRIC Square Dial, 13 ½" X 13 ½" & a Set of Hands.
Roy Crowe, 9257 Appleby St., Downey, CA 90240, (310) 861-8788

Master Clock with Tape or Drum Program Control & Internal Pilot (slave) Clocks by **STANDARD ELECTRIC / SELF WINDING / HOWARD** etc. Early / unusual Time Recording Clocks / Watchmans Clocks. Excellent Condition will bring a high offer! (508) 448-5547
Robert A. Simon, 930 Townsend Road, Groton, MA 01450

Dial for **ITR** master clock: 12-1/2" O.D. with wood bezel surround on outside edge of dial; minute track diameter 11"; independent seconds bit. (713) 554-7387
Kenn Koerber, 105 Royal Drive, League City, TX 77573-1951

ELECTRO-MECHANICAL Clocks, Fancy & Simple Cased. Unusual Clocks, Movements. Books. Day or Night (516) 541-2400 or 351-5869
Elliot B. Siegel, 930 Broadway, Massapequa NY 11758

Dial for **BULLE** Clock, Approx. 5½" Diameter, 1½" hole in center, "rolled" brass outer edge.
Jerry Hahn, 2714 Hampshire Ave., Cincinnati OH 45208

The electrical unit that goes on a small **WALLACE** & Tiernan Wall Clock. The "Ears" have been broken off my armature. Source for domes that fit the large two contact **TIFFANY**. The casting that mounts the pendulum on a seconds beat **GENTS** and the pendulum assembly or any piece of it. Richard B. Pridham, 10402 Bellman, Downey CA 90241 (310) 862-3086 Call collect.

HANDS for a 13 inch Chapter Ring. (312) 238-3294 - evenings or 445-5381.
G. Frederickson Sr. 1716 W. 100th Pl. Chicago IL 60643

Tapped Coil for Transistor Driven **JUNGHANS** Battery Clock. John McGrory (908) 537-4575

SYNCHRONOME Master Clock. William F. Baker (212) 560-2013

REPAIR: ALL EARLY BATTERY CLOCKS Specializing in **BULLE** using orig. parts.
Martin C. Feldman, FNAWCC, 6 Stewart Pl., Spring Valley, NY 10977

FOR SALE: **TIFFANY NEVER WIND**, Double Contact Model, Replacement Castings for Pendulum Suspension & Contact Arms (Brass not Pot Metal) $20 each, $37 for both. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

Repair Parts for **TIFFANY NEVER-WIND** Clock Co., **CLOISTER** Mfg. Co., & **NATIONAL MAGNETIC** Clock Co. David Lee, P. O. Box No. 171, Knox, NY 12107

SCOTT BATTERY Electric Shelf Clock (London Stereoscopic Co.) Circa 1905. Photo & Details in A. & R. Shenton "The Price Guide to Collectable Clocks." Fig. 404. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

BULLEElectric Gallery Clock w/ 12" dial, 17" square overall, walnut wood case w/ pendulum.
BARR Electric Mantle Clock w/ Glass Dome. **SWCC** Dials and other electric dials.
(312) 238-3294-evenings or 445-5381
George Frederickson Sr., 1716 West 100th Place, Chicago IL 60643

SWCC Western Union, 15-1/2" convex "glass". Actually it is plastic, but it beats a naked dial.
$20.00 (I'll pay UPS up to $5.00) (205) 967-1237
Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243

Seth Thomas Square Oak Gallery Battery Electric with 13" Dial, Large Seconds Bit & Weight Driven Movement per pg. 65 (lower left) "150 Years of Electric Horology." $300
Robert Simon, 930 Townsend Road, Groton MA 01450 (508) 448-5547

Very Rare **Cornelius Jamin, jr.** Master Clock. Double Contact seconds beat. Of extraordinary quality. Dutch made late 19th or early 20th Cent. Beautiful oak case about 6' tall, beveled glass all around, jeweled movement. (617) 599-4171 evenings, weekends,(617) 598-3881 FAX days.
Steve Lefkowitz, 496 Lynnfield St., Lynn MA 01904

Requests for reprints of previously published material should be directed to the Chapter Historian;

Dr. George Feinstein
75-19 195th Street
Flushing, NY 11366

THE JOURNAL OF THE
ELECTRICAL HOROLOGY SOCIETY
CHAPTER #78 NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXI, #2, JUNE 1995

Fellow Horologists:

This issue continues the publication of the ITR bulletins, with the popular model-S operation and adjustments covered in detail. This model was made and sold from 1919 through 1958 when IBM sold the time service to SIMPLEX... A long run for any piece of equipment! A great many are still in service and the information fills a void that sorely needed attention.

The second half of this journal provides us with an insight into the early years of the WALLACE & TIERNAN organization, with a look at the history of the company and technical descriptions of their movement. This story will be in two parts... half in this issue and the balance in journal #3. We are indebted to HERB FREELAND for this material which is scheduled for inclusion in the NAWCC BULLETIN in the near future. We get a pre-publication opportunity to see, and enjoy this significant data and thank Herb for his generous offering.

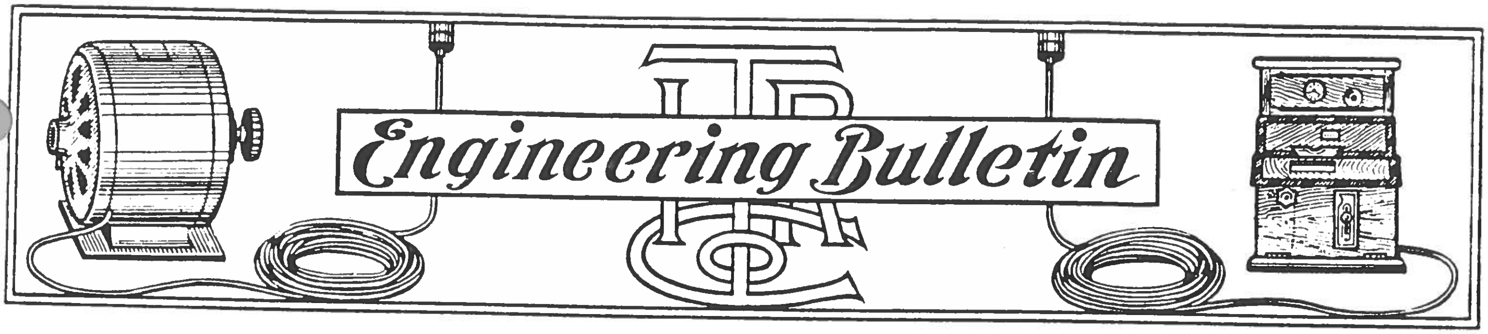
A meeting is scheduled for Chapter 78 members at the home of MITCH JANOFF on Saturday, July 15th . Mitch lives in the Westchester area which is convenient to folks that live in north & central New Jersey and the general Metropolitan New York areas. An RSVP is a MUST, so please call (914) 997-5670 for address, travel instructions and your reservation.

A meeting of chapter 78 (and other electrical enthusiasts) is scheduled at the NAWCC National Convention in Richmond, Virginia, June 21st through June 25th. Meetings are also scheduled for the upcoming regionals at Chicago, Syracuse, and Dearborn. While chapter 78 is the sponsor, these meetings are usually co-chaired by all of the electrical chapters, the MIDWEST ELECTRICAL HOROLOGY GROUP #125, and the WESTERN ELECTRICS #133, and are open to any interested persons. If you plan to attend any of these regionals, leave time in your schedule for attending ... you will NOT be disappointed!

Our membership now stands at more than 130, a slow and steady increase each year, notwithstanding the loss of seven members this year for non-payment of dues. Note the increase in our MART participation... lots of new names with wants & offerings, all to the membership's gain. Good reading ahead...

Martin Swetsky, FNAWCC, President
Harvey Schmidt } Co-Editors
Dr. George Feinstein }

HARVEY SCHMIDT, SECRETARY-TREASURER 75-80 179th STREET, FLUSHING, NY 11366



No. 11 *International Time Recording Co., of N. Y.* ENDICOTT, N. Y. October 15, 1919

The International Master Clock

TYPE "S"

For Electric Synchronized System

By J. W. Bryce, Supervising Engineer

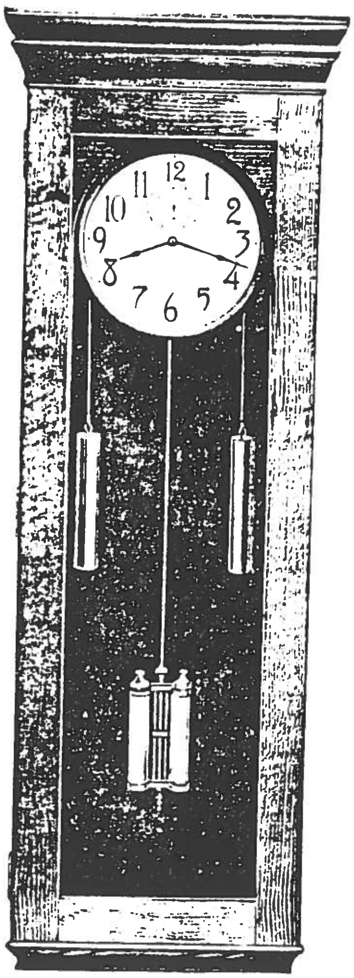


FIG. 1

THIS is a weight driven clock of the self winding type. The mechanism consists of two main parts, the clock movement itself and the back plate or casting upon which is mounted the motor for winding, the gearing immediately connected to it, the drum for carrying the cables to which the weights are attached, and the switch for cutting the motor in and out of circuit together with its connections. The casting above mentioned also forms the bracket or support for the pendulum.

An inspection of the photographs will show that the casting upon which the entire mechanism is mounted and supported is massive and will easily preserve the alignment of all the parts even though subjected to severe handling in shipment or from other causes.

The mechanism is so arranged that the clock will run between eight and nine days from the time it is fully wound up to the time when the weights reach the bottom of their run. The above statement covers the condition when a mercurial pendulum is used. Owing to the greater diameter of the metal ball pendulum and its greater swing it is necessary to shorten the drop of the weights and the full capacity of the run is then a little over five days.

In the ordinary operation of the clock, approximately 44 hours elapses from the fully wound condition of the clock to the point where the winding switch is thrown. If there happens to be no current on at the time the switch is thrown, the weights continue to fall, the winding switch remaining closed. It will be apparent, therefore, if there is no current available for approximately, a week, the master clock will continue to run.

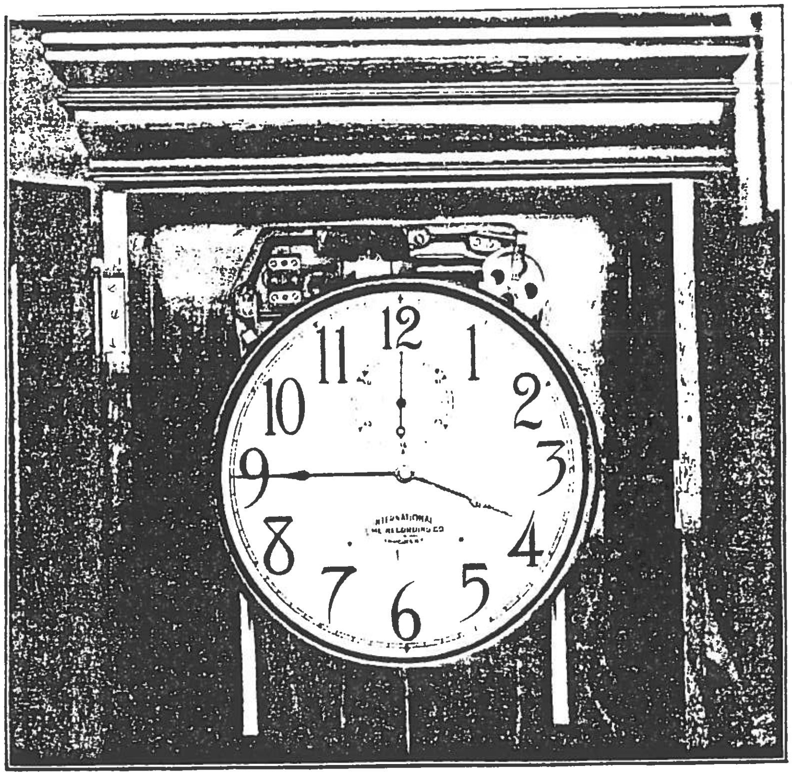


FIG. 2

To facilitate making connections to the outside circuits, a terminal block "A" is provided to which the wires 10, 11, 12, may be fastened. (1, 2, 3, Fig. 4.).

The master clock movement is the result of years of deep thought and practical test to obtain the best movement that can be devised for the class of service it has to perform.

The master clock movement is made strong and rigid, and mounted on the cast iron back frame, it is reinforced and rigidly supported. The plates of the clock movement are made from a fine grade of hard brass best suited for this work, and are nicely finished to give the movement a pleasing appearance and harmonize with its general good quality.

In the illustrations:

Fig. 1, is a front view of the master clock, with mercurial pendulum.

Fig. 2, is a larger face view of the clock with the door open.

Fig. 3 is a front view of the master clock showing the metal ball pendulum.

Fig. 4, is a front view of the mechanism with the clock dial removed to show the mechanism more clearly.

Fig. 5, is a close up view of the winding motor control switch.

Fig. 6, is a view showing the method of locking the driving mechanism preparatory to the removal of the clock mechanism proper.

Fig. 7, shows the second step in the locking operation.

Fig. 8, shows the actual removal of the clock mechanism from the driving mechanism.

Fig. 9, shows the circuit connections of the master clock and its connections to the outside circuits.

The contacts, etc., in Figs. 2, 4, and 9 are all in the same positions, that is to say just at the moment of establishing the synchronizing current. As shown in Fig. 2, this is at fifteen minutes of the hour, exactly to the second.

Perhaps it will be well to state at this point that this clock does not send just one electric impulse at some given moment to accomplish the synchronizing of the secondary or recorder clocks but does it by means of an impulse of considerable duration and of known length of time. This will be described more fully later and reference is made also to ENGINEERING BULLETIN No. 4 for further description.

Referring, to Fig. 4, the contacts may be readily seen. To make comparison easier similar reference characters are used in this figure and also in Fig. 9.

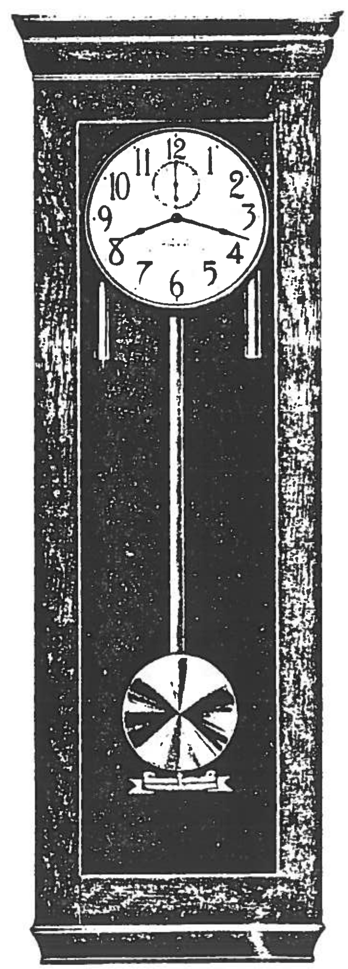


FIG. 3

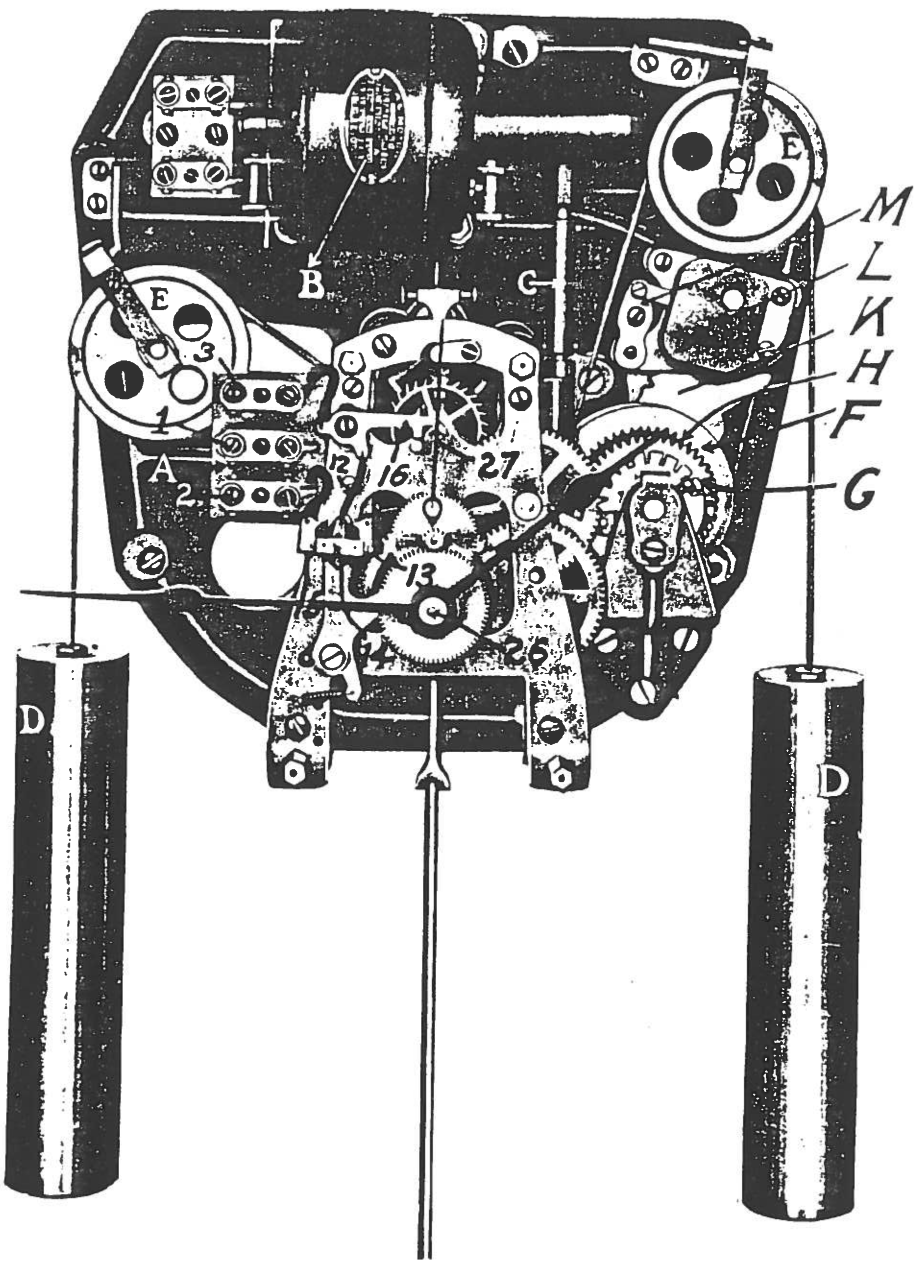


FIG. 4

The gears are also made from sheet brass of suitable temper and quality for the work they are to perform, the teeth being milled from the solid stock, giving much more uniform and even running teeth than can be obtained when the teeth are punched out with punch and die. The pinions, which operate in these gears, are all turned integral with the shafts from a special grade of carbon steel, the teeth being lapped and polished to give them a high finish and insure as near frictionless operation of the parts as possible. In many so-called high-grade clock movements the pinions are made of separate pieces and assembled to the shafts, but as this method does not produce accurate running pinions we use the other and more expensive method.

The Graham dead beat escapement consisting of brass escape wheel and hardened steel verge is used, this type of escapement being best suited for this kind of clock movement.

The clock movements are fitted with blued steel, hour, minute and second hands, while the clock dial is white enamel finish with black figures, minute and second dials.

The winding mechanism (Fig. 1,) consists of a motor "B" (which will operate equally well on either A. C. or D. C.) in the end casting of which is mounted a worm and worm wheel by which the speed of the driving shaft is materially reduced to make it suitable for operating the winding drum of the mechanism.

To reduce the hum of the winding motor to a minimum, it is mounted on yielding or flexible support which keep it from direct and rigid contact with the back plate.

The drive shaft "C" which is the connecting shaft from the motor to the winding drum gear is provided with swivel or universal joint connections at each end. This permits the motor to have the slight movement made necessary by its flexible supports without requiring special alignment with the winding mechanism.

Two weights "D" are provided, each attached to a cord passing over pulleys "E" the other end of cords being fastened to a drum "F" (See Fig. 4.).

The power from the downward movement of the weights is transmitted through a differential gear mechanism to the driving gear "G" by which the time train of the clock is driven.

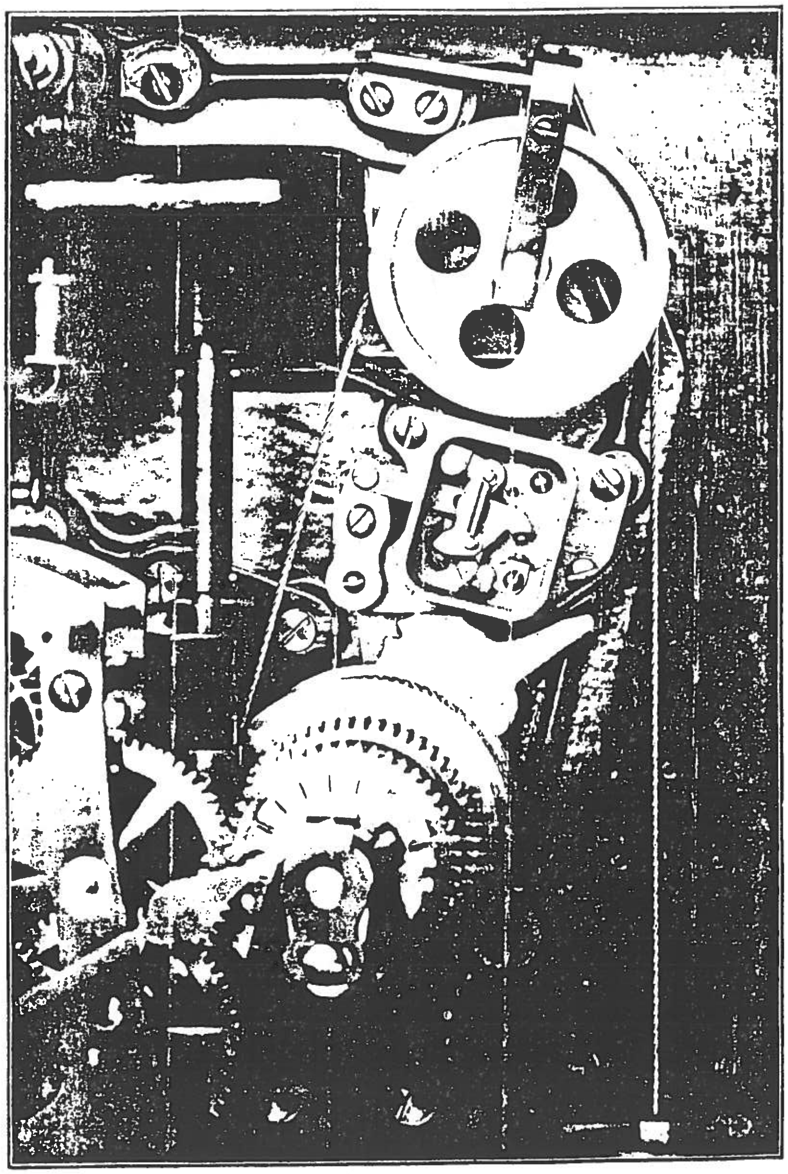


FIG. 5

On the middle or "floating" member of the differential gear there is mounted a worm wheel "H" which is in mesh with the main wheel of the clock train.

The usual train of gears are in mesh with the gear just mentioned and terminate in the Graham dead beat escapement above described.

Mounted on the shaft 26 carrying the minute hand of the clock (see Figs. 4 and 9) is a cam 25. This cam is really two cams fastened together and is so arranged that the arm carrying contact 14 is allowed to come into contact with contact 13 just about a half minute before the clock reaches the fifteen minutes of the hour position. As the cam revolves, just fifteen minutes later or about a half minute before the exact hour position, the other part of the cam permits contact 13 to fall away from contact 14 and causes contact 15 to rest against contact 14. Later in the hour these contacts are separated and remain so until the next fifteen minutes of the hour position is reached when the above operation is repeated.

Referring to Fig. 9, the operation of the contacts in connection with the controlling circuits is as follows: current from line wire 1 at the top of the master relay cabinet flows through the main switch to wire 8, wire 9, terminal (1) in relay box, wire 10, contact 13, and if the clock is at the fifteen minutes of the hour position, contact 14, wire 12, contact 16, wire 12, terminal (3) on relay box, wire 17, coils 18 of relay, wire 19, resistance 20, wire 21 and return to line by wire 2 at top of cabinet.

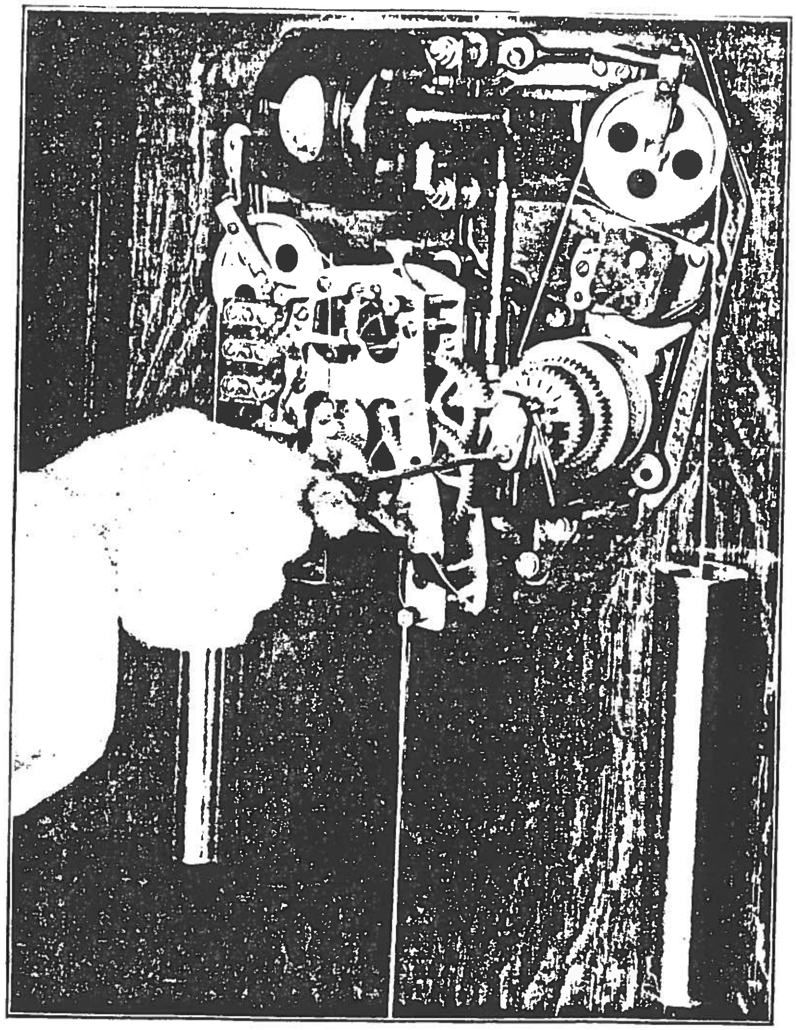


FIG. 6

It will be obvious that this energizes the relay and attracts its armature 23. A circuit is now closed from line through wire 8, armature 23, contact 24, coils 18 of relay, wire 19, resistance 20, wire 21, and back to line. This armature 23 will stay in contact and remain so until the master clock establishes a new circuit which it does at the exact hour.

While armature 23 is attracted and its contacts are closed, a circuit is also established from wire 8, armature 23, contact 29, wire 30 to wire 6 of the synchronizing circuit, which is completed over wire 7, wire 22 and back to line.

At exactly the hour, as previously described, contact between 13 and 14 is broken, and that between 14 and 15 is made. As soon, therefore, as contact 16 is closed which is in series with the above contacts a circuit is established from wire 17, attached to one end of coil 18 of relay, wire 12, contact 16, wire 12, contacts 14, 15, wire 11, wire 19 to the other end of relay coil 18. It will be seen this short circuit coils 18 and as a result armature 23 drops, cutting off all current to the synchronizing curcuit. Current is prevented from rising to a dangerous amount by resistance unit 20.

Owing to the arrangement above described, there is no tendency to spark at the master clock contacts as they never break a circuit. In order, however, to protect them in every possible way tungsten steel contacts points are provided.

It will be noted that the winding circuit for the master clock is brought out separately from the synchronizing circuit. This is partly to save running additional wires from the master relay cabinet to the master clock, as the clock may be wound from the nearest source of electric light supply, and partly to have a more flexible installation.

If at any time it becomes necessary to move the master clock, it may be kept running indefinitely and used as an ordinary time piece by connecting its winding circuit to a source of electric power without regard to whether the synchronizing circuits are connected or not.

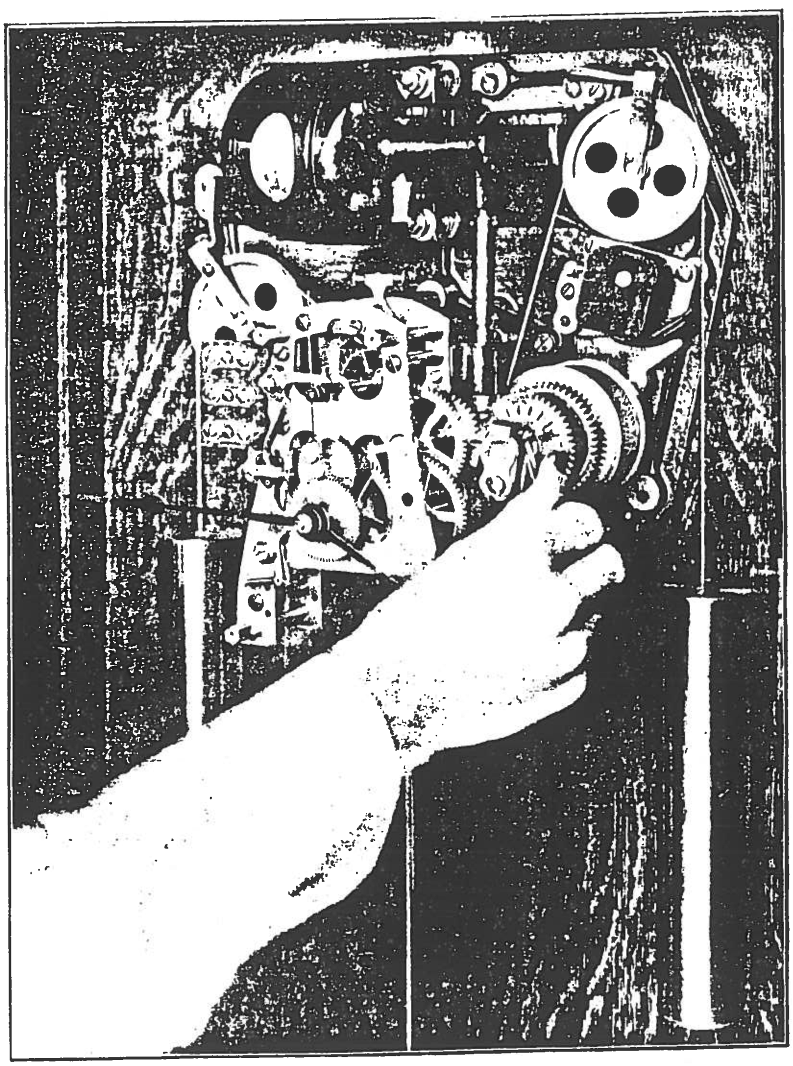


FIG. 7

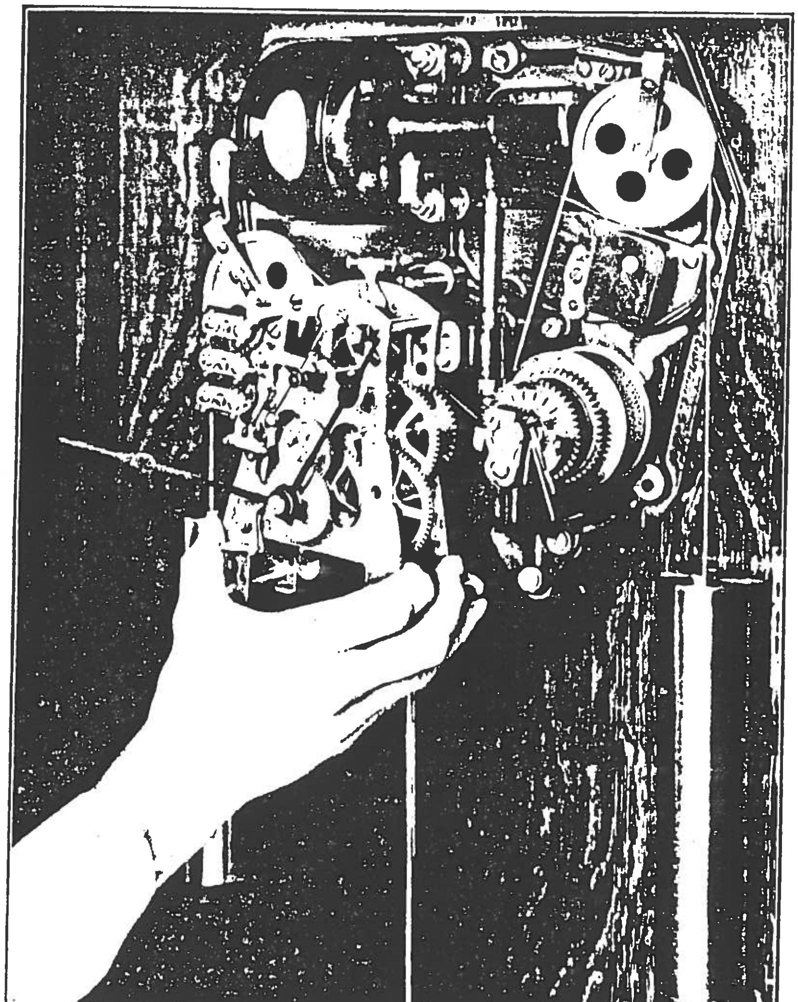


FIG. 8

As a guide to the power necessary for the winding, the following information is appended:

Electric Current	Amps. to wind	Time to wind for 9 days run approximately	Time to wind each day Approx.
110 V. D. C.	.35	1 min. 30 sec.	10 Seconds.
110 V. 60 cyc. A. C.	.37	1 min. 30 sec.	10 Seconds.

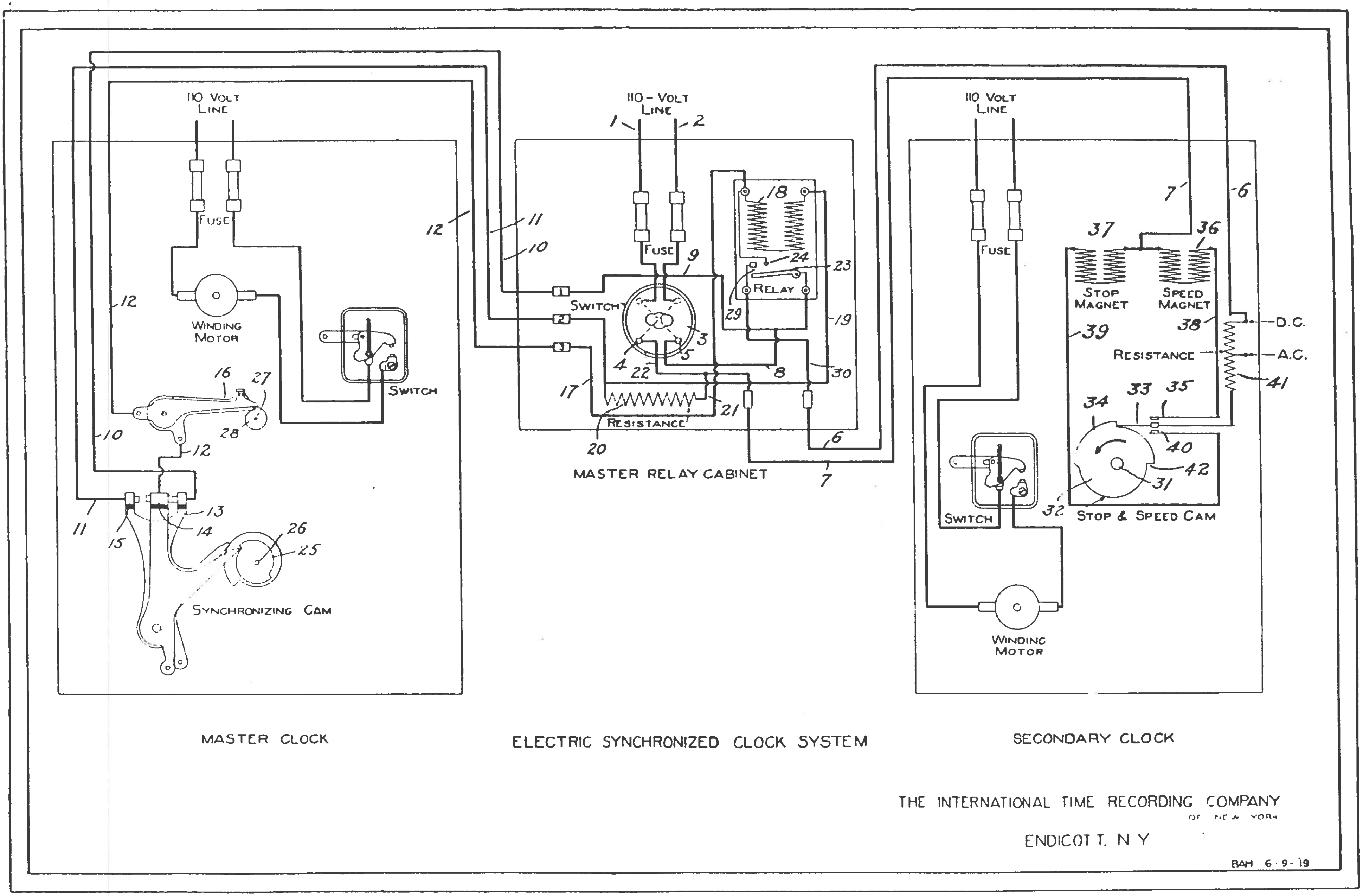
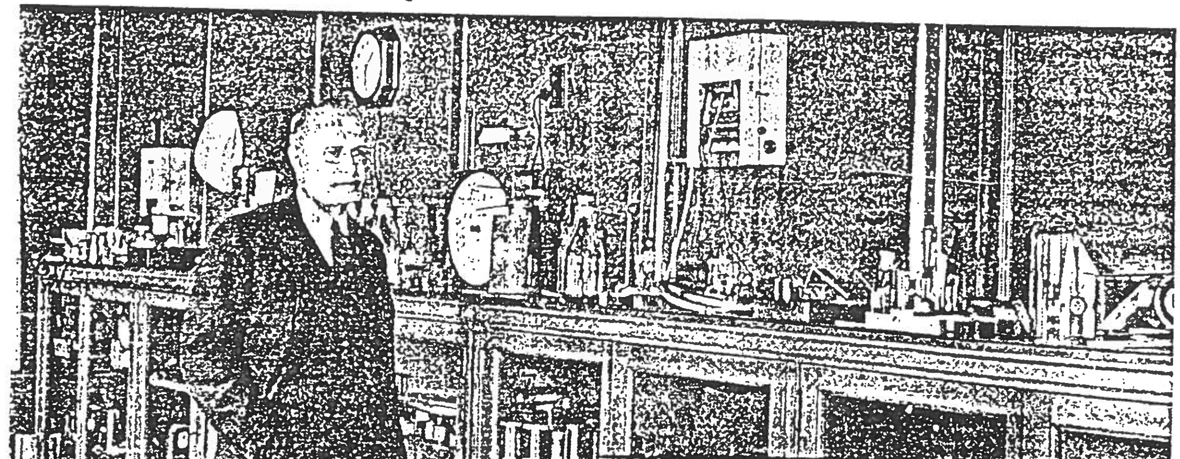

110 Volt Line
Fuse
Winding Motor
Switch
Synchronizing Cam
Master Clock
110 - Volt Line
Fuse
Switch
Relay
Resistance
Master Relay Cabinet
110 Volt Line
Fuse
Stop Magnet
Speed Magnet
Resistance
D.C.
A.C.
Stop & Speed Cam
Switch
Winding Motor
Secondary Clock
ELECTRIC SYNCHRONIZED CLOCK SYSTEM
THE INTERNATIONAL TIME RECORDING COMPANY
ENDICOTT. N Y
BAH 6-9-19

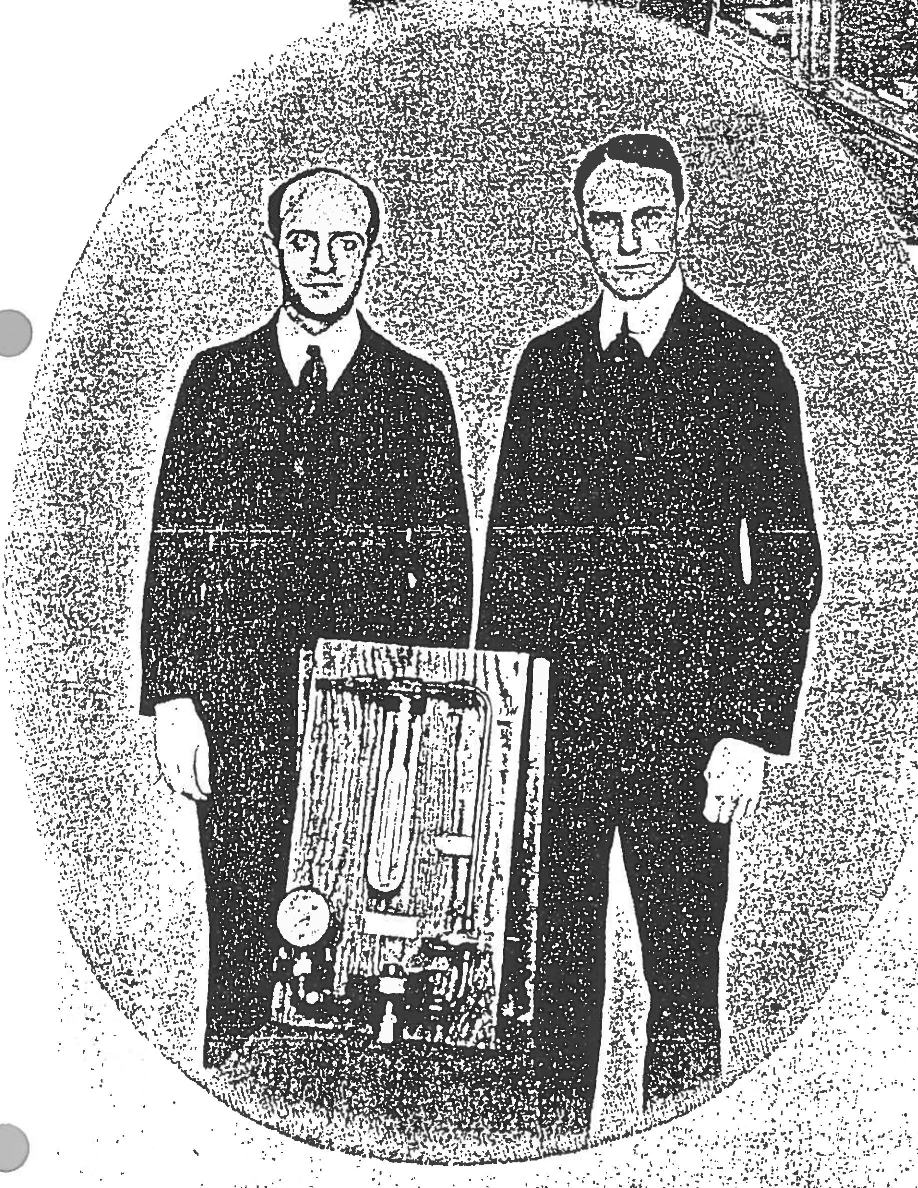
FIG. 9



Wallace wants his inventions where he can get at them, hence the cluttered look of the shelves

NESMITH

Tiernan, president and treasurer of W & T, takes care of the firm's business interests



The first water chlorinator built 40 years ago by C. F. Wallace, left, and M. F. Tiernan was a crude apparatus

"The Rise and Fall of The Wallace Electric"

WALLACE AND TIERNAN PRODUCTS, INC.

Belleville, N.J.

1928-1932

"Not failure, but low aim, is crime."

"For an Autograph"
James Russell Lowell

There were bound to be a lot of failures in the competitive business of American clocks in the 1920's and 30's. The buying public had progressed into an age when more and more conveniences were being offered which were powered by electricity. Manufacturers were continually attempting to "build a better mousetrap." A few decades had passed since the first public clocks were introduced using some form of electrical power. A new breed of elctromechanical clocks had now gained wide acceptance for homes and offices. They were highly accurate, never needed winding, and were, perhaps above all, affordable by the average person or business.

Many of the best-known companies which had survived so far in the industrial revolution, were already producing electric clocks in addition to their tried and true lines. Names like Seth Thomas, Ingraham, New Haven, Sessions, Waterbury and others the public had come to know and trust had significant advantages over others who might enter the field. They could all boast a generation or more of satisfied customers.

Then there were the other not so familiar names like Warren Telechron, Hansen, Frick, Lux Manufacturing, No-Key Clock Company and a vanguard of others who entered the marketplace with a single new idea for an electric timepiece. The need was great enough that there was a sufficient low-end market for these companies to enjoy some success for a few years.

One such company was Wallace and Tiernan Products, Incorporated, of Belleville, New Jersey, which manufactured clocks in the years 1928 to 1932. Eight different case styles were offered in the 1931 catalog.

These included a full-sized banjo, an English carriage style, a cathedral style, two tambours, two miniature schoolhouse models, and a square office clock. All of these cases were better than average quality for the period, and all contained the same unique movement.

EARLY COMPANY HISTORY

Wallace and Tiernan entered the American clock market in order to diversify its interests, just as it had done with many other product lines throughout its history. It has, for more than eighty years, mostly for its water purification equipment. The company was founded in 1913 by Charles Frederick Wallace and Martin F. Tiernan in New York City with a patent for the world's first chlorinator, a revolutionary instrument still in use today for the purification of public water supply systems.

Charles F. Wallace, the company's co-founder, is credited with inventing the process which is known as chlorination, the most widely accepted method of removing bacteria and water-borne disease from the public water supply. Chlorination will cut slime mold from the pipes of power plant condensers and eliminate soft spots of bacterial growth in paper, textiles and linoleum. Of importance in steel, rubber or any industry using water, the chlorinator will disinfect anything from a dishwasher to a swimming pool.

Martin F. Tiernan, who was a chemical engineer, had worked with Wallace at the Gerard Ozone Process Company in 1909. The two became friends, and Tiernan invited Wallace to share a room with him at the local Y.M.C.A. Both men later joined a second company involved in the ozone treatment of water, but it also folded. In a few years Tiernan suggested they pool their savings and start a business for themselves. They both put in what little savings they had and rented a one-room office factory in New York City.

In those early years, the small towns and major cities of America grew, and more homes were built with indoor plumbing. Developers looked to build towns near lakes and rivers so there could be a public water supply. There arose, however, a very desperate need of operators of public water works for practical methods of chlorination. Without this treatment, people died by the thousands each year of typhoid, cholera, and other water-bourne illnesses.

A small stream was polluting the Jersey City, New Jersey water supply in Boonton. Tiernan found out about it and sold Jersey City's water superintendent on chlorine gas. He contracted to build and install a gas-feed apparatus for $150. As no such apparatus existed it had to be designed and built from scratch. So, they purchased a cylinder of chlorine gas and went to work.

Wallace's first attempt blew up when subjected to chlorine gas under pressure, almost gassing both partners. But after several attempts, they produced a device which worked. And on Washington's Birthday in 1913, they installed their chlorinator near the offending stream. They turned on the gas, double checked, and left for New York. The next morning they received an urgent call from Boonton--the chlorinator had sprung a leak. In frustration, some men had heaved it into the water.

Wallace retrieved it and made some alterations. He substituted silver tubing for rubber, made some other changes, and reinstalled the chlorinator. This time it was successful. A second apparatus for Jersey City's water supply followed. And it wasn't long before the news of this successful new invention spread throughout the country. As it was the only product of its kind, orders soon poured in from everywhere. A multimillion dollar multinational company had been born.

Wallace and Tiernan moved to larger quarters several times, owing mostly to a crying public need, Tiernan's aggressive salesmanship, and

Wallace's inventive genious. In 1921, they leased an old piano factory on Mill Street in Belleville, New Jersey. Both the factory and the chlorinator have been updated and upgraded over the years. But the development, manufacture, sales and service of this equipment has carried the company into the present day. Their name is as familiar to the public water business as Seth Thomas' is to the horological realm.

THE COMPANY'S FOUNDERS

Charles Frederick Wallace was born July 1, 1885 to Charles Stewart and Nellie (Galehouse) Wallace. Since his father was a colonel in the United States Army, he spent his boyhood and adolescent years on or near the Army posts where his father was stationed. Although highly intelligent, he never earned a college degree. Wallace did, however, develop an early fascination with gadgets, especially those powered by electricity. He would then study the scientific books while tinkering with various instruments and devices.

In a similar manner to which computers have been applied to our lives today, so it was with electricity during this era. People were discovering thousands of ways in which electricity could be used to improve the quality of our lives. So Wallace became the inventive genius of the company with his own army of engineers and scientists to assist him along the way. Before his death in 1964, Wallace held more than eighty patents making significant contributions to the fields of science and health. The National Association of Manufacturers in 1940 named him as one of the country's nineteen leading inventors.

A most reserved individual, Wallace rarely if ever spoke at Board meetings or public functions, depending instead upon Tiernan as the salesman and spokesman. Wallace was most at home in his office-laboratory, surrounded by shelves piled with his inventions, and his ancient rolltop desk full of tubing, valves, fittings, and other metalic remnants of many years.

Martin F. Tiernan, on the other hand, tended to the company's business interests. Born in Charlotte, New York, a suburb of Rochester, the seventh of an Irish immigrant farmer's family of nine, he had worked his way through the University of Rochester and then studied sanitation at the Massachusetts Institute of Technology. Although he was highly qualified as a chemical engineer, and in fact worked together with Wallace early in the company's development, the company's growth found him doing what he did best in his managerial ability.

An article in <u>Nation's Business</u> in January 1951 notes:

"It is difficult to imagine partners with more opposite talents and tastes. Wallace doesn't like to travel. Tiernan loves it. Wallace neither smokes nor drinks; Tiernan does both. Wallace seeks no amusement outside his work except a movie on Tuesday and Thursday nights. Tiernan hunts, shoots, and plays golf."

Nonetheless, the two men had complete faith and confidence in each other, and respectfully each gave the other independence in his own sphere. Out of this mutual trust they developed a corporate partnership which seemingly knew no bounds.

"Due to Wallace's inventiveness and Tiernan's love of the new and exploitable, they...manufacture a bewildering number of products in 15 distinct fields. These range from lighthouse and navigation buoy flasher lights to a remedy for athletes foot, from a system of cooling beer kegs to wound antiseptics and burn ointments, from secret sound-locating devices used in the war to processes for preserving oranges and aging bread flour."

THE CLOCK BUSINESS DEVELOPS

The idea for a clock appears to have begun with a timing mechanism for the chlorinator, the chloroclock. In its applied use for industry and public swimming pools, the chlorinator was fitted with equipment for metering small amounts of chlorine solution. The timing mechanism was later applied to other equipment in what became the aids to navigation business.

Given the business savvy of Martin F. Tiernan, one can imagine that the idea for a commercially successful timepiece came originally from him. Or, Mr. Wallace, on his own might have reasoned that the chloroclock could be changed and its timing mechanism used in other ways. One can only speculate on the specific question based on documented information as to the role each partner played in the company over a period of several decades. And we see in Mr. Tiernan a constant drive to develop new product lines in the true spirit of the early industrialists. Diversification had served Wallace and Tiernan exceedingly well.

By the 1920's, the company had achieved a worldwide reputation for its water purification equipment. They were now ready to introduce, without much fanfare, their line of clocks for home and office. The Wallace and Tiernan research laboratories began developing this idea about 1924. According to the 1931 catalog,

"Numerous models were developed, and after three years, one model was perfected and named the 'Wallace Electric' clock. Then began an exhaustive test program. As many as thirty models were placed under laboratory test and observation, subjected to every conceivable breakdown test, operated at high speed to give them the equivalent of fifty years--a lifetime of actual wear. When these tests had been successfully met two thousand clocks were built and sold in a limited test area."

That such a test program existed is attested to by what are believed to be some prototype models currently in the collection of Robert Brown of Millington, New Jersey. Brown recently purchased a collection of Wallace clocks, the largest known collection, from the estate of deceased member Richard Shevalier. Some of these clocks are believed to be among the test models because they are contained in cases not found in the 1931 catalog. Also among this collection are two distinctive movements, one slightly varied from the other, but with obvious differences.

The catalog would describe the test program further. Test models were sold in an "undisclosed" part of the country to a wide variety of homes and businesses to assure their use under various circumstances, temperatures, and levels of humidity. When inspectors surveyed for owner satisfaction they found some"astounding" results.

"Not only were owners pleased with the clock, they boasted to their friends about it. So unusual was public response that without advertising or promotion of any kind except the unsolicited praise of its owners, the 'Wallace Electric' has established a widespread reputation for performance in this test area."

The clocks were marketed in jewelry stores where they were also praised for their quality. Marketing would be by word of mouth, and a reliance upon the company's proud reputation for quality and precision.

The hard fact was that the Wallace Electrics were not selling very well. One year following this product's introduction to the public, the stock market crashed in October 1929. What followed were some of the most difficult economic times in our nation's history. With a virtual monopoly on the chlorination business, Wallace and Tiernan itself would hold up quite well.

Ironically, a more successful venture grew out of the clock business with the advent of the aids-to-navigation. These namely were marine beacons, range lights, lamp changers, foghorns, sun switches, buoys, and flasher mechanisms. Mr. Warren Haring, a retired executive who worked for this products division, remembers clearly the story of how this division got its start from the Wallace Electric clock. A senior member of the U.S. Lighthouse Service (today the U.S. Coast Guard) was strolling around the Wallace and Tiernan exhibit at a trade show in 1928, the year the clock was formally introduced. He suggested to the W+T representative that it might be possible to adapt the clock mechanism to flash aids to navigation lights in a precise and reliable manner. The representative advised Mr. Wallace of the suggestion and within months Wallace developed a prototype battery operated flasher.

The aids-to-navigation business took off quickly with the above mentioned products with its main consumer being the United States Lighthouse Service. The clock business, meanwhile, as it was directed towards a depressed consumer market, was not doing very well. So, in its catalog of 1931, Wallace and Tiernan sought to promote its line of clocks by appealing to nautical themes, and the success of the aids-to-navigation business:

"Wallace Electric Clocks are a product of the same organization that developed and builds the primary and secondary control clocks controlling the Radio Beacon Directional Signals broadcast by the U.S. Lighthouse Service."

Wallace and Tiernan's reputation for precision instruments was, indeed, worldwide. They were more accustomed, however, to selling their products to business and industry rather than the consumer market. Nonetheless, this proud company could boast:

"On stormswept lightships riding the furies of the gale at sea, in wave lashed lighthouses trembling under the teeth of hurricane winds, when nature obscures and nullifies all other aids-to-navigation, the Radio Beacon signals must go out. The primary clocks which synchronize them, the time interval program clocks that start and stop them with unfailing split-second accuracy must meet the exacting demands of the Lighthouse Service. Lives are at stake, property at sea endangered, and the rigors of the Service know no excuse for halting, failing performance."

Simply stated,

"Wallace and Tiernan are proud that their research laboratories, the precision craftsmanship of their works were enlisted in this all-important service-proud that their apparatus unfailingly meets these exacting demands."

But by 1931, the year this catalog was published, notwithstanding the success of this company, one third of the nation's work force was unemployed. The mood of the entire country was decidedly grim. Those who could afford to buy anything in a jewelry store were themselves an endangered species. Wallace and Tiernan's clock sales fell victim to the Great Depression and further production was halted.

THE WALLACE ELECTRIC MOVEMENT

In the collection of articles on electromechanical clocks, 150 Years of Electric Horology, editor Elmer G. Crum observed the Wallace movement unfavorably. "The plates were stamped," he notes, "and the movement shows very little of the quality that Wallace was capable of producing."

One possible reason for the apparent lack of quality is that the inventor of this movement, like Thomas Edison, was chiefly an inventor, and not a horological student. Charles Frederick Wallace would come up with hundreds of ideas, and then place the best ones in the hands of his engineers in the laboratory. Some ideas worked better than others. But unlike Seth Thomas or Edward Howard, Mr. Wallacè did not have the benefit of a direct descendency from Eli Terry, or Simon and Aaron Willard. Nor, apparently, did the laboratory engineers in research and development.

Given the company's reputation for quality and precision in its other product lines, there is no reason to doubt the company's claims stated in the catalog that they did their homework before launching this venture. The catalog would boast that, "To the fine art of clockmaking has been added the exact science of engineering." The methodology is fully defended:

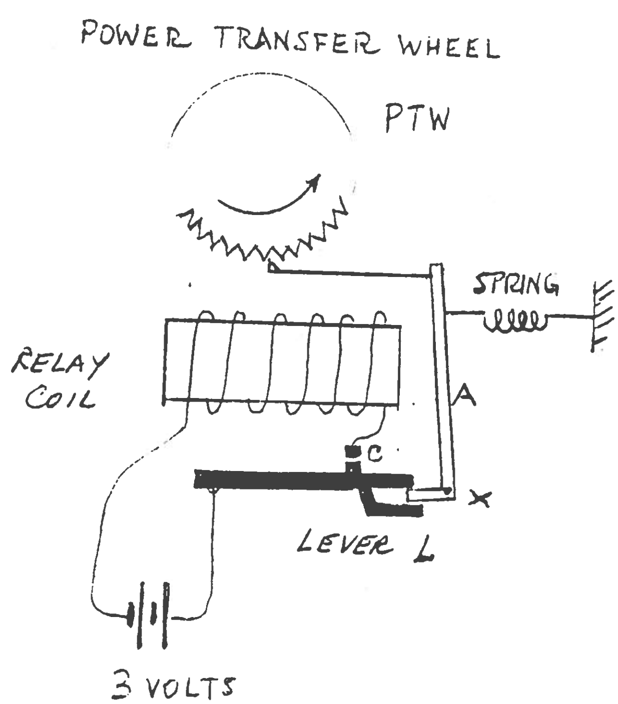
"Materials of construction were investigated. The function of each part was studied and where changes in material or design would improve the service or lengthen the life of these parts, changes were made. All gears are machine-cut, the desirable shape of the teeth received special attention. Escapement wheel is aluminum studded with steel pins. The escapement itself is of bronze. Special alloys are used in making non-pitting positive acting contact points. The pendulum bars are of special steel unresponsive to temperature changes. The pendulum bob is equipped with fine micrometer adjustment, making it possible to adjust for as little variation in accuracy as one fifth of a second. Shafts are of steel, shaft bearings are highly polished steel, accurately fitted. It is to these niceties of design, this precision craftsmanship that 'Wallace Electrics' owe their unfailing accuracy."

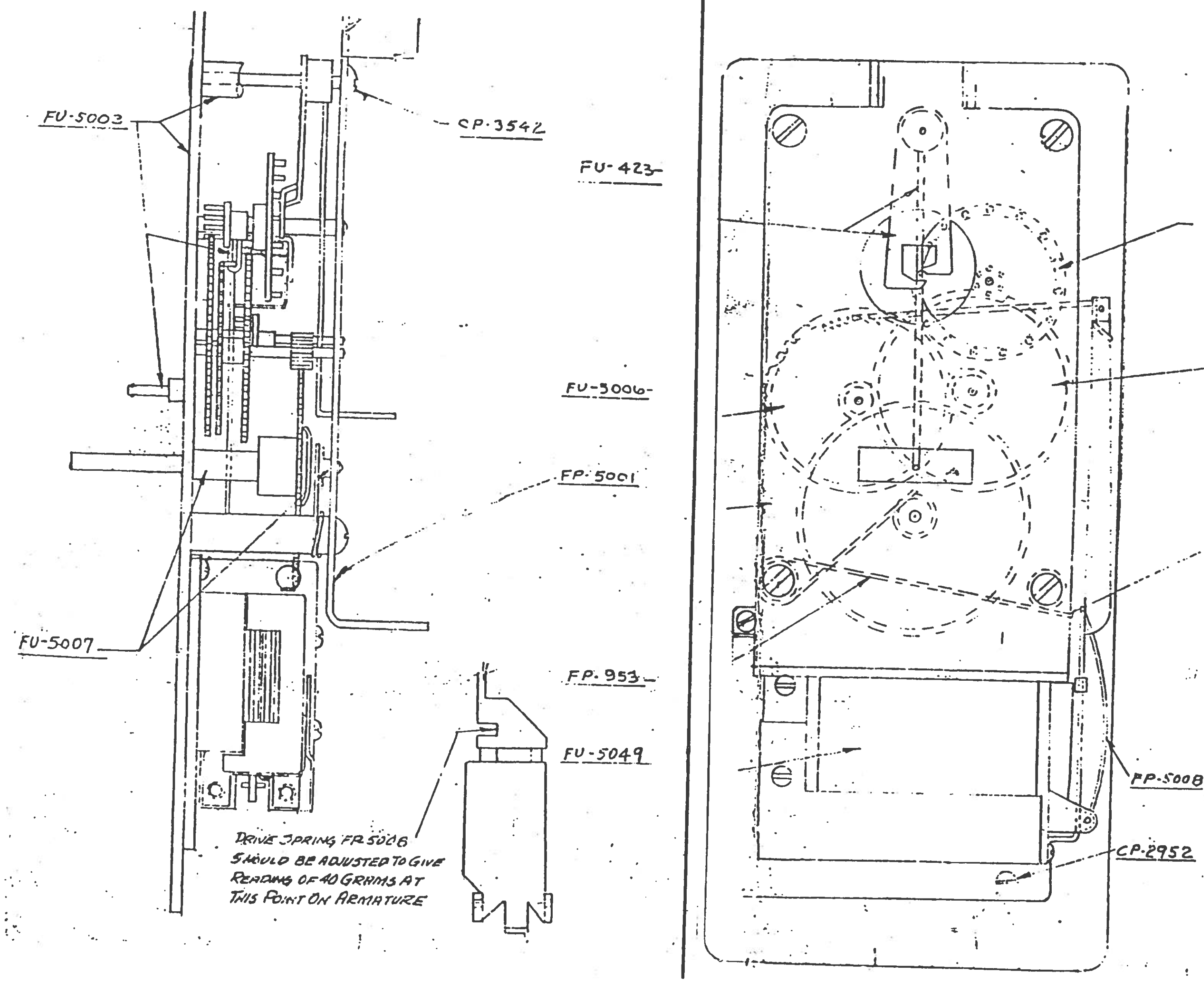
The two partners truly believed they had done it again. They had, they thought, built a better mousetrap. It would only be a matter of time before the world would again beat a path to their door. And once these clocks got into circulation they would truly be appreciated as "state of the art" technology.

OPERATION OF ELECTRICAL SYSTEM TO POWER WALLACE CLOCK

The pin escapement unlocks under control of the pendulum. The power transfer wheel, PTW, is on the same arbor as the third or fourth wheel in the time train. The armature, A, of the solenoid has a wire with a hooked end that acts like a "rake" to pull the power transfer wheel counterclockwise, under the force of the spring, S.

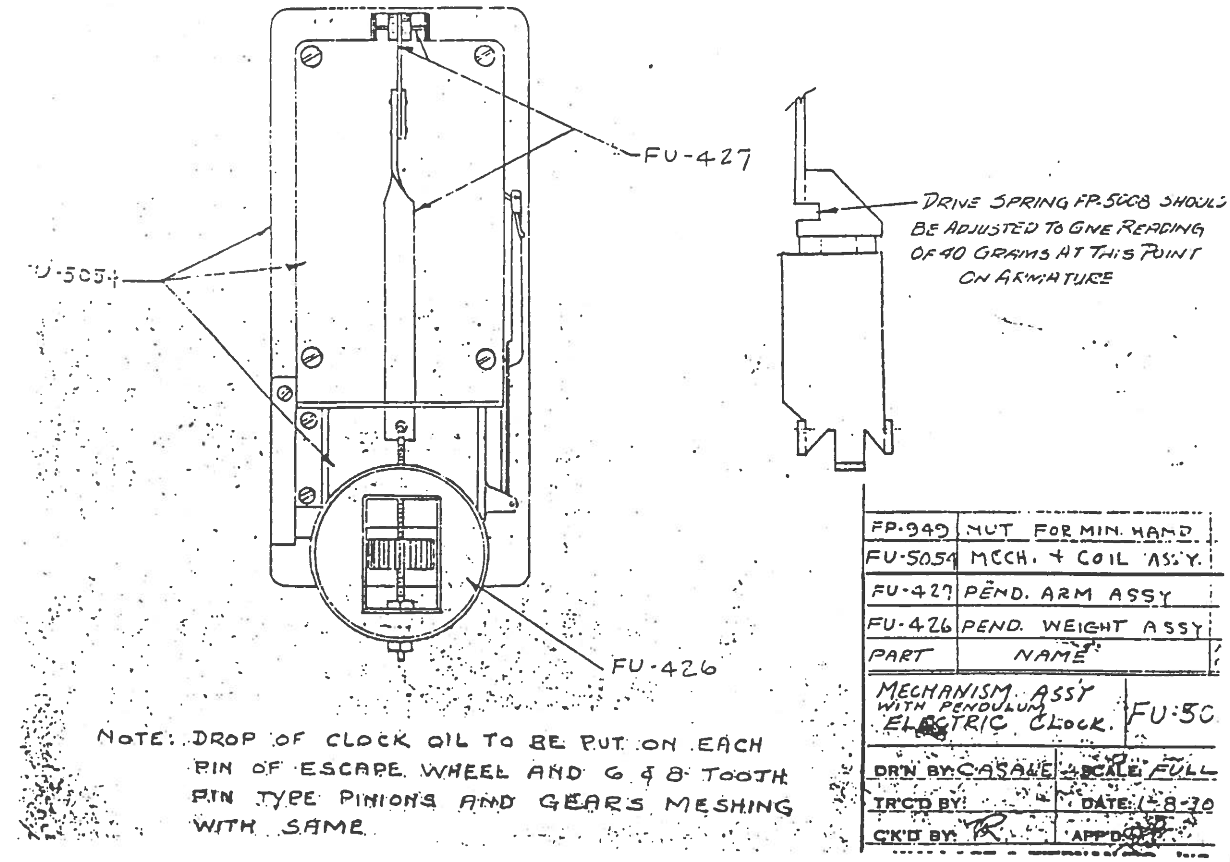
After several teeth of the PTW are gathered, the tail of the armature, pivoting at point "X", lifts lever, L, sufficiently to meet the contact, C, on the solenoid coil. The electric circuit is thus closed. The solenoid is energized and the armature is pulled against the spring. The hooked wire is backed into its "raking" position. The motion of the armature lowers the lever so the circuit is opened. The force pulling the PTW is resumed and the cycle is repeated.

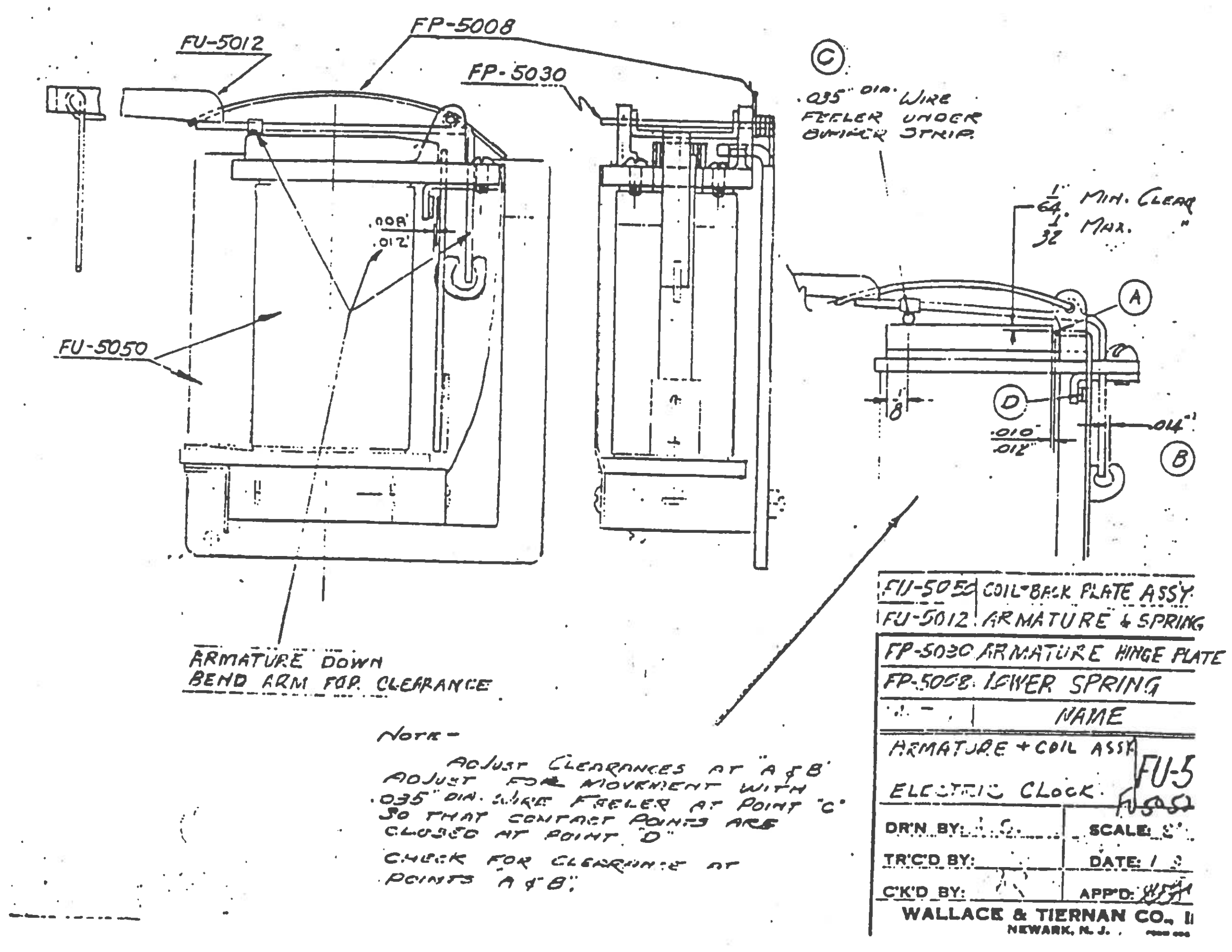




PART	NAME
CP-2952	#2-56-1/8 LG. R
FU-5007	CENTER SHAFT
FU-5003	BACK PLATE
FU-5049	COIL & BACK PLA
CP-3542	#4-36x1/4 LG. R
FP-5001	FRONT PLATE
FP-953	BACK LASH S
FP-5008	ARMATURE SPR
FU-5006	2ND SHAFT AS
FU-5005	3RD SHAFT ASS
FU-5004	ESCAPEMENT SH
FU-423	PAWL SHAFT

FRONT PLATE & COIL ASSY
ELECTRIC CLOCK
CASALE


FU-427
U-5054
FU-426
DRIVE SPRING FP-5008 SHOULD BE ADJUSTED TO GIVE READING OF 40 GRAMS AT THIS POINT ON ARMATURE
FP-949 NUT FOR MIN. HAND
FU-5054 MECH. + COIL ASS'Y.
FU-427 PEND. ARM ASSY
FU-426 PEND. WEIGHT ASSY
PART NAME
MECHANISM ASSY WITH PENDULUM ELECTRIC CLOCK.
FU-50
DR'N BY: CASALE
SCALE: FULL
TR'C'D BY:
DATE:
C'K'D BY:
APP'D:
NOTE: DROP OF CLOCK OIL TO BE PUT ON EACH PIN OF ESCAPE WHEEL AND 6 & 8 TOOTH PIN TYPE PINIONS AND GEARS MESHING WITH SAME


FU-5012
FP-5008
FP-5030
FU-5050
.008"
.012"
C
.035" DIA. WIRE FEELER UNDER BUMPER STRIP.
1/64 MIN. CLEAR
1/32 MAX.
A
D
B
.010"
.012"
.014"
1/8
ARMATURE DOWN BEND ARM FOR CLEARANCE
NOTE -
ADJUST CLEARANCES AT A & B
ADJUST FOR MOVEMENT WITH .035" DIA. WIRE FEELER AT POINT "C" SO THAT CONTACT POINTS ARE CLOSED AT POINT "D"
CHECK FOR CLEARANCE AT POINTS A & B.
FU-5050 COIL-BACK PLATE ASS'Y.
FU-5012 ARMATURE & SPRING
FP-5030 ARMATURE HINGE PLATE
FP-5008 LOWER SPRING
NAME
ARMATURE + COIL ASSY
ELECTRIC CLOCK
FU-5
DR'N BY:
SCALE:
TR'C'D BY:
DATE:
C'K'D BY:
APP'D:
WALLACE & TIERNAN CO.
NEWARK, N. J.

— MART —

All MART Ads are FREE, Send copy to the attention of the Editor:
Harvey Schmidt, 75-80 179th St., Flushing, NY 11366, Limit 3 lines.

WANTED: **HOROLOGICAL LITERATURE**, Repair info, Catalogs, etc. for the Journal
PORTESCAPSecticon Clock or Movement. Antique Watch & Clockmaker's Tools & Machinery.
(718) 969-0847 Harvey Schmidt, 75-80 179th St., Flushing, NY 11366

Junker **EARLY BATTERY CLOCKS**, Movements, Parts, etc, send details.
Martin C. Feldman, 6 Stewart Pl., Spring Valley, NY 10977

STANDARDELECTRIC Master Clock, 120 Beat, Eye Brow or Square Case. Also Slave Clocks in Eye Brow Case's. David Lee, P. O. Box No. 171, Knox, NY 12107

ITR, STROMBERG, STANDARD, & SWCC Movements and Parts for Master Clocks. Also Wood Cased Slaves. Call or send photo (914) 997-5670
Mitch Janoff, 3 Stratford Ave., White Plains, NY 10605

STANDARD ELECTRIC Square Dial, 13 ½" X 13 ½" & a Set of Hands.
Roy Crowe, 9257 Appleby St., Downey, CA 90240, (310) 861-8788

Master Clock with Tape or Drum Program Control & Internal Pilot (slave) Clocks by **STANDARD ELECTRIC / SELF WINDING / HOWARD** etc. Early / unusual Time Recording Clocks / Watchmans Clocks. Excellent Condition will bring a high offer! (508) 448-5547
Robert A. Simon, 930 Townsend Road, Groton, MA 01450

Dial for **ITR** master clock: 12-1/2" O.D. with wood bezel surround on outside edge of dial; minute track diameter 11"; independent seconds bit. (713) 554-7387
Kenn Koerber, 105 Royal Drive, League City, TX 77573-1951

ELECTRO-MECHANICAL Clocks, Fancy & Simple Cased. Unusual Clocks, Movements. Books. Day or Night (516) 541-2400 or 351-5869
Elliot B. Siegel, 930 Broadway, Massapequa NY 11758

Dial for **BULLE** Clock, Approx. 5½" Diameter, 1½" hole in center, "rolled" brass outer edge.
Jerry Hahn, 2714 Hampshire Ave., Cincinnati OH 45208

The electrical unit that goes on a small **WALLACE** & Tiernan Wall Clock. The "Ears" have been broken off my armature. Source for domes that fit the large two contact **TIFFANY**. The casting that mounts the pendulum on a seconds beat **GENTS** and the pendulum assembly or any piece of it. Richard B. Pridham, 10402 Bellman, Downey CA 90241 (310) 862-3086 Call collect.

HANDS for a 13 inch Chapter Ring. (312) 238-3294 - evenings or 445-5381.
G. Frederickson Sr. 1716 W. 100th Pl. Chicago IL 60643

Tapped Coil for Transistor Driven **JUNGHANS** Battery Clock. John McGrory (908) 537-4575

SYNCHRONOME Master Clock. William F. Baker (212) 560-2013

Original Glass Battery for **BRILLIE** Electric Clock as shown on pg. 87 of "150 Years of Electric Horology." Kenneth Erlenbusch, 124 North Avena, Lodi, CA 95240

REPAIR: ALL EARLY BATTERY CLOCKS Specializing in **BULLE** using orig. parts.
Martin C. Feldman, FNAWCC, 6 Stewart Pl., Spring Valley, NY 10977

FOR SALE: **TIFFANY NEVER WIND**, Double Contact Model, Replacement Castings for Pendulum Suspension & Contact Arms (Brass not Pot Metal) $20 each, $37 for both. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

Repair Parts for **TIFFANY NEVER-WIND** Clock Co., **CLOISTER** Mfg. Co., & **NATIONAL MAGNETIC** Clock Co. David Lee, P. O. Box No. 171, Knox, NY 12107

SCOTT BATTERY Electric Shelf Clock (London Stereoscopic Co.) Circa 1905. **Photo & Details** in A. & R. Shenton "The Price Guide to Collectable Clocks." Fig. 404. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

BULLEElectric Gallery Clock w/ 12" dial, 17" square overall, walnut wood case w/ pendulum. **BARR** Electric Mantle Clock w/ Glass Dome. **SWCC** Dials and other electric dials.
(312) 238-3294-evenings or 445-5381
George Frederickson Sr., 1716 West 100th Place, Chicago IL 60643

SWCC Western Union, 15-1/2" convex "glass". Actually it is plastic, but it beats a naked dial. $20.00 (I'll pay UPS up to $5.00) (205) 967-1237
Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243

Seth Thomas Square Oak Gallery Battery Electric with 13" Dial, Large Seconds Bit & Weight Driven Movement per pg. 65 (lower left) "150 Years of Electric Horology." $300
Robert Simon, 930 Townsend Road, Groton MA 01450 (508) 448-5547

Wall Master Clocks: **Synchronome** 1 sec., **Princeps** (New System) 1 sec., **David Perret** rare Swiss clock 80 beat, **Self Winding** No. 18A w/ rotary motor. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

Requests for reprints of previously published material should be directed to the Chapter Historian:
Dr. George Feinstein
75-19 195th Street
Flushing, NY 11366

THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78 NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXI, #3, AUGUST 1995

Fellow Horologists:

Issue number 3 continues with ITR bulletins #12, 13, & 14 covering their Program Devices, Cost Recorders, and Bell Ringing Attachments. Of special interest is the commentary in bulletin #12 describing the faults inherent in that Bell-Ringing unit, and the decision to discontinue the product. Would this be a likely scenario in today's business climate?

The second half of the WALLACE & TIERNAN presentation by Rev. Herb Freeland, covering the early history of the organization completes this issue. This material has been prepared in an interesting as well as informative manner and is a pleasure to read. Thanks again, Herb for your offering.

The meeting at MITCH JANOFF'S home on July 15th saw about a dozen members from the metro NY area plus one from Maryland in attendance. We had an opportunity to see, first hand, the synchronizing system that Mitch uses for his Self-Winding clocks, and enjoy looking and poking into the rest of his collection. Our informal get-together ended with a tasty repast of cold cuts and salad, and we offer our gratitude to the Janoffs for their hospitality.

A meeting of electrical enthusiasts was held during the National NAWCC Convention in Richmond, Virginia, and while there was no scheduled program, informal discussions took place covering many topics, including a discourse on early electrical meters by ELMER CRUM, who demonstrated a few examples. Those in attendance enjoyed their hour together, as indicated by their reluctance to leave the meeting room!

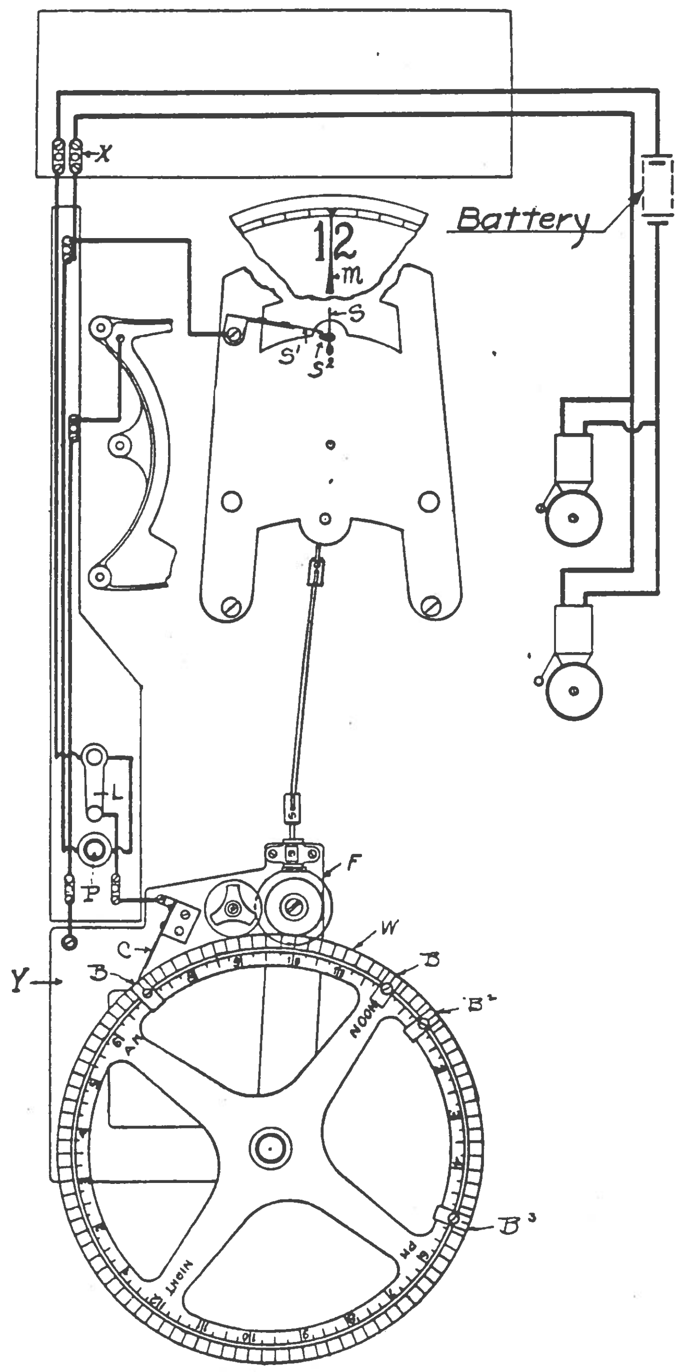
Since chapter 78 is non-geographical and occasions to meet with one-another are limited to major regional meetings and the NAWCC National Convention, it has been suggested that those members that may be interested in informal local gatherings inquire of the secretary about other members who might live in nearby areas. Harvey Schmidt, chapter secretary, has the membership roster on computer, and can provide replies by virtue of zip-code similarities, to the accommodation of any requests...

Enjoy this issue, good reading ahead...

Martin Swetsky, FNAWCC, President
Harvey Schmidt
Dr. George Feinstein } Co-Editors

Engineering Bulletin

No. 12 *International Time Recording Co., of N. Y.* **ENDICOTT, N. Y.** **November 1, 1919**



BELL RINGING ATTACHMENTS

For Use With Card and Dial Recorders

By J. W. Bryce, Supervising Engineer

After experience extending over a long period of time and obtained under many different kinds of operating conditions, it has been decided to discontinue the sale of the so-called bell ringing device which, as is well known, consists of a program wheel mechanically driven by gearing between it and the clock movement and the program wheel is fitted with adjustable contact blocks adapted to co-act with certain contact brushes at stated times during the day.

The device is illustrated in diagrammatic form in Fig. 1, which also shows the circuits which were used with it.

The scheme on the face of it is a good one but there are some very serious practical objections to it and in this bulletin such objections are pointed out and a description of suitable devices is given, whereby more satisfactory results may be obtained.

The features that have proven most objectionable in the mechanical device are:

1-The device puts too much load on the clock movement.

2-The program wheel requires so many divisions on its periphery (1440 minutes) that the center to center distance is obviously very close and should there be the slightest irregularity in

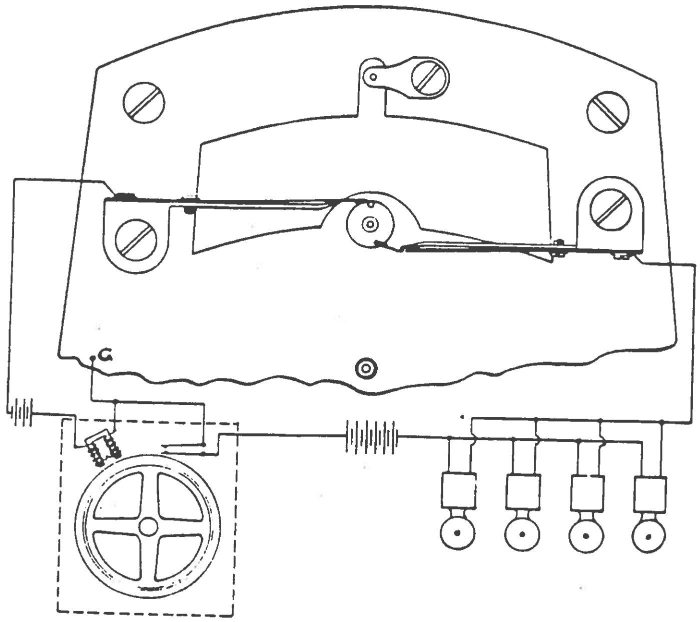


Fig. 2

the geering, eccentricity, etc., owing to the very slow and continuous forward movement of the parts, the position for each minute will not be accurately registered and unsatisfactory operation result.

3-The contact on the wheel is not of the most desirable type because it opens its circuit very slowly instead of with a quick movement like that in our regular program device.

The arrangement recommended in place of the above described apparatus is one of our electrically operated program devices operated by a contact on the clock movement. This is illustrated in a diagrammatic form in Fig. 2.

The contact on the clock movement is a very simple one, consisting of a disc with a pin mounted in it which is brought first into contact with the top contact and a few seconds later with the bottom contact. The contact with the top spring is designed to be of short duration (approx. 1 second) and is used to advance the program wheel from minute to minute.

The bottom spring makes contact with the pin for a longer period, say three or four seconds and where low voltage is used and very few small bells are involved directly closes the circuit to them through the contact fingers of the program device.

If higher voltage than say 6 volts is used and more than 3 or 4 small bells are to be rung, neither the contact on the clock nor the contact fingers on the program device will stand the current and sparking for any length of time and a carbon point relay should be used on this circuit and the bell circuit closed through its points.

This will be absolutely necessary, if the lighting current is used for the bells or horns and type "E" relay is recommended for this purpose.

Any of the program devices listed may be operated from the contact on the clock but type A. B. C. and D. or the program wheel mounted in Wooden Case, are most suited for work in hand as they are already fitted with relays as described. This insures protection to the contacts in the clock, and enables low voltage to be used on the clock contact which is essential. The voltage on these contacts should be 6 volts as above stated. In ordering program devices the voltage should be stated, because unless otherwise stated the magnets in the program device and relays will be furnished for 12 volts.

Fig. 3, illustrates a program wheel mounted in wooden case and suitable for use on circuits of not above 10 volts. This wheel is particularly adapted for use on such circuit as illustrated in Fig. 2. It has the same schedule every day in the week and controls one circuit. The cabinet has no relay and practically only adapted for use on primary battery circuits.

ADDENDUM:

While Fig. 2. shows two batteries for use with program wheel, it is to be understood that one may be used and both circuits shown connected thereto. The two batteries were shown for sake of clearness for explanatory purposes.

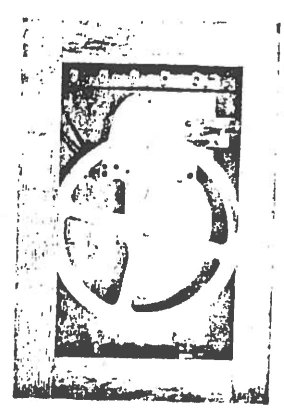


Fig. 3

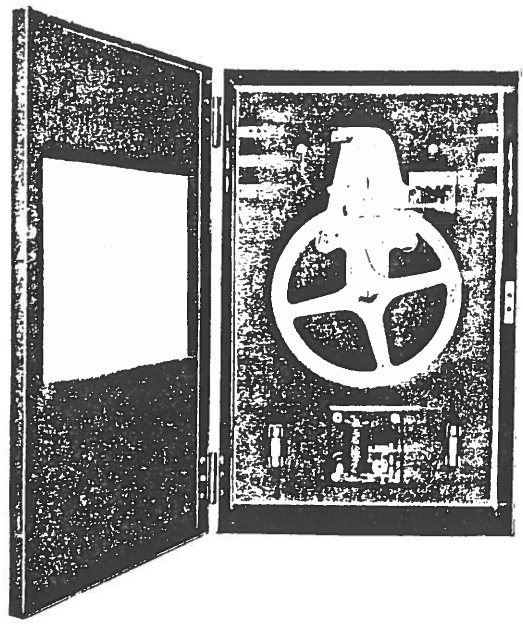
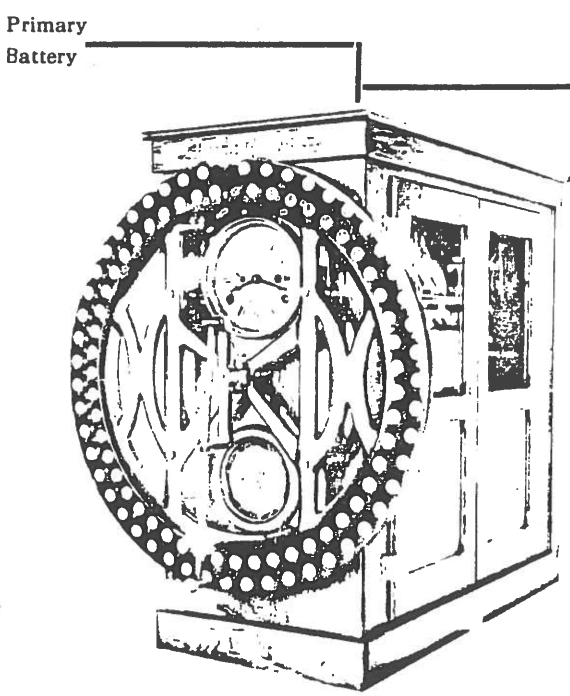


Fig. 4
Cut shows type C Program Device



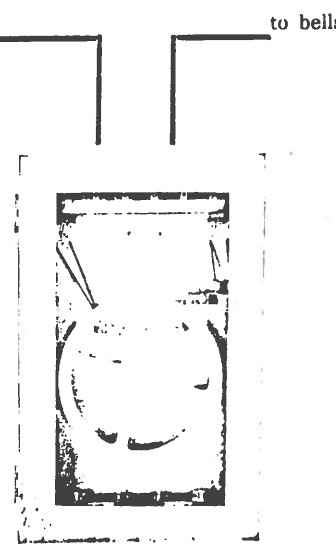
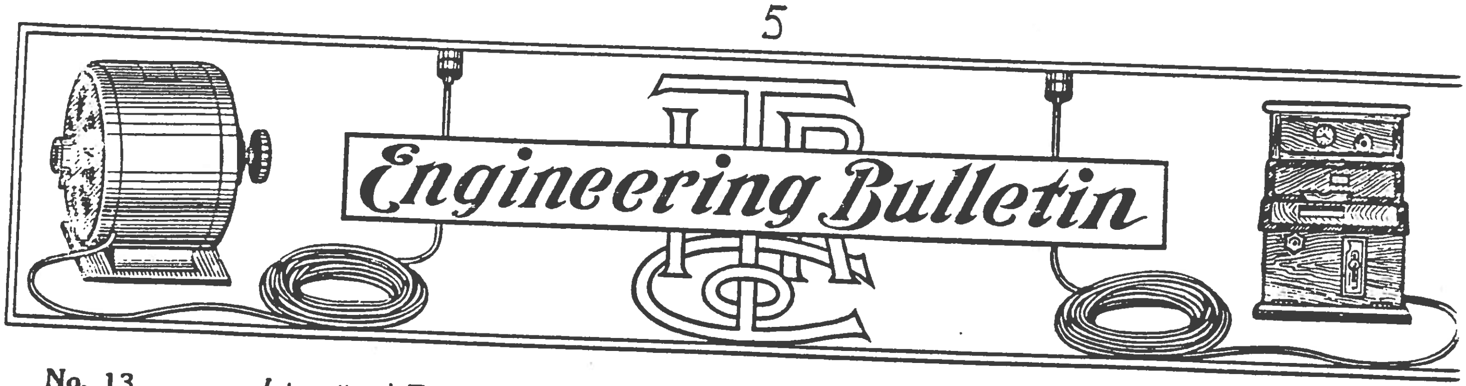


Fig. 6
Program wheel with
calander

Fig. 5



No. 13 International Time Recording Co., of N. Y. ENDICOTT, N. Y. November 15, 1919

INTERNATIONAL COST RECORDER
Styles of Cards and Card Tables

By C. E. Larrabee

C. E. LARRABEE

The object of this bulletin is to describe the kinds of card tables and cards to be used therewith on the International Cost Recorder.

Fig. 1 is a composite layout showing both the narrow and wide card tables of the so called open front style. With this style the location of the card is determined by the operator lining up the proper printing space on the card with the marker or indicator on the shield just above the card table as shown in Fig. 2. By this method practically any width card may be used, as it is only necessary to have a suitable marking for the various spaces, in order to line each space properly for its registration.

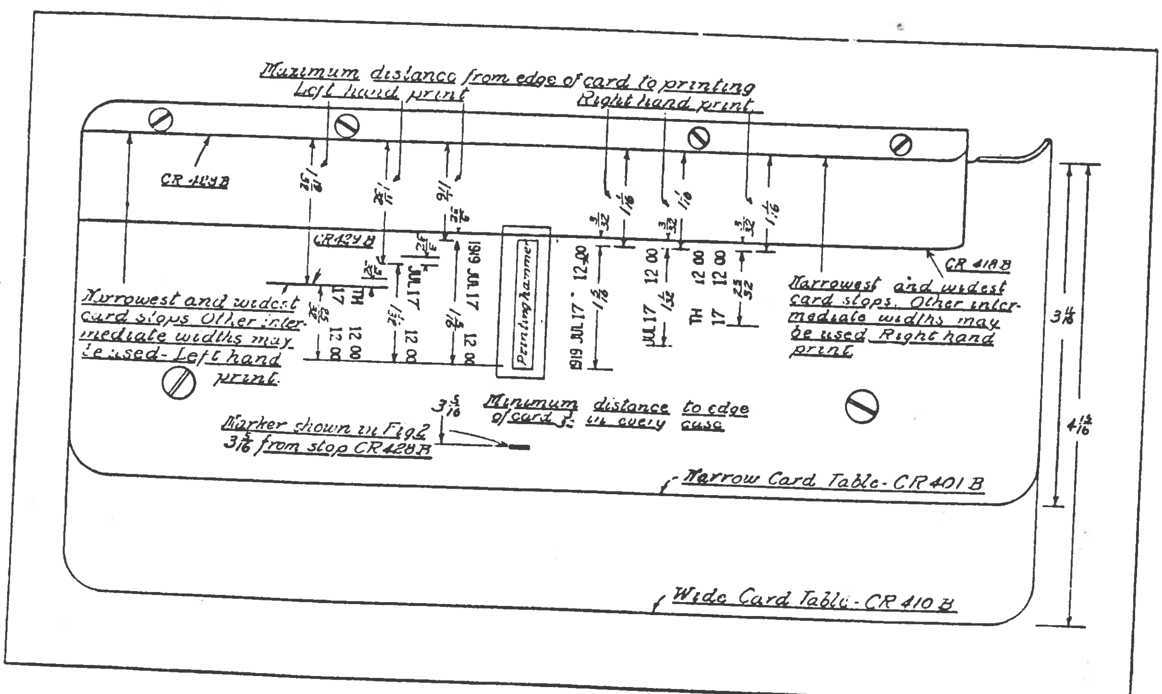


FIG. 1

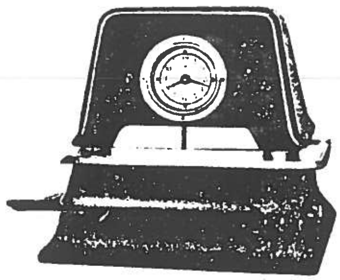


FIG 2

No.	Name.		
Order No.	Operation.		
Piece Number.	Piece Name.		
Pieces Started.	Finished.		
Time Record.			
Finish			F
Start			S
Finish			F
Start			S
Elapsed Time			
Rate	Cost	Dept. Ex.	
Approved ------------------------			

FIG. 3

Fig. 3 shows a facsimile card, used with a stop C R 418 B and printing date, hour and minute. It will be noted that this card has a series of markings S. F. S. F. in line with the printing spaces and being located the proper distance from the left margin will be easily comparable with the marker on the upper plate. It will be noted that in Fig. 1, the several different date lines are shown thus, 1919 Jul 17 12 00, Jul 17 12 00, TH 12 00 and 17 12 00. These are shown in the position which they take relative to the card stops for both the right and left hand print.

The same type wheel frame is used for either right or left hand print, it being necessary only to shift some of the parts from one side to the other of the frame and turn the type wheel frame around in order to have a right or left hand print.

Attention is called to the fact that where the full date line is printed on the left margin of the card the maximum distance from the edge of the card to printing is 1 1-16 inches, Fig. 1. Where the month, date, hour and minute is printed the maximum distance is 1 11-32 and where day or date, hour and minute is printed the maximum distance is 1 19-32 inches from the edge of the card, while in each case the minimum distance is 3-32. It will be noted that where the right hand print is used the mimimum and maximum distance to the printing is the same irrespective of the length on the date line. The figures given are the size of dimensions to the edge of the actual imprint and not the dimensions for the outline of the printing space.

We recommend that 1-16" be allowed between the ends of the imprint and the border around the printing space.

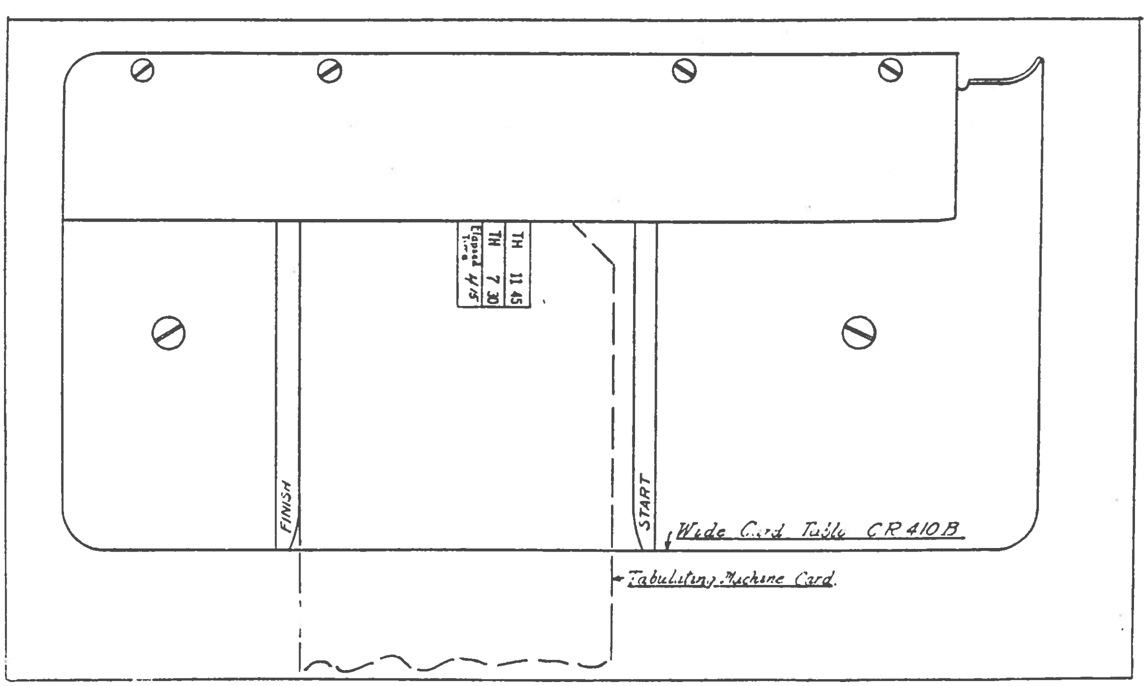


FIG. 4

The card stops C R 429 B may be used in two positions as shown, it being necessary only to remove the screws along the back edge and move the stop either forward or back as the case may require.

Stops may also be made for cards which have margins ranging between the minimum and maximum distances shown.

Where it is desired to use the Tabulating Machine Card and make but one start and stop record on same, this can be arranged as shown in Figs. 4 and 5, Fig. 4 showing the records on the left end of the card, while Fig. 5 shows the record on the upper edge of card, Fig. 4 being left hand print and Fig. 5 right hand print. It is obvious that these conditions may be reversed if desired. In each of these cases it will be seen that the card is located by inserting it in the receiver against either the START or STOP gauge as the case may be. More than two registrations may be made on the card following the same method for the marking as shown in Fig. 3.

NOTCHING DEVICE

Fig. 6, is a composite print showing the two widths of card tables C R 403 B and C R 405 B arranged for use with notching device, the table having a guide along the front edge which encloses the table and tends to hold the card in proper place for printing and notching. The notching device may also be used with either width of open front card tables if desired, but the best results are obtained with the closed front type card tables.

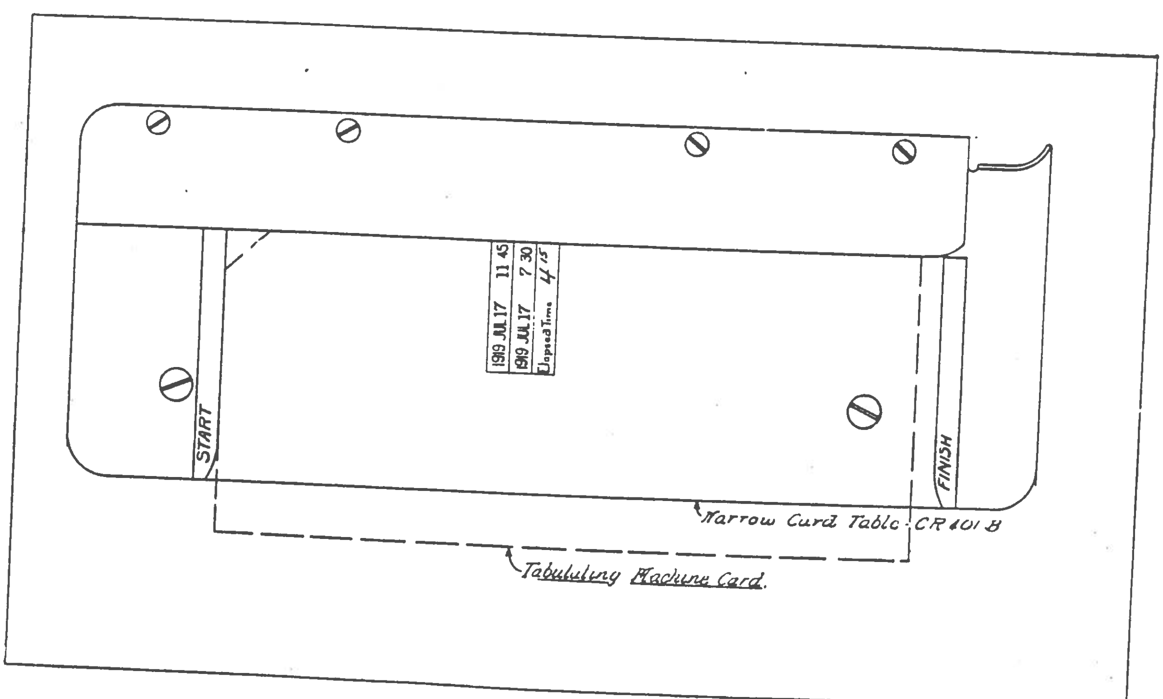


FIG. 5

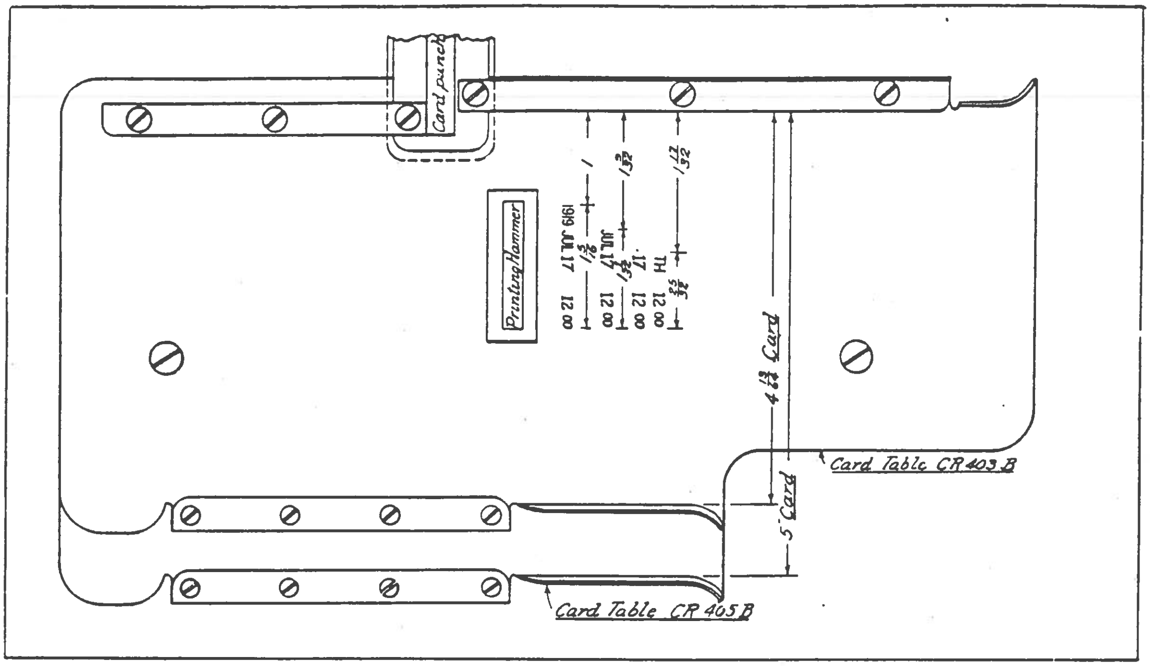


FIG. 6

TWO COLOR RIBBON

The two color ribbon attachment may be used on recorders having any of the card tables shown.

Figs. 7 and 8 show the types of cards used in conncetion with the notching device, Fig. 7, being a patented design in which 1-2 the registrations plus one are used as compared with the card shown in Fig. 8, the stopping record of one job being the starting record of the succeeding job.

Fig. 8, shows the overtime recorded as 9.0 to 11.5 or 2 1-2 hours, and where the two color ribbon is used this time would be shown in red.

The Figs. 1, 4, 5, and 6 will take care of the kinds of cards ordinarily encountered but where special card forms are to be used it is best to submit sample cards so that the factorymay recommend the arrangement most suitable for that particular card.

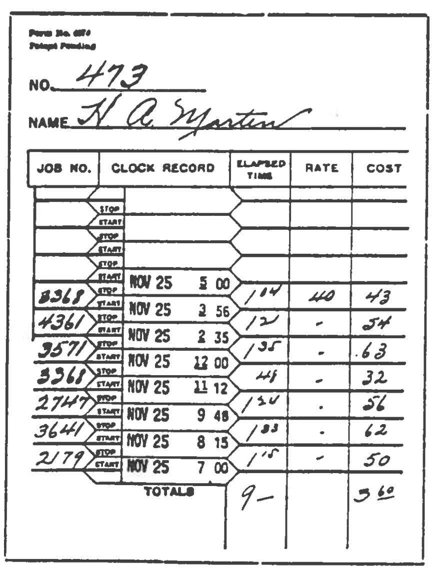


FIG. 7

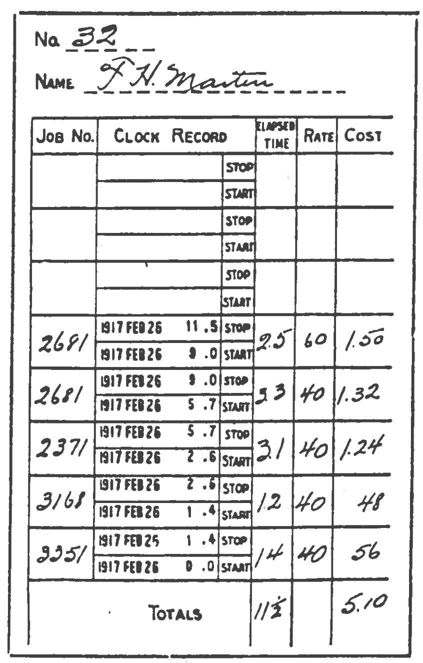
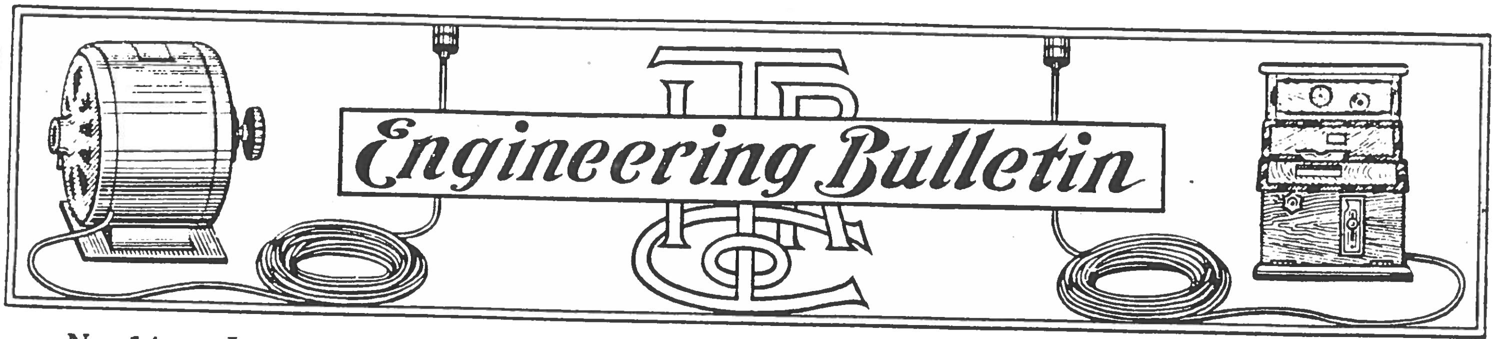


FIG. 8



No. 14 International Time Recording Co., of N. Y. ENDICOTT, N. Y. Dec. 1, 1919

INTERNATIONAL PROGRAM DEVICES

By J. W. Bryce, Supervising Engineer

DEVICES are manufactured by the International Time Recording Co., of N. Y. for controlling the operation of signals, such as bells, horns, whistles, time recorders for cost keeping, to operate on varying schedules, to change ribbon colors in cost recorders, etc.

As the different classes of service require electric current for different lengths of time as well as at different times of the day, certain special forms have been devised for each class of service. These have been designated for convenience by the letters of the alphabet and while no attempt will be made in this bulletin to go into the subject of program devices exhaustively, each of the standard forms adopted will be described so that its functions may be clearly understood.

In order to keep this bulletin as compact as possible and yet have it contain sufficient detail, the I. T. R. program wheel and contacts will first be fully described. As it forms the basis of all the program devices mentioned above, and is assembled with other devices, a clear understanding of the program wheel and contacts will make it comparatively easy to understand its applications for different uses.

In general there are three kinds of impulses required of program devices. (1) a short impulse of say 1 second's duration several times during the day, either every day or on certain days of the week. (2) a short impulse every minute for certain hours of the day and not at other hours, and (3) a longer or sustained impulse, say 5 to 15 seconds, several times during the day.

The devices that require impulses of short duration as described above (1) are taken care of by program devices A. B. C. & D.

Those devices that require minute impulses of short duration at some times (2) and not at others (eliminated time) are taken care of by program devices H and I.

Those devices that require a contact at different times of the day (3) of longer duration (bells, etc.) are taken care of by program devices L and M.

THE PROGRAM WHEEL

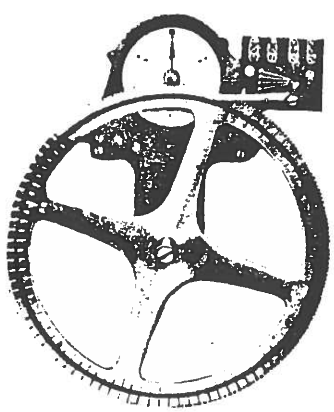


Fig. 1

Fig. 1 is a face view of the program wheel and its driving mechanism and Fig. 2 is a rear view of the same device.

It consists of a large gear wheel which is accurately cut and carefully fitted to revolve on a central stud. Near the periphery of the wheel is cut a T shaped groove adapted to receive small screws which carry the blocks which are adjustable around the entire circumference and which serve to bring the program contacts together. As there are 1440 minutes in 24 hours (60 x 24=1440), it is obvious that the wheel must

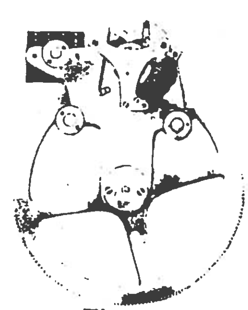


Fig. 2

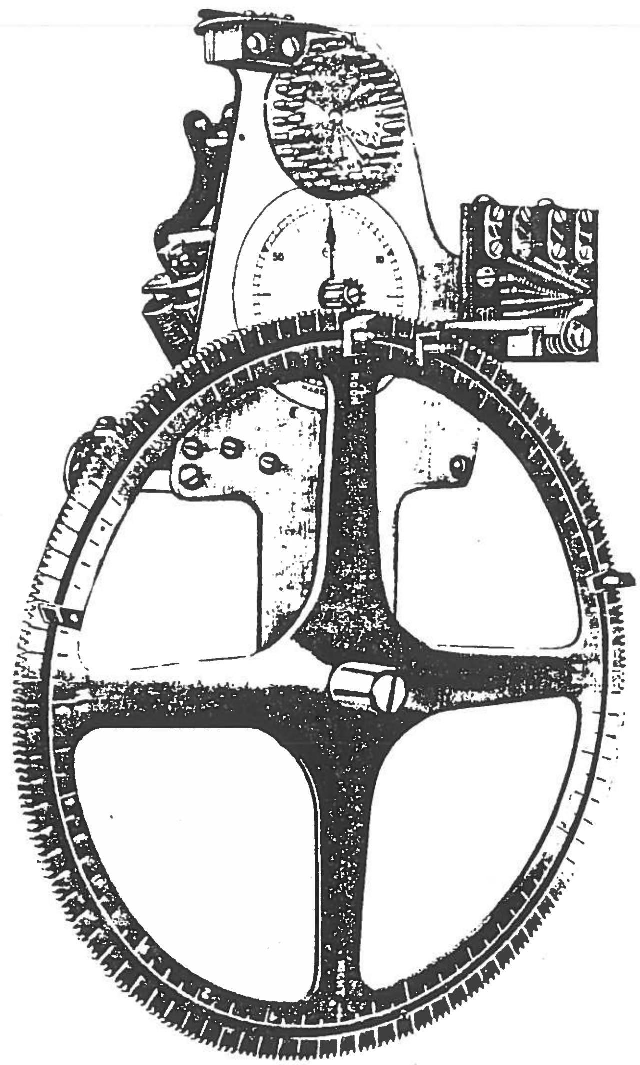


Fig. 3

be quite true and the blocks carefully placed if they are to make contact accurately at the particular minute required.

To assist in the setting of the wheel, it is engraved with the entire 24 hours with A. M. and P. M. clearly marked, (in 15 minute divisions.)

In mesh with the program wheel is a pinion which is advanced one sixtieth of a turn every minute.

To assist in setting the blocks a pointer or hand is provided moving over a dial suitably engraved.

Referring to Fig. 2, a magnet is provided together with ratchet and pawl which magnet receives an impulse every minute from the master clock (perhaps through one or more relays) and through its attendant ratchet and pawl moves driving pinion (Fig. 1,) forward as described.

It will be apparent therefore, that the program wheel advances in a series of minute jumps and that it will make one complete revolution in 24 hours.

Mounted on the frame work are a pair of insulated fingers which co-act with the adjustable blocks so that whenever a block gets in exactly the right position under these contact fingers it allows them to come together and remain in contact for one whole minute.

This is the simplest form of program wheel and it is not adapted to make any change in its schedule but closes the circuit every day in the same order.

This is the device that is supplied for use in connection with Card and Dial Time Recorders as a so-called "gong Ringer" and for use on low voltage(10 volts or less) circuits is furnished mounted in wooden case and is known as Program Device types, N, O, P and Q.

It must be noted that the contacts of such a device (Fig. 1) must necessarily be light and therefore, if anything but the smallest load is to be placed on them (say one or two, 2 or 3 inch bells) and at very low voltage, a relay must be used as will be presently described.

To assist in the description of the device illustrated in Figs. 1 and 2 reference is now made to Fig. 5 which shows the circuit connections of the wheel diagrammatically and in dotted lines shows how a relay is to be connected in. In the figure A is the wheel mounted on a stud M, B are the adjustable contact blocks. E is the diagrammatic representation of the fingers shown in Fig. 1.

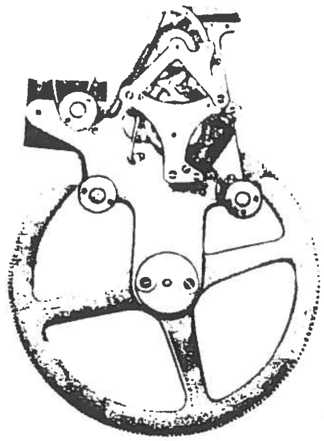


Fig. 4

It often is necessary to vary the program from day to day and in order to accomplish this a second contact device must be used.

Reference is now made to Fig. 6, this is a diagrammatic representation of a one circuit program device for the sake of simplicity and to Figs. 3 and 4 for the face and rear view of the mechanism as regularly supplied.

Referring to Fig. 6, the wheel A is just the same as that previously described but geared to its driving mechanism is a wheel E which is advanced once every six hours or four times per day. As there are seven days per week, this wheel is divided into 28 parts and a hole is drilled and tapped at each position so that a pin may be inserted at any or all of the 28 positions.

A contact D is provided wired in series with the regular contact C of the program wheel. Contact D is adapted to be closed or opened whenever a pin is inserted or omitted as the case may be.

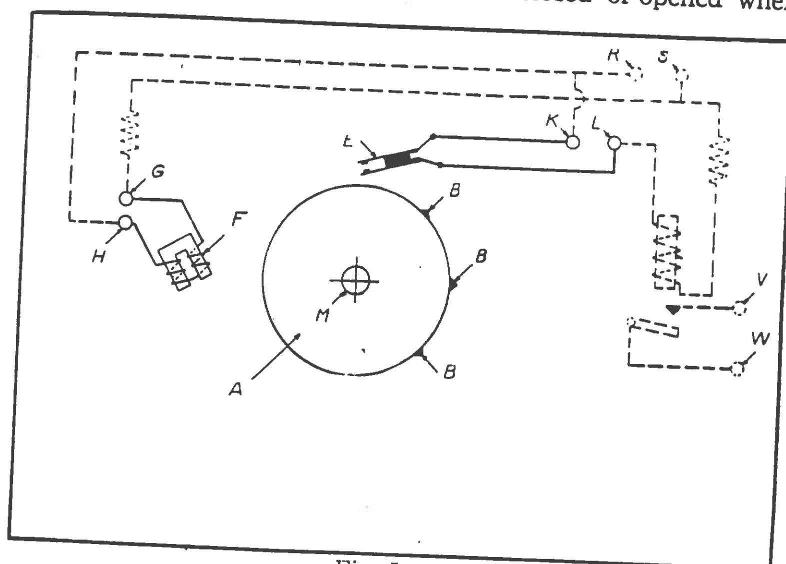


Fig. 5

As ordinarily set the wheel E is jumped forward from one position to the next just after midnight, noon, and at the six hour position midway between these. It will thus be seen that with such a device if the blocks B were set to close contacts C at say, 7:00 A. M. 11:50 A. M., 12:45 P. M. and 4:30 P. M., they would do so every day and that if the program was not required Saturday afternoon and Sunday it could be easily omitted by alteration of the pins on the wheel E at those positions. To assist in that setting, wheel E is suitably engraved.

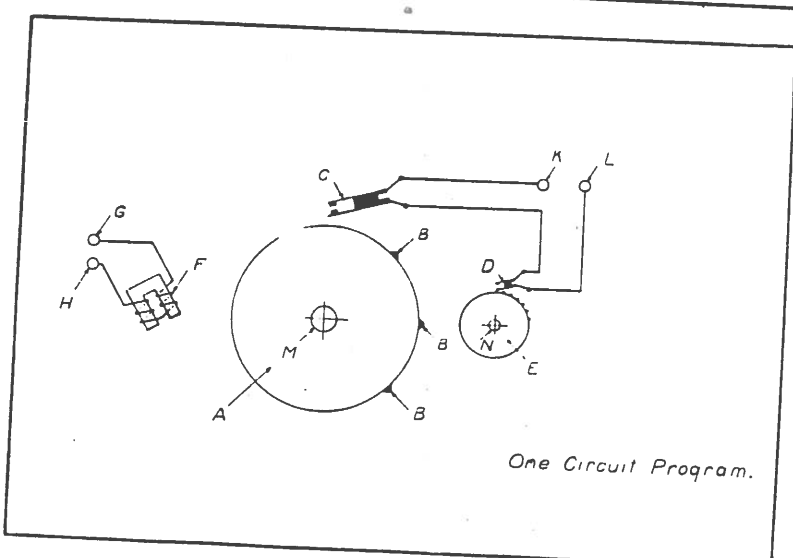


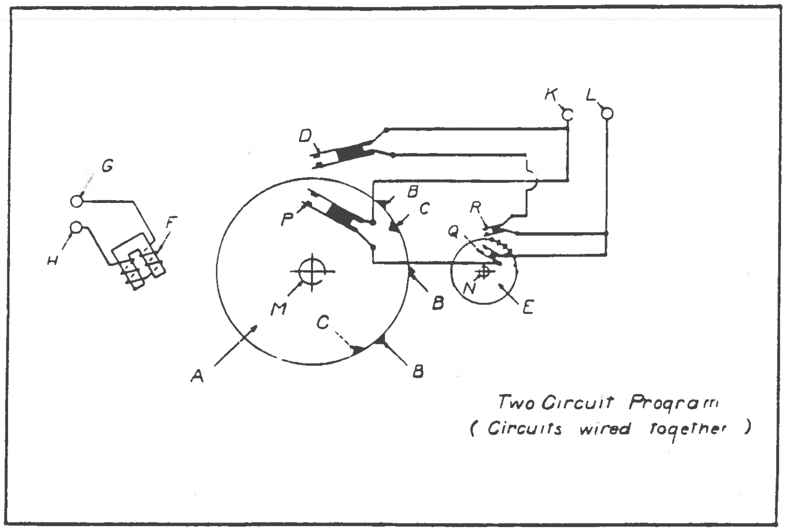
Fig. 6

The device just described however, does not permit of any alteration in the schedule except the omission of part of it which brings us to a consideration of

The Two Circuit Program Device

In the figures 3 and 4, we have a face and rear view of this device.

This device uses the same large wheel previously described but is provided with two sets of contacts arranged one behind the other and adapted to co-act with the blocks on the wheel. These blocks are made of different shapes (See Fig. 32) so that one or both circuits may be affected as may be desired.



Two Circuit Program
(Circuits wired together)

Fig. 7

The calendar wheel at the top of the program device is also provided with two sets of contacts so that either or both of the contacts first described may be rendered inoperative at any six-hour period if desired. Except for the addition of the one circuit and the calendar device just described the program device is like that first described in this bulletin in connection with Figs. 1 and 2.

Fig. 7, illustrates in diagrammatic form the connections of the device described in connection with Figs. 3 and 4.

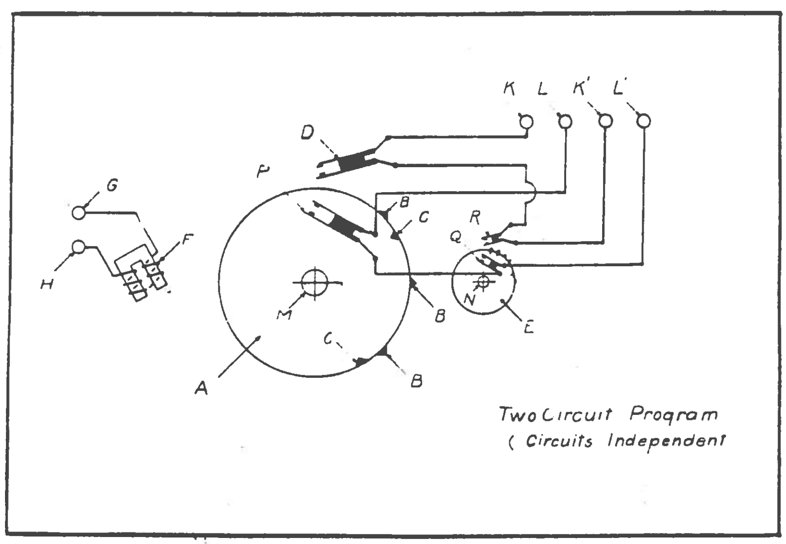
Referring to Fig. 7, A is the program wheel. There are two sets of contact blocks B and C adapted to co-act with contact fingers D and P respectively. A wheel E is provided as previously described adapted to advance in six hour steps and is adapted to receive two sets of pins and has two sets of contact fingers R and Q to co-act with them. Contact D is wired in series with contact R and contact P is in series with contact Q.

It will be clear from the diagram that in order to close a program circuit, it is necessary to have either contacts D and R closed at one time or contacts P and Q. By means of the pins on wheel E therefore, contacts on wheel A may be made to fail to close a circuit even though they close every time a contact is encountered on their own wheel.

Perhaps an example will illustrate most easily how a variable schedule may be taken care of by this wheel. Assume blocks B to be at positions as follows: 7:02 A. M., 11:55 A. M., 12:32 P. M. (noon hour) and 4:38 P. M. Contacts D will be closed at those times **every** day. Now let us further assume we want to omit those times on Saturday and Sunday and alter the schedule then. We alter the pins on wheel E for the Saturday and Sunday positions.

Now let us assume we want the schedule to be on Saturday 7:02 A. M., 11:30 A. M. Blocks C are put at the 7:02 and 11:30 A. M. positions and pins on wheel E to co-act with contact Q are put in appropriate positions to omit the schedule from contacts P all week except Saturday morning.

It is sometimes important to have two entirely different schedules and where there are no variations other than to omit any six hour period from either or both of them, the program wheel is wired as shown in Fig. 8.



Two Circuit Program
(Circuits Independent

Fig. 8

In this figure the structure, arrangement of contacts, etc., is the same as before but the circuit

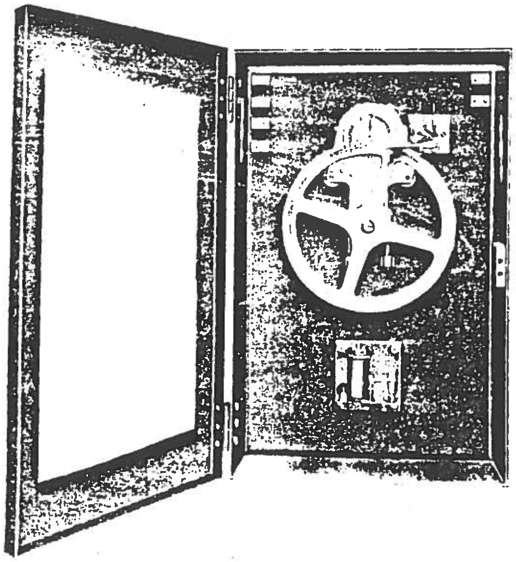


Fig. 9

through contacts D and P and R and Q are brought out independently. This is really just like that shown in Fig. 6 but with two circuits.

In order to keep the diagrams clear, contacts P and Q are shown as being inside the periphery of wheels A & E but they are really mounted side by side as will be seen by reference to Figs. 3 & 4.

Having described the program wheel and mechanism in detail, reference will now be made to the various combinations of relays, etc., with which it is regularly combined in the standard list of I. T. R. Program Devices.

PROGRAM DEVICE TYPE A

This is illustrated in Fig. 9. The cut is a face view and shows a one circuit program wheel without calendar attachment mounted together with carbon relay, terminals, etc., on an insulating and fireproof backboard which is secured to the metal case. The case or cabinet is of sheet steel finished in dull black enamel and is provided with oval openings adapted to receive condulet fittings. The openings are so arranged that either condulet fittings for conduit or the insulated covers with openings for wires may be used. These cabinets are thus adapted for use with either open wiring or with conduit.

In Fig. 5, we have the scheme of wiring of this device. Further de-

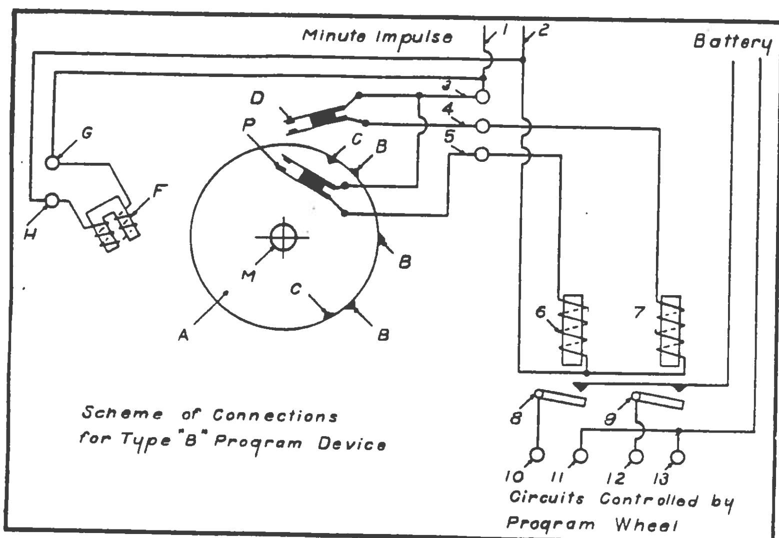


Fig. 10

tailed description is not deemed necessary as this figure has been described above. It is a simple device and is useful where a uniform schedule is to be followed every day.

PROGRAM DEVICE TYPE B

Fig. 11 is also a face view of this device. It will be noted that it is exactly like type A as far as general appearance is concerned. The only difference between this device and type A is that this device has two circuits while type A has but one.

Fig. 10 shows the scheme of connections in diagram-

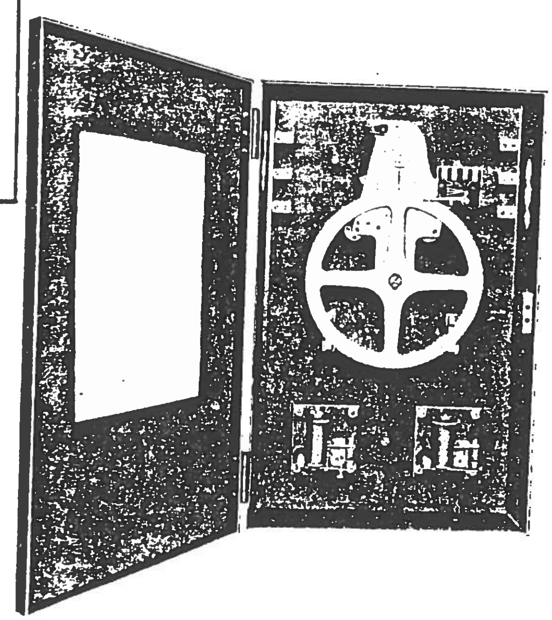


Fig. ~~11~~ 15

matic form. It is to be noted that in these diagrammatic figures the arrangement is such as to illustrate the principle involved and any detail parts or positions of parts is disregarded.

Referring to the figure, A is the program wheel and B and C the blocks to close contacts on the two circuits respectively.

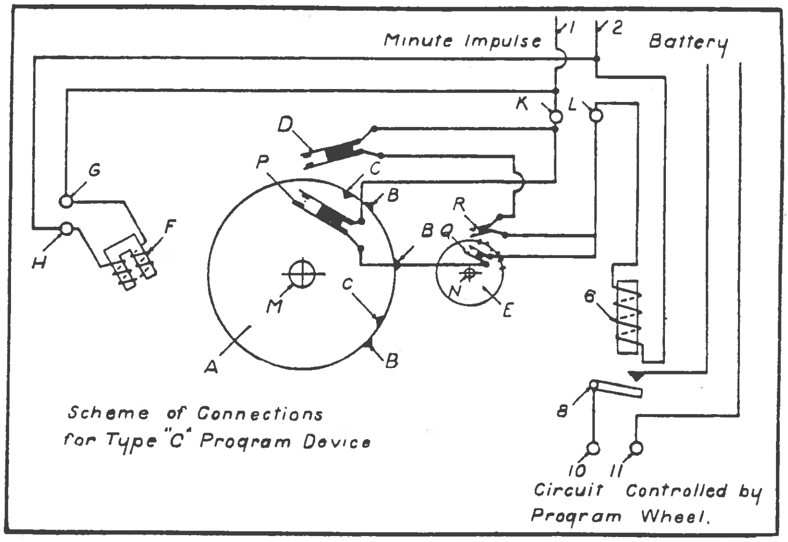


Fig. 12

Wires 1, 2, have a minute impulse sent over them by the master clock or master relay. F is the magnet that steps the program wheel forward.

The arrangement is such that one circuit may be energized at certain times of the day and the remaining circuit at other times of the day. To this end wire 3 is common to both program wheel contacts D and P. A wire 4 leads from contact D to relay 7 and wire 5 from contact P to relay 6.

Relays 6 and 7 have a common return over wire 2.

When a minute impulse flows over wire 1 and contact D is closed it completes its circuit through relay 7. As a result it causes armature 9 to close its circuit and battery is thrown on terminals 12, 13. Similarly when a minute impulse flows through contacts P relay 6 is energized and armature 8 is attracted and closes its circuit, throwing battery on terminals 10, 11.

It is evident therefore, that this device is suitable for throwing an impulse of the same duration as that given by the master clock on either or both of two circuits at any minute of the 24 hours. For example, an impulse could be put on terminals 10, 11 at say 7:00 A. M., 12:00 noon, 12:45 etc., and an impulse could be put on terminals 12, 13 at 7:06 A. M., 11:52 A. M. etc.

Such impulses might be used to cause the color of the ribbon to change in cost recorders, operate a locking device or do any work where an impulse of approximately one second's duration would be desirable. It must be noted however, that the schedule will be the same every day unless a manually operated switch is inserted in the circuits to prevent it. This device may (like type A), be used in connection with bell ringing contacts on card and dial clocks in which case a drag or duration contact on the clock movement causes the relays to remain closed several seconds and is therefore suitable for ringing bells, etc. (See Engineering Bulletin No. 12).

PROGRAM DEVICE TYPE C

A front view of this device is shown in Fig. 13. This program wheel is fitted with a calendar arrangement and with two sets of contacts (2 circuits) wired through and controlling one carbon relay. Owing to this arrangement a variable schedule is possible and the limitations of variation will hereinafter be pointed out. The device is mounted in steel cabinet all as described in connection with types A and B.

Fig. 12 is a diagrammatic representation of the scheme of connections. It is to be noted that it is similar to that shown in Fig. 7 except for the addition of the relay. In the figure the minute impulse is impressed on wires 1 and 2, it flows through either contacts D and R or P and Q as the case may be and thence through the coils of relay 6 and back through wire 2. This will cause the armature 8 to be moved and throw battery on to terminals 10 and 11. The duration of this will of course be only the duration of the master clock contact. This device is therefore suitable for the same work as types A and B, but owing

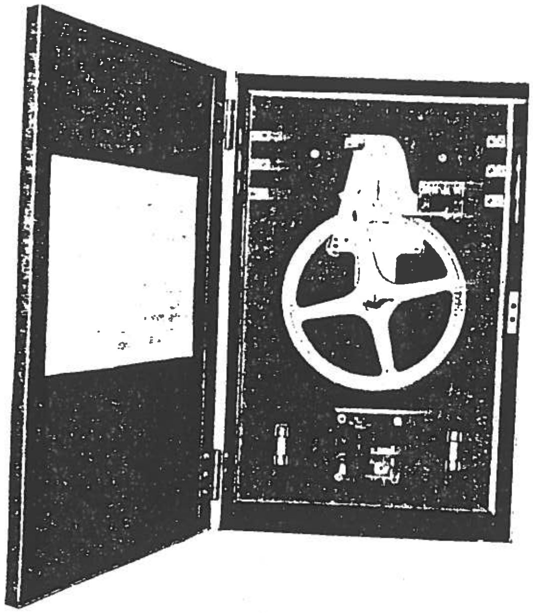


Fig. 13

to the calendar attachment will permit a varying schedule.

An example will illustrate. Suppose the relay is required to close at 7:00 A. M., 12:00 noon, 1:00 P. M., 4:58 P. M. every day but Saturday and on Saturday was required to close at 7:00 and 11:50 A. M. and to be silent during the afternoon of Saturday and all day Sunday. This device will permit such schedule.

In short it will permit of two schedules being set on the wheel and any 6 hour period of either or both of these to be omitted.

PROGRAM DEVICE TYPE D

This device is shown in front view in Fig. 15. It is seen to consist of the same parts as type C except for an additional carbon relay. It is wired with the two circuits independent.

The scheme of the wiring connection is shown in the diagram Fig. 14. Here as in Fig. 10, relays 7 and 6 are in circuit with contacts D and P respectively but with the additional contacts R and Q also in the circuits. It will be seen therefore, that we really have two separate program circuits each of which may have its own schedule set up on it and from which any six hour period may be omitted. Thus we may impress a contact on terminals 10 and 11 at any minute of the day, on such a schedule, for example as 7:00 A. M., 12:00, 1:00 P. M., 4:58 P. M., every day except Saturday and Sun-

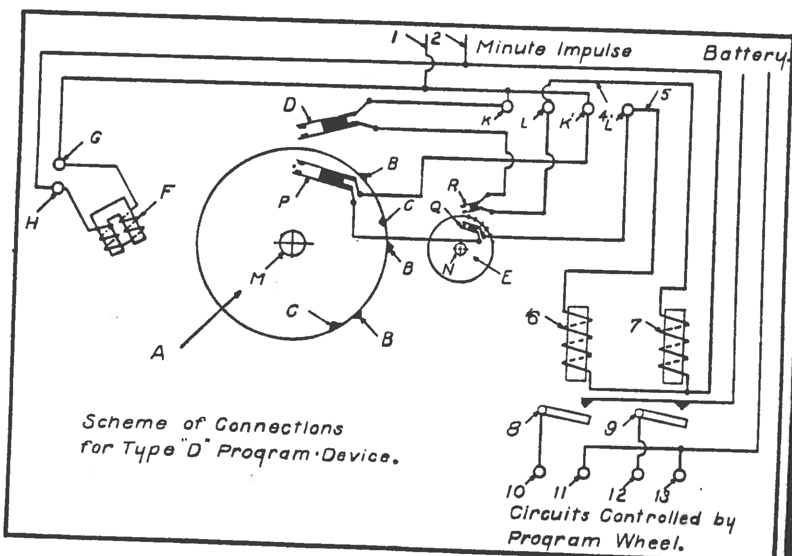


Fig. 14

day and on Saturday have a contact at 7:00 A. M., 12:00 noon, and omit Saturday afternoon and Sunday.

Similarly on the second circuit we might have a schedule such as 7:05 A. M., 12:05 P. M., 1:02 P.M., 4:50 P. M. and have it run every day in the week except say Wednesday. Also we might add contacts at 7:03 P.M. and 9:17 P. M. and have these operate only on Tuesday night. In short any schedule on either circuit may be set up and any six hour period made active or not at pleasure.

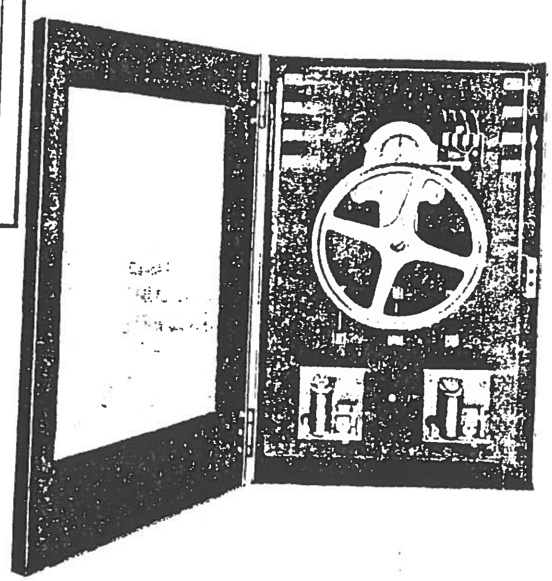


Fig. ~~15~~ 11

PROGRAM DEVICE TYPE H

Fig. 17 is a front view of this device. This device is fitted with a program wheel (with calendar) with the two sets of contacts wired to control one "make and break" relay and one carbon relay. As previously stated this wheel is adapted to permit master clock contacts to operate under the control of the program during certain parts of the day and to omit such operation during other parts of the day.

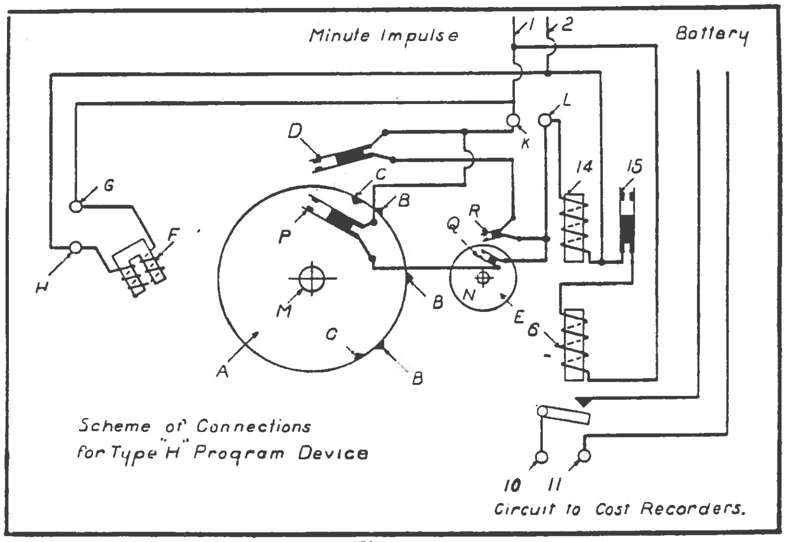


Fig. 16

Owing to the method of wiring as shown in Fig. 16 the schedule is as flexible as it can be with a device of this description. This device is especially adapted to the control of working schedules on cost recorders.

Referring to Fig. 16 it will be seen that this device is wired just like the program wheel in Fig. 7, except for the addition of the make and break and carbon relays.

The minute impulse from the master clock comes over the wires 1, 2 and steps the program wheel forward minute by minute. It also flows from wire 1 through contacts D and R or P and Q as the case may be and thence through the coils of make and break relay 14 and back over wire 2. This will occur **at the minute** in the day that it is desired to either begin or end a working schedule. As it is well known the make and break relay is designed to alternately make and break the circuit controlled by the movement of its armature. A detailed description of it will not be given here. Suffice it to say the contacts 15 are **made** by the first impulse received from the program wheel and **broken** by the next impulse received, **made** by the next and so on.

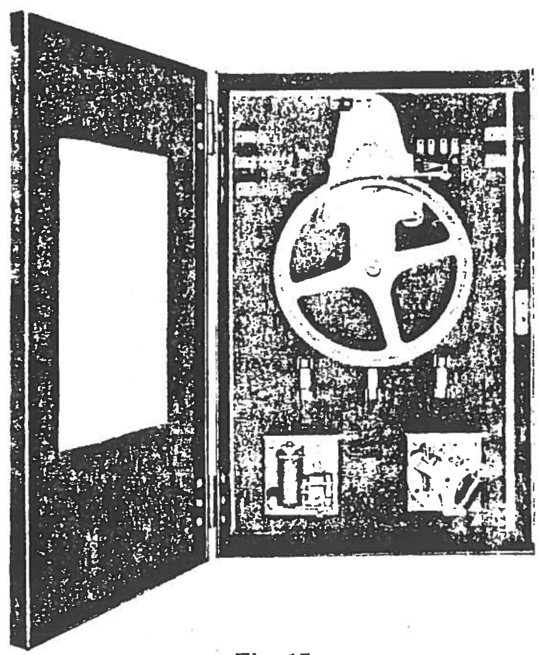


Fig. 17

As shown in the diagram when contacts 15 are closed or made, every minute impulse received over wires 1, 2 flows through the coils of relay 6 and closes a battery circuit to terminals 10, 11 which are directly connected to the magnets in the cost recorders. It is to be clearly understood this device simply permits the minute impulses to flow from the master clock to the recorders or other devices during certain hours and prevents it at other hours. The impulses themselves are not altered in length or in any way.

To illustrate a use of the device, suppose we have cost recorders adapted to accumulate 600 periods and we want them to stand at zero Monday morning at 7:00 A. M. and that schedule calls for working hours 7:00 A. M. to 12 noon 1:00 P. M. to 5:00 P. M. every day except Saturday when it ends at 11:00 A. M. and no schedule Sunday.

If blocks are arranged on the wheels so that impulses go to the recorder from 7:00 A. M. to 12:00 noon, at Monday noon we will have 50 periods on the type wheels. They will still be at that amount at

1:00 P. M. and will advance to 90 periods at 5:00 P. M. so on through the week. At the end of the working day Tuesday they will be at 180 periods, Wednesday 270 periods, 360 on Thursday 450 on Friday, 490 on Saturday at 11:00 A. M. when the schedule stops. Now we want the wheels at zero by Monday morning so we start them in operation at some convenient time Saturday night or Sunday or both and advance them until we have added in the required 110 periods (490 plus 110 equals 600) and brought the wheels to zero again. So we have to run the wheels eleven hours between the ending of the working schedule Saturday and the beginning next Monday morning. We could, with this device start these wheels up at say 5:00 P. M. Saturday afternoon and run them until 4:00 A. M. Sunday morning or do the same thing on Sunday if that were more convenient.

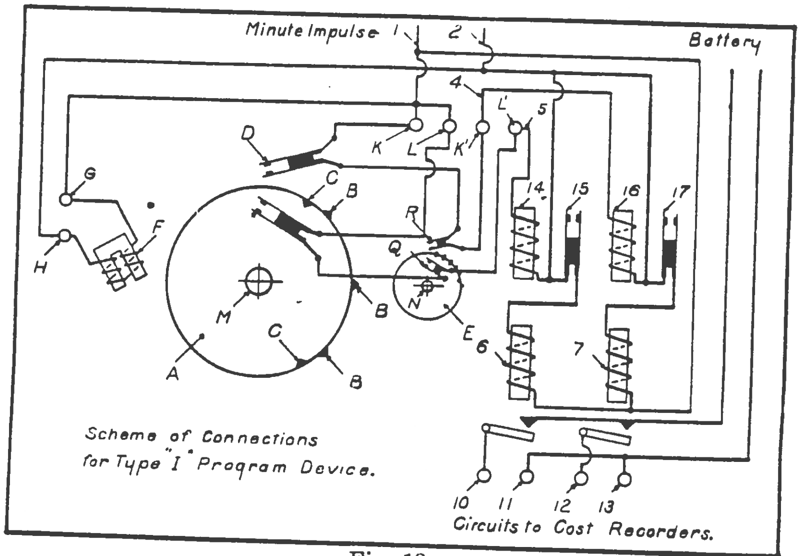


Fig. 18

It will be obvious that cost recorders printing in hours and minutes, etc., may also be operated from this device in the same way.

To state briefly the conditions, this device will permit of a double schedule operating the one set of devices and will permit of any 6 hour period of either or both to be omitted or not as desired.

PROGRAM DEVICE TYPE I

This is illustrated in face view in Fig. 19 and in diagram in Fig. 18.

It consists of the same parts as those shown and described in connection with type H except for the addition of another make and break relay and another carbon relay.

The difference between this device and type H, is exactly the difference as described between types C and D. This device is for the same purpose as type H but both circuits are wired independently.

Referring to Fig. 18 the program wheel is wired like that shown in Fig. 8 and the minute impulse is applied on wires 1, 2. It advances the program wheel as previously described and also flows through contacts D and R and thence through wire 4 to make and break relay 16 and back over wire 2 and through contacts P and Q thence over wire 5 and through coils of make and break relay 14. Contacts 15 of relay 14 control carbon relay 6 while contacts 17 of relay 16 control carbon relay 7. Relay 6 closes battery to circuit terminals 10, 11 to which are connected one group of cost recorders and relay 7 closes battery to circuit terminals 12, 13 to which the second group of recorders are connected.

This device is adapted to control cost recorders on a schedule for example, like that given in connection with program device type D except that this device permits or prevents all impulses between the hours stated while type D only gives one impulse **at** the stated times.

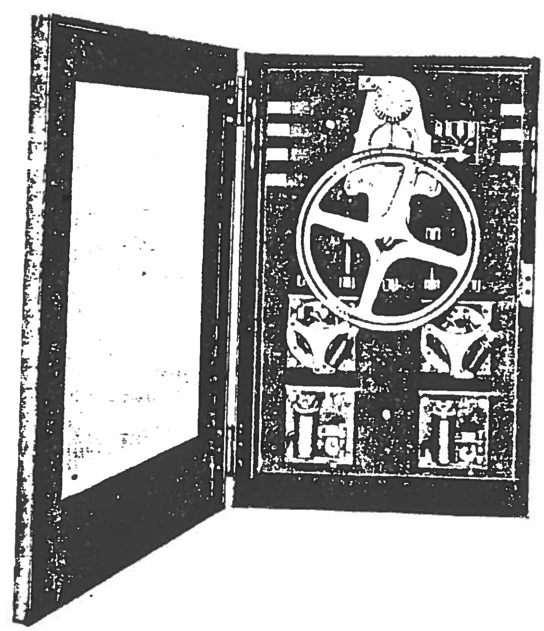


Fig. 19

PROGRAM DEVICE TYPE L

This is one of the most useful program devices and will not need very detailed description after all that has gone before in this bulletin. The object of the device is simply to give a prolonged impulse(which may be altered in duration) at certain hours of the day. It is illustrated in Fig. 21 in front view and in diagram in Fig. 20.

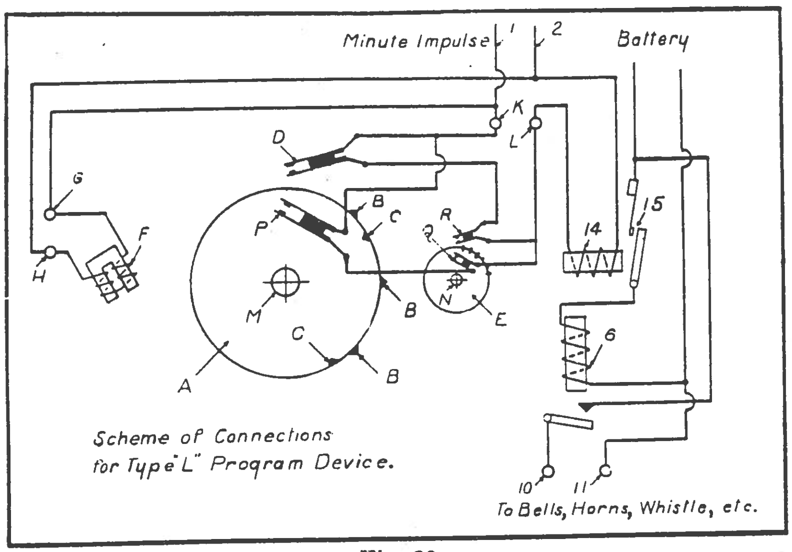


Fig. 20

It will be seen this device is like type C except for the addition of the timing relay. Everything said in connection with type C applies to this device except the duration of the contact supplied by the program device to the controlled circuit.

Reference to Fig. 20 will make the above statement clear. The wiring of the program wheel is the same as illustrated in Fig. 7. The minute impulse comes over wire 1 flows through either contacts D and R or P and Q thence through the coil 14 of the timing relay and back over wire 2. This attracts the armature of the timing relay and closes contact 15, of the relay and the mechanism is such that contacts 15 do not immediately open. The return of the armature does not begin until the master clock contact opens, which is after the lapse of one second and the armature then falls slowly back, being restrained from sudden movement by the clock work mechanism of the relay. It then gradually permits contacts 15 to open. The design is such that it takes from 5 to 15 seconds to open the contacts 15.

As shown in the diagram, the closing of contacts 15 causes relay 6 to throw battery on to terminals 10, 11 and that condition obtains just as long as contacts 15 remain closed. The bells, other relays, auto- call connection, whistle blowing devices are connected to terminals 10, 11.

PROGRAM DEVICE TYPE M

This is illustrated in Fig. 23 in front view and in diagram in Fig. 22. It is designed to operate two entirely independent schedules and is to be compared to type L just as type D does to type C and type I to type H. It is fitted with two timing relays and two carbon relays wired to the two circuits of the program wheel (with calendar).

All the remarks made in connection with type D program apply to this except that in this device the timing relays cause a prolonged impulse to be sent by the program device instead of the short ones described in connection with type D. These impulses are adjustable as explained in connection with type L. As the impulses on each circuit are entirely independent, two different sets of bells may be rung each on its own schedule and one set may be rung for say 6 seconds each time while the others may be rung say 11 seconds each time and on the same or a different schedule from the first set. Likewise, (Referring to Fig. 22) if all the bells are connected together on one circuit and terminals 10, 11 and ~~13, 17~~ are connected
12, 13

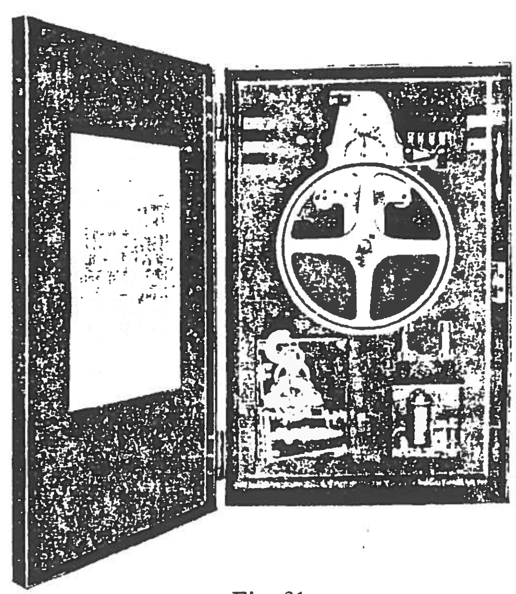


Fig. 21

in multiple it will be possible to ring the signals a long ring at 6:58 A. M. and a short one at 7:02 A.M. and so on. That is a long ring (up to 15 seconds) may be given at any minute and a short ring may be given any other minute. It cannot give two rings during any **one** minute.

In all the above descriptions, it is obvious that the current for operating recorders, bells, etc., may be obtained from the battery which operates the clock system or it may be some other source. Sometimes for example, it is desirable to ring bells, etc., from the electric light current either A. C. or D. C. while D. C. is required to actually operate the program device and relays, an A. C., circuit to signals may easily be closed through a relay as pointed out at the end of this bulletin.

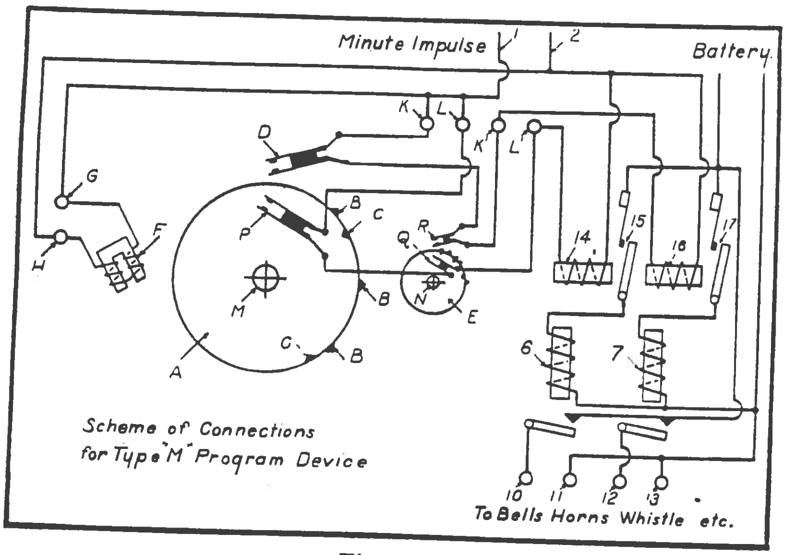


Fig. 22

PROGRAM DEVICE TYPE N

This is illustrated in Fig. 31 in front view. It is seen to consist of a single circuit program wheel without calendar and is mounted in wooden case with glass door. It is particularly adapted for use on low voltage systems for ringing bells when operated from contacts on card and dial time recorders, (see Engineering Bulletin No. 12).

There is no variation possible in the schedule from day to day and to allow signals to be silenced, a switch is provided in the cabinet. In Fig. 5 is illustrated the diagram showing the scheme of connection of this program wheel.

The wires, etc., shown in dotted lines only to do not belong to this device so it is really like type A proram wheel except for the omission of the relay and it is mounted in wood case instead of steel. The magnets of this device are regularly supplied for operation on 6 volt circuits.

PROGRAM DEVICE TYPE O

Fig. 31 is also a good illustration of the appearance of this device. It is exactly like type N except that it is a two circuit wheel. It is mounted in the same size wood case, etc.

The circuits are entirely independent and neither schedule may be varied from day to day. As with type N to silence a schedule a switch is provided.

This device is particularly adapted to operate two independent schedules of bells and is to be used with contacts on card and dial clocks on low voltage (6 to 10 volts) circuits.

The standard winding is for operation on nominal 6 volt circuits.

PROGRAM DEVICE TYPE P

Fig. 30 is a front view of this type of program device. It is a two circuit device with calendar and therefore, is adapted to control a schedule like that mentioned in connection with the circuits of type C for example:

7:00 A. M., 12:00 Noon, 1:00 P. M., 4:58 P. M., every day except Saturday and Sunday and on Saturday have a contact at 7:00 A. M., 12:00 Noon and omit Saturday afternoon and Sunday. In other words the schedule for Saturday afternoon is omitted.

Fig. 7 shows in diagrammatic form the connections of this device. It is adapted for use in connection with program and signal contacts on card and dial recorders, for bell ringing. It is regular supplied for operation on 6 volt circuits. Voltage on this device should not be over 10 volts. (Continued on Last Page)

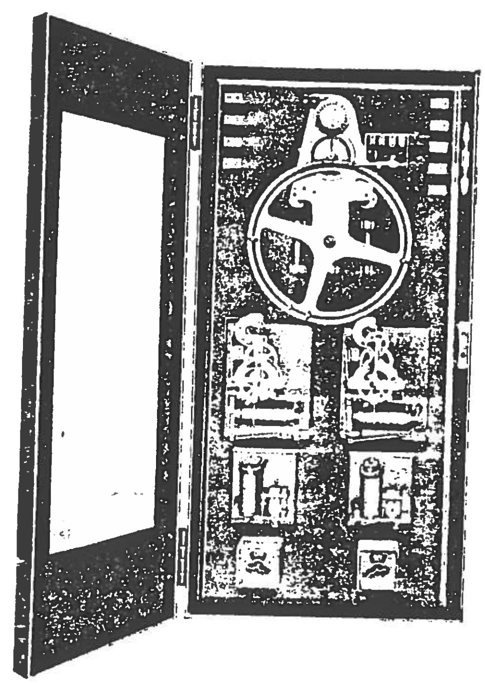


Fig. 23

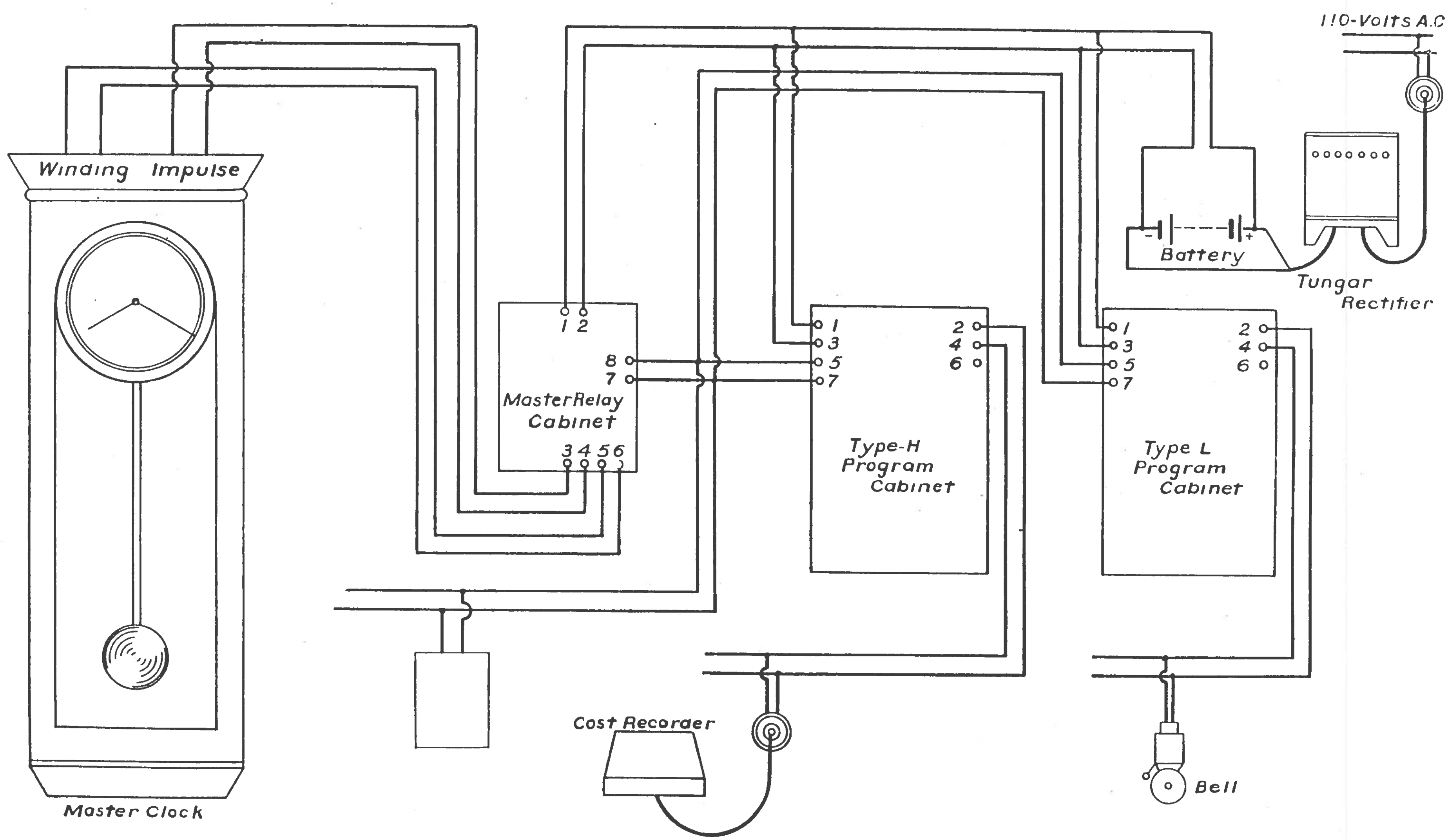


Fig. 24

Cut shows specimen diagram of clock system operating regular time recorder, cost recorder, and signals and employing program devices types H and L.

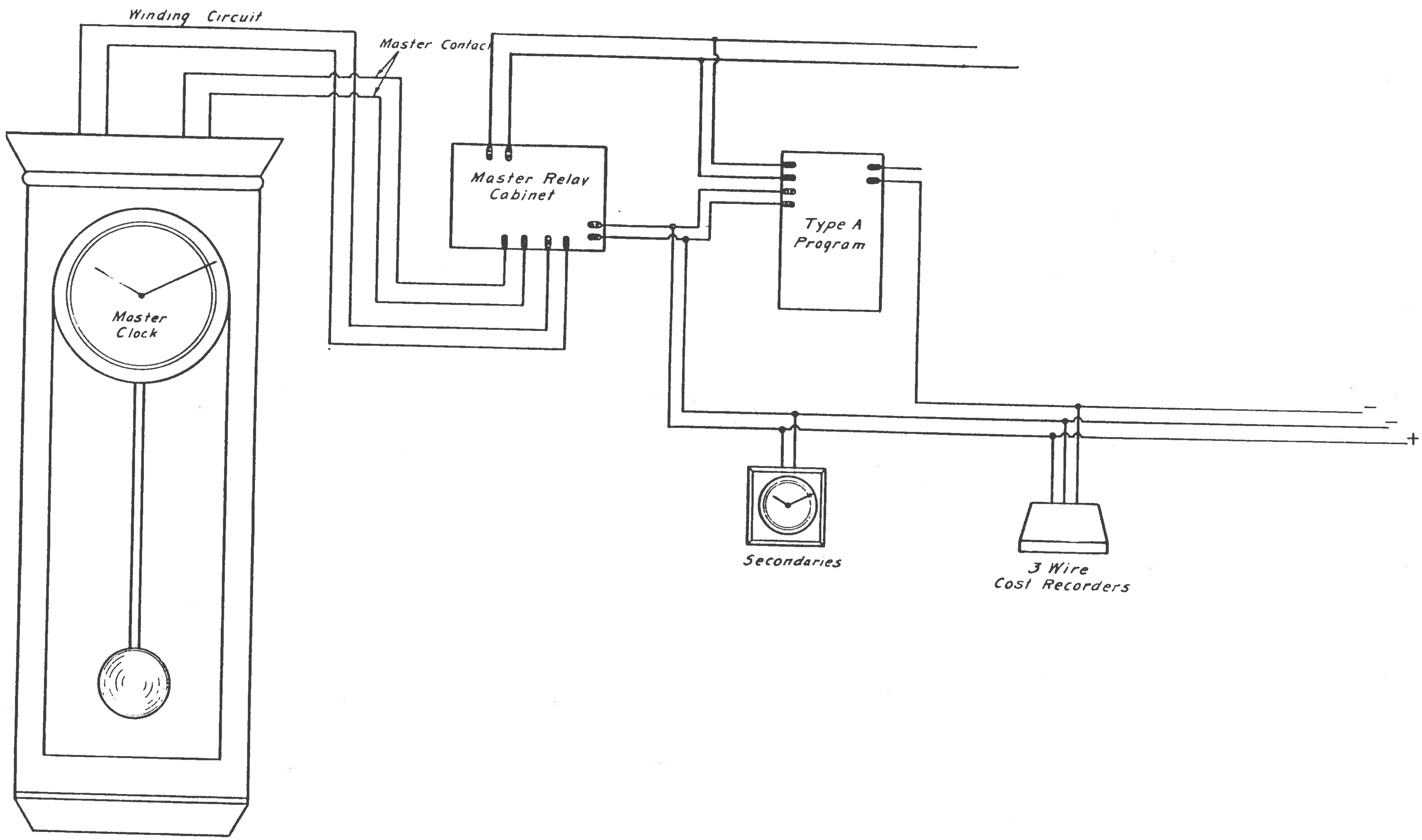


Fig. 25

Cut shows the arrangement of circuits for a type "A" program device with master clock.

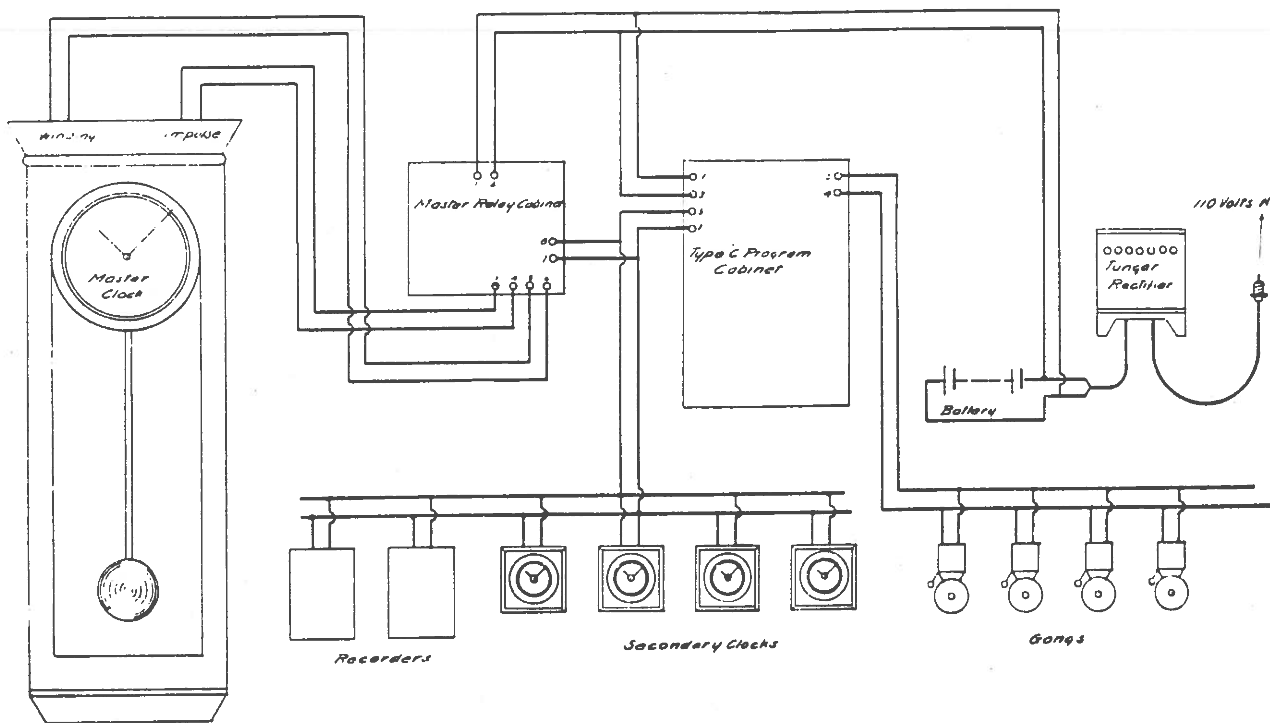


Fig. 26

Cut shows connections for use of type C Program Device (this will only ring gongs for length of master clock contact, i. e., 1 second approx.

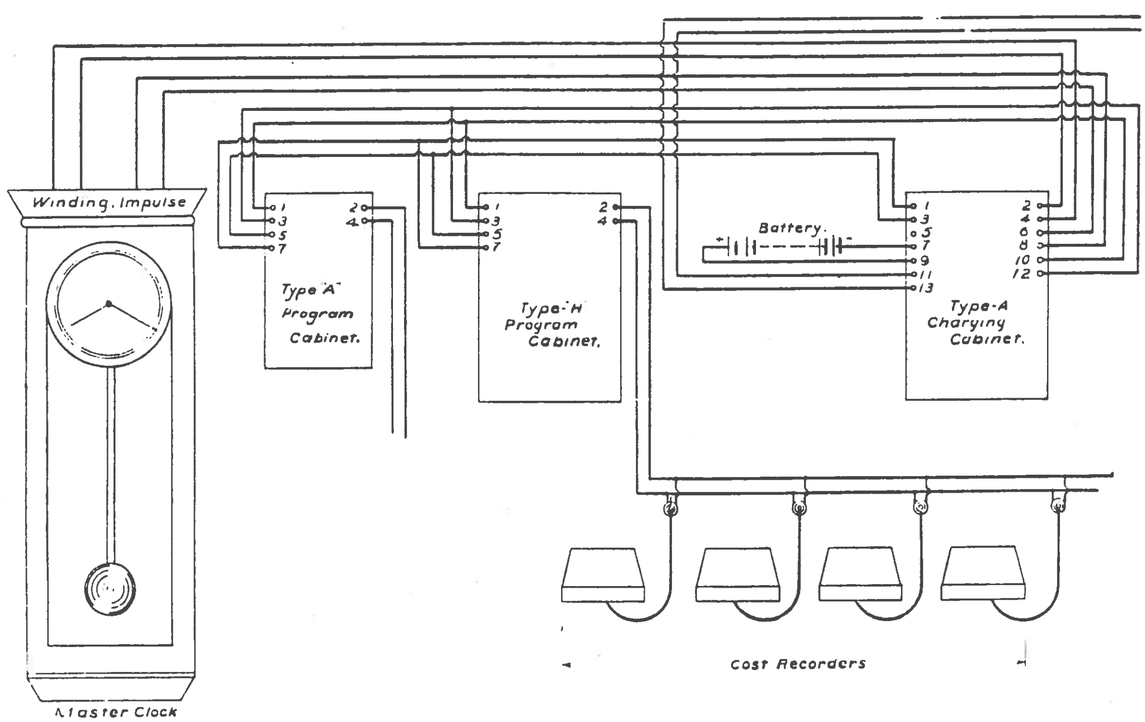


Fig. 27

Cut shows an arrangement with type II program device.

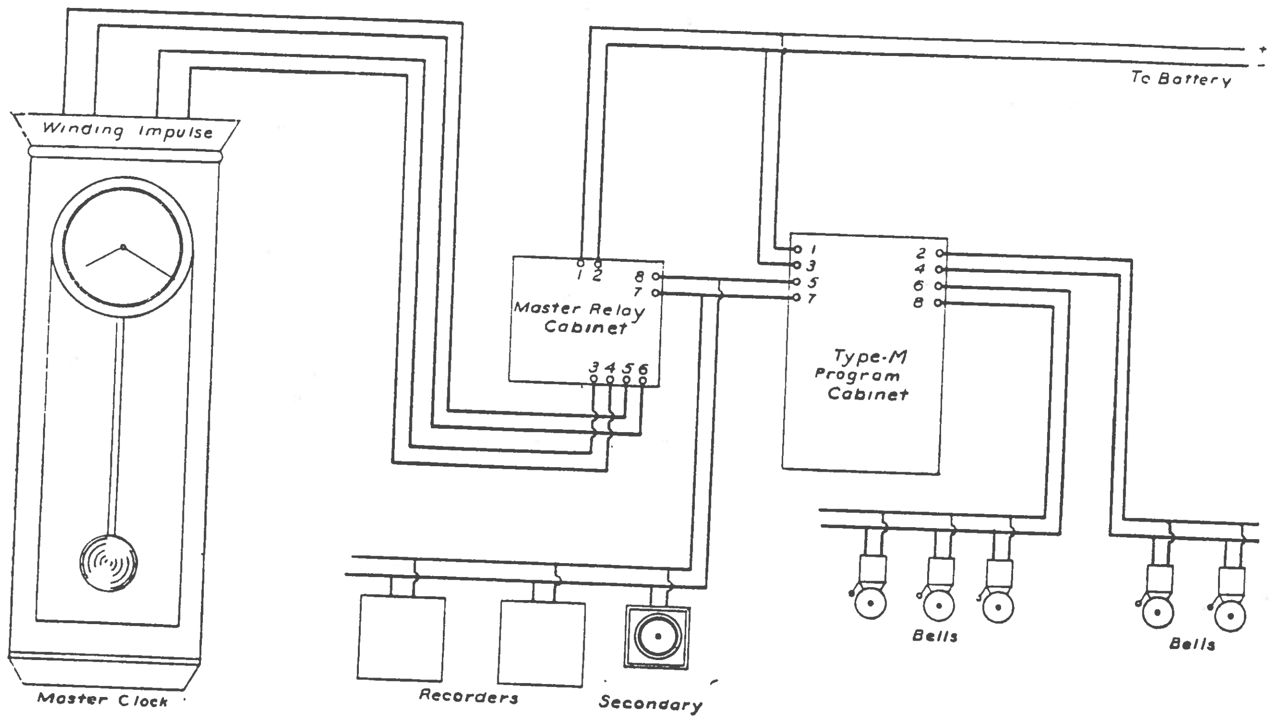


Fig. 28

Cut shows connections for use with Type M program device.

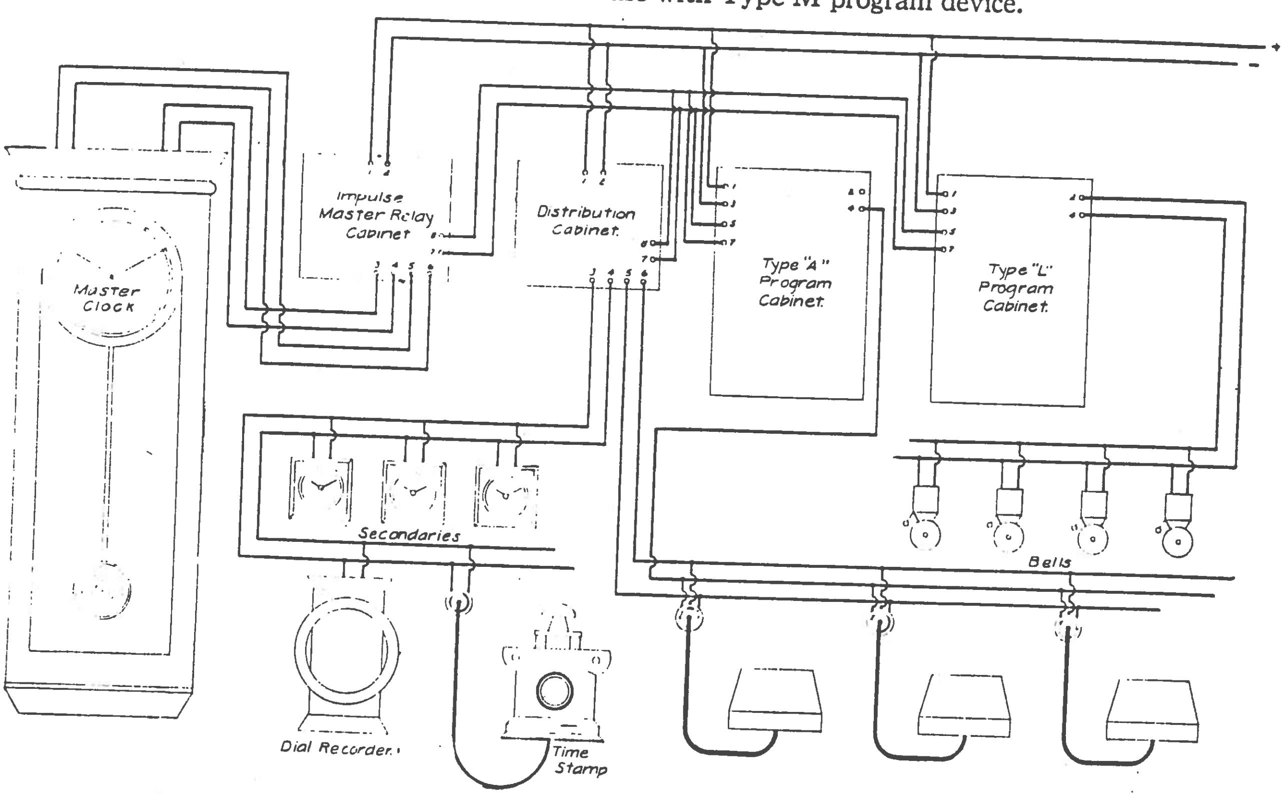


Fig. 29

Cut shows connections for use with types A and L program devices.

Fig. 30

This device uses the same large wheel as previously described but is provided with two sets of contacts arranged one behind the other and adapted to co-act with the blocks on the wheel. These blocks are made of different shapes (see Fig. 32) so that one or both circuits may be affected as may be desired.

The calendar wheel at the top of the program device is also provided with two sets of contacts so that either or both of the contacts first described may be rendered inoperative at any six hour period of desired. Except for the addition of the one circuit and the calendar device just as described the program device is like that first described in this bulletin, in connection with Figs. 1 and 2.

PROGRAM DEVICE TYPE Q

Fig. 30 is also a front view of the two circuit program device, with calendar. It is mounted in wood case with glass door like type P. It is adapted to control a schedule like that described in connection with type D. It is for use on low voltage circuits (6 to 10 volts) and is supplied for operation on nominal 6 volt circuits. It is particularly adapted for use with program and signal contact on card and dial recorders for bell ringing.

In Fig. 8 is illustrated diagrammatically scheme of connection of this device.

Where bells, horns, etc., are to be operated from electric light circuits on either alternating or direct current from an electric clock system a type 'E" relay should be specified in connection with a type L program device. Reference to Fig 20 will show how the relay regularly supplied with that device is wired in such a way that all bells, etc., will be operated by the battery current supplied to the clock system.

By using the type "E" relay in connection with the type L program device it permits the wiring to be

Fig. 32

standard and has the further advantage of permitting the use of several type E relay if necessary close to the points where gongs, horns, etc., are to be operated.

The type "E" relay is like our regular carbon relay, except it is provided with extra wide gap to eliminate arcing and is mounted on a special base and provided with a metal cover. The coils are brought out to a pair of terminals and the armature and points to a second pair of terminals, for convenience of attachment to external circuits. For use with type L program device the coils of the type "E" relay are connected across terminals 10, 11, (See Fig. 20,) and the armature and contact are connected in series to the bells, and electric light supply.

Program Devices in steel cabinets (types A, B, C, D, H, I, L, M) are furnished with openings to receive condulet fittings but no fittings are supplied with the program devices because there are a number of kinds any of which may be used according to circumstances. For example, conduit may be brought in at the left, center, right, on an angle, etc., or conduit may not be used at all and condulet covers may be needed for use in connection with open wiring.

Condulet covers are made of composition and are manufactured by the Crouse, Hinds Co., of Syracuse, N. Y., and may be had of all dealers in electrical supplies.

The composition covers that fit the cabinets are known by the following catalog numbers (Crouse, Hinds Co.)

2 wire, Cat. No. C F 22
3 wire, Cat. No. C F 23
5 wire, Cat. No. C F 2500

All of the above are for 3-4" condulet bodies. The condulet bodies to be used with conduit to fit openings in cabinets are known as catalog No. A2, B2, C2, D2, E2, LB 22, etc., according to manner of attaching conduit to the condulet body.

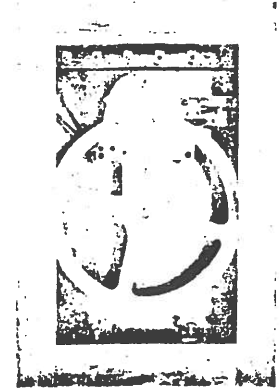


Fig. 31

Part 2 of the WALLACE & TIERNAN article, continued from EHS Journal issue #2, June 1995. This section provides the historical background of the company, completing the submission by Rev. Herbert T. Freeland as draft copy for future inclusion in the Bulletin of the NAWCC.

"The Rise and Fall of The Wallace Electric"

WALLACE AND TIERNAN PRODUCTS, INC.

Belleville, N.J.

1928 - 1932

THE COMPANY TODAY

Given the lack of information available about this company, and its clock business in particular, I decided to pay a visit to the main factory as it exists today. Although Wallace and Tiernan maintains its regional offices today in Weaton, Maryland, Atlanta, Georgia, Naperville, Illinois, Shawnee Mission, Kansas, and Diamond Bar, California, its world headquarters is still located in the old piano factory building in Belleville, New Jersey, occupied by the founders in 1921. It has, of course, undergone many renovations and additions to bring it to the present day.

Before I realized my interest in clocks, I lived in Belleville for a brief time, so I knew well the location of the factory. It is located just a few miles north of Newark, New Jersey, just west of the Passaic River, on the opposite side of Route 21. It is an imposing complex, covering several square blocks, the original building of which is reminiscent of the old clock factories in Connecticut, a large brick, early 20th century-style building.

As I drove up to the guard house, I showed my clock to the security guard and was granted permission to see the receptionist. Prominently displayed in the lobby are portraits of the company's founders. I asked the receptionist if she could connect me with someone who could give me some company history, perhaps a longtime employee. She gladly obliged, and in a few minutes two old gentlemen and myself were chatting away like old friends at a mart.

They told me first that printed information would be hard to find. The company has changed hands several times in the past few years, having been a Division of the Penwalt Corporation of many years. With each change of ownership, the connection with the company's past becomes more distant. As each new management "cleans house" more achival material tends to disappear. So, spare parts information, schematic diagrams, and any manufacturing equipment connected with this venture is now long gone. Not even the patents are in the files any longer. The only item the men were able to extract from the files was the 1931 catalog which I have relied upon for much of this information.

Also all but gone are people who were with the company to have known Wallace and Tiernan personally or professionally. The two gentlemen I spoke with are the exception, though one of them was only working for the company part time in retirement and the other was nearing retirement age. As we gazed at the portraits of the founders it was explained that Wallace was the inventor and chief engineer, and Tiernan, though he started out in engineering, was the company's chief salesman and spokesman.

Company lore has it that Tiernan would come back from the sales field with an idea for a new product and it would be up to Wallace to develop it. There is enough evidence to suggest, however, that Mr. Wallace came up with more than enough inventions on his own.

We then took an elevator to the second floor lobby, which housed a prominent display of the W+T Chlorinator as it has evolved throughout the past eighty years. On the wall between the two elevators was their one remaining banjo clock in a glass case. It was not running, though it showed evidence of periodic maintenance. The case had been refinished and the encased batteries were of today's variety. To the delight and surprise of all of us, my banjo clock and their were next door to each other on the assembly line, the last serial numbers were one digit away from each other.

Another display case at the far end of the lobby contained one of their tambour clocks along with a variety of other precision instruments the company has produced at one time or another. Even today the values of pride in craftsmanship, quality and precision are reflected in the old-style paneled walls and in the men I spoke with. Their products today are still well-known and widely used in public water works and wastewater treatment facilities throughout the world.

THE DEMISE OF THE CLOCK BUSINESS

Notwithstanding the failure of the Wallace Electrics to survive for more than a few years in the marketplace, the makers of this timepiece truly believed, at least at the outset, that they had a superior product. In the spirit of the early industrialists, Wallace and Tiernan had achieved tremendous success through the invention of a process which saved millions of lives and is today, in fact, taken for granted. Their overwhelming success in this and other areas led them to believe they could pose a serious threat to the giants of the American clock industry. Why, then was the effort aborted?

I have already suggested the advent of the Great Depression as the first major underlying cause for the Wallace clock's demise. The years of production were years of utter despair for the entire country. Not very many people could afford to go to a jewelry store and buy a fancy new clock.

The second major cause of Wallace Electric's demise was the introduction about this time of a line of clocks from the Warren Telechron Company. These were offered in a wide array of case styles with reliable precision and accuracy, and were much more competitively priced for the hard times. They were also much more effectively marketed.

No one knew at the time how popular or unpopular an electrical cord protruding from the household clock would be with the public. But considering the austerity of the times, an electrical cord proved to be of little concern to people. Most of all, the Telechron clocks were afforbable by just about everyone, and they never needed winding. A "state of the art" clock or anything else for the home was simply not at the top of the priority list of most people.

Both of these reasons are supported by Mr. Joseph C. Cornwall, retired General Counsel for the Wallace and Tiernan Board of Directors, and son-in-law of Mr. Wallace. He writes in response to my inquiry on the subject,

> "On numerous occasions I heard Mr. Wallace say that the plug-in Telechron timepiece spelled the death-knell of his battery-driven timepiece. And everyone at W+T knew that the company had no stomach for price competition in any line, i.e. regardless of competitor's pricing W+T products were priced strictly by formula based on cost of materials, labor, and full measure for overhead, something possible with patent protection which existed for most successful lines of business at W+T. Understandably, the mass market was based on price and I'm sure housing the Wallace clocks in Ingraham cases made for a pretty expensively priced item."

In summation, then, I do not believe that design faults which appear to be glaring today had anything to do with the Wallace clock venture being aborted. The clocks today can be faulted for lack of plate thickness, lack of gear thickness, and the failure of the bakelite part of the electic motor to hold up after more than sixty years. But they were simply not around long enough at the time for these things to have become a great concern. Given the company's resources, they could simply have gone back to the drawing board if design flaws were a problem. But in the throes of the Great Depression, the more affordable and widely available Telechron clocks clearly made it impossible for Wallace and Tiernan's clocks to do very well in the marketplace. It was too big a risk for the company to lose any more money on them.

So, sometime in 1932, the company made this judgement. It was no longer profitable for Wallace and Tiernan to be in the clock business. Their interests would be sold and the company would cut its losses in this venture.

A retired employee in charge of the aids-to-navigation business, Mr. Warren Haring, remembered there was stockpile of these clocks in the warehouse when he arrived on the scene in 1934. For some years, he remembers, the company would offer these clocks to employees at cost, or give them as gifts to departing employees.

As long as spare parts were available the company could offer maintenance and a supply of parts to repairmen who would inquire. It wasn't very many years before the supply ran out, and the company would have to respond to these inquiries with regret.

Mr. Cornwall, having been married to Mr. Wallace's daughter, Barbara, remembers that they had these clocks "all over the place" in their home. They would leave one running all winter in their summer home and would be surprised to find it running nearly on time when they returned in the spring.

As for the rights to Wallace and Tiernan's clock interests, they were sold to the American Timing Company of Hartford, Connecticut.

Mr. Cornwall remembers the price as $40,000, at tidy sum at the time, especially for a failed venture. One can only guess that it brought as much since the idea had come from Charles F. Wallace, inventor of the chlorination process. When he asked Mr. Wallace himself why anyone would offer that much he said, remembers Mr. Cornwall, that the purchaser intended to develop a market in South America where domestic electricity was not available. He did not know whether such a market was ever developed.

At any rate, Mssrs. Cornwall and Haring, and the old gentlemen I spoke with at the factory were all truly grateful that anyone in the world still cared about their old clocks, or that once upon a time their company's founders dared to dream they could stand as equals to the giants of the American clock industry.

Lowell was right. It is better to fail than not aim to be among the greatest.

Second Draft submitted to the National Association of Watch and Clock Collectors for inclusion in The NAWCC Bulletin. December 27, 1994.

Rev. Herbert T. Freeland, NAWCC# 0109511

216 S. Broadway

South Nyack, New York 10960

BIBLIOGRAPHY

Crum, Elmer G., editor, 150 Years of Electric Horology, 1992.

Drost, William E., Clocks and Watches of New Jersey, Engineering Publishers, Elizabeth, New Jersey.

Encyclopedia of American Biography, 1965

"Wallace Electric Clocks" , 1931 catalog, Wallace and Tiernan Products, Inc., Belleville, New Jersey.

Commemorative Booklet marking 50th Anniversary, 1963, Wallace and Tiernan Products, Inc., Belleville, New Jersey.

— MART —

All MART Ads are FREE, Send copy to the attention of the Editor:
Harvey Schmidt, 75-80 179th St., Flushing, NY 11366. Limit 3 lines.

WANTED: HOROLOGICAL LITERATURE, Repair info, Catalogs, etc. for the Journal
PORTESCAPSecticon Clock or Movement. Antique Watch & Clockmaker's Tools & Machinery.
(718) 969-0847 Harvey Schmidt, 75-80 179th St., Flushing, NY 11366

Junker **EARLY BATTERY CLOCKS**, Movements, Parts, etc, send details.
Martin C. Feldman, 6 Stewart Pl., Spring Valley, NY 10977

STANDARDELECTRIC Master Clock, 120 Beat, Eye Brow or Square Case. Also Slave Clocks in Eye Brow Case's. David Lee, P. O. Box No. 171, Knox, NY 12107

ITR, STROMBERG, STANDARD, & SWCC Movements and Parts for Master Clocks. Also Wood Cased Slaves. Call or send photo (914) 997-5670
Mitch Janoff, 3 Stratford Ave., White Plains, NY 10605

STANDARD ELECTRIC Square Dial, 13 ½" X 13 ½" & a Set of Hands.
Roy Crowe, 9257 Appleby St., Downey, CA 90240, (310) 861-8788

Master Clock with Tape or Drum Program Control & Internal Pilot (slave) Clocks by **STANDARD ELECTRIC / SELF WINDING / HOWARD** etc. Early / unusual Time Recording Clocks / Watchmans Clocks. (508) 448-5547
Robert A. Simon, 930 Townsend Road, Groton, MA 01450

Dial for **ITR** master clock: 12-1/2" O.D. with wood bezel surround on outside edge of dial; minute track diameter 11"; independent seconds bit. (713) 554-7387
Kenn Koerber, 105 Royal Drive, League City, TX 77573-1951

ELECTRO-MECHANICAL Clocks, Fancy & Simple Cased. Unusual Clocks, Movements. Books. Day or Night (516) 541-2400 or 351-5869
Elliot B. Siegel, 930 Broadway, Massapequa NY 11758

Dial for **BULLE** Clock, Approx. 5½" Diameter, 1½" hole in center, "rolled" brass outer edge.
Jerry Hahn, 2714 Hampshire Ave., Cincinnati OH 45208

The electrical unit that goes on a small **WALLACE** & Tiernan Wall Clock. The "Ears" have been broken off my armature. Source for domes that fit the large two contact **TIFFANY**. The casting that mounts the pendulum on a seconds beat **GENTS** and the pendulum assembly or any piece of it. Richard B. Pridham, 10402 Bellman, Downey CA 90241 (310) 862-3086 Call collect.

HANDS for a 13 inch Chapter Ring. (312) 238-3294 - evenings or 445-5381.
G. Frederickson Sr. 1716 W. 100th Pl. Chicago IL 60643

Tapped Coil for Transistor Driven **JUNGHANS** Battery Clock. John McGrory (908) 537-4575

SYNCHRONOME Master Clock. William F. Baker (212) 560-2013

Original Glass Battery for **BRILLIE** Electric Clock as shown on pg. 87 of "150 Years of Electric Horology." Kenneth Erlenbusch, 124 North Avena, Lodi, CA 95240

SESSIONS Synchronous Motor (or repair thereof) for WM Chime Clocks of mid 1930's.
JEFFERSON GOLDEN HELM Synchronous Motor (different from Golden Hour Motor).
REMPE 80 beat movement for #44 case. Or will sell/trade case.
Len Brenner, 1127 Towne Lake Dr., Longview, TX 75601, (903) 758-0638 late evenings

REPAIR: ALL EARLY BATTERY CLOCKS Specializing in **BULLE** using orig. parts.
Martin C. Feldman, FNAWCC, 6 Stewart Pl., Spring Valley, NY 10977

FOR SALE: **TIFFANY NEVER WIND**, Double Contact Model, Replacement Castings for Pendulum Suspension & Contact Arms (Brass not Pot Metal) $20 each, $37 for both. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

Repair Parts for **TIFFANY NEVER-WIND** Clock Co., **CLOISTER** Mfg. Co., & **NATIONAL MAGNETIC** Clock Co. David Lee, P. O. Box No. 171, Knox, NY 12107

SCOTT BATTERY Electric Shelf Clock (London Stereoscopic Co.) Circa 1905. Photo & Details in A. & R. Shenton "The Price Guide to Collectable Clocks." Fig. 404. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

BULLEElectric Gallery Clock w/ 12" dial, 17" square overall, walnut wood case w/ pendulum.
BARR Electric Mantle Clock w/ Glass Dome. **SWCC** Dials and other electric dials.
(312) 238-3294-evenings or 445-5381
George Frederickson Sr., 1716 West 100th Place, Chicago IL 60643

SWCC Western Union, 15-1/2" convex "glass". Actually it is plastic, but it beats a naked dial.
$20.00 (I'll pay UPS up to $5.00) (205) 967-1237
Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243

Wall Clocks: **Princeps** (New System) 1 sec. Pendulum; **Stsndard Electric** w/ tape program mechanism, AC motor driven (no pendulum); **Eveready** by American Man. & Novelty Co.; & others. Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230 (800)221-0424 X206

Requests for reprints of previously published material should be directed to the Chapter Historian:
Dr. George Feinstein
75-19 195th Street
Flushing, NY 11366

THE JOURNAL OF THE

ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78 NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXI, #4 DECEMBER 1995

Fellow Horologists:

In this, our final issue of 1995, we continue the serialized ITR material along with the complete set-up and instruction information for REVERE clocks. We are fortunate to have this data which will prove invaluable to anyone repairing one of these models due to the complexity of the mechanism and the shortage of information prior to this printing.

Our printing schedule for 1996 will include material about the REIFLER clocks and McCLINTOCK clocks with interesting sidelights and correspondance directed to the company by users of their system. We will conclude the ITR material early in the year with the last of the engineering bulletins in our possession completing this most informative series.

In keeping with previous practice, all mart ads will be deleted unless the chapter Secretary or Historian is advised to the contrary. This is a good time to update your mart ads with changes or new material, since the overall modification is generally an annual effort.

Another annual event is the request for the dues payment for the coming year... still only $10 for domestic members and $15 for the offshore group. A dues notice and payment form is included as the last page of this issue... Please be prompt and avoid the suspension and loss of continuity of the journals.

Thanks to those members who have provided material for your journal is always in order, and we are gratefull to David Lee, Herb Freeland and any of the other contributors that we may have overlooked. We are always in the market for new material, especially original work, and encourage all contributions. For those timid souls who feel that their work may not be sufficiently "professional", we will gladly edit or modify their submission, so fear not!

Your officers and committee-people extend their heartfelt best wishes for a healthy & happy holiday season, and a most favorable new year.

Enjoy this issue, good reading ahead...

Martin Swetsky, FNAWCC... President
Harvey Schmidt)
George Feinstein) CO-Editors

HARVEY SCHMIDT, SECRETARY-TREASURER 75-80 179th STREET, FLUSHING, NY 11366

Engineering Bulletin

No. 15 — International Time Recording Co., of N. Y. — ENDICOTT, N. Y. — December 15, 1919

Notes on Electric Clock Systems*

By J. W. Bryce, Supervising Engineer

J. W. BRYCE

Electric Clock Systems are the only practical means whereby a number of recorders and clocks may be kept in perfect step or synchronism. An electric clock system is absolutely reliable if supplied with a constant current and connected to a system of wiring properly connected, properly installed and proportioned.

The electric wires which connect the various pieces of apparatus become in effect a part of that apparatus just as much as the various levers, springs, gear wheels, etc., are in any mechanical device. It will be apparent then, that we cannot expect perfect operation of any of our electrical devices unless we connect them to a wiring system that is just as perfect as the Recorder itself.

A properly designed and installed wiring system should have:

First—Wires amply large to carry the current without undue voltage loss.

Second—Clean and perfect connections where wires are joined together or where they are joined to apparatus. If wires must be spliced or connected see that the joints are properly soldered and thoroughly insulated. It is preferable not to join wires except at some point where the joint may be readily inspected. Preferably have the joints come at some outlet where the parts may be fastened securely.

If they can be fastened under a stout screw so much the better as they may be readily separated for testing at any time.

Third—None but the best rubber covered National Code Standard wire should be used indoors. No wire smaller than No. 14 should be used because of mechanical strength if for no other reason.

Fourth—Before any Recorders or Clocks are connected the wiring should be thoroughly checked up to see that the circuits are right and all wires tested for "grounds."

It may seem to be a lot of work to do this but it has happened not infrequently that clocks have been reported stopping, "scattering," fuses blowing, batteries refusing to charge, etc., which, when traced out, were due entirely to the presence of grounds and faulty connections on the clock lines.

Fifth—If a potentiostat or other automatic battery charging device is used be sure it is in proper adjustment.

*Reprinted from "Echoes from the Class Room" now out of print.

Sixth—Be sure the batteries are large enough and are taken care of; properly charged, filled with clean distilled water, etc., and that all terminals and nuts are tight, and CLEAN.

Seventh—Be sure that the relays are not carrying too heavy a load. The sparking on the carbons gradually burns them away. They will last a long time if not overloaded and will burn away very rapidly if overloaded.

Eighth—It is because of the danger of the full voltage of the electric light lines getting through to the clock lines that we recommend the use of duplicate batteries except with type A automatic charging device and because of better voltage regulation.

In testing be careful how you use the current you are testing with. so as not to endanger yourself. SAFETY FIRST. If you are in doubt use a magneto or a number of dry cells or flash light batteries for testing.

If a clock system is properly supplied with current by proper batteries, wiring, and given any reasonable attention it is absolutely reliable, but if ANY ONE of these is faulty it will give trouble.

DO NOT OVERLOAD YOUR BATTERY

The successful operation of an electric time recording system depends largely on the condition of the storage battery which furnishes the constant current supply. It must be of sufficient capacity to do its work or the current will be quickly exhausted and will have such fluctuating character as to lead to trouble.

To determine the size of the cells (not the number of them, but the size) necessary for any given installation, add all of the amounts of current required by each piece of appatarus (at the voltage you have selected) as given on page 104C of Price Book No. 2. This will give you the current in amperes or fraction of an ampere required to operate the devices. It is safe to add 25 per cent or so to this amount to take care of variations caused by changes in voltage and to take care of relays, program devices, etc., which you will be apt to overlook.

All type "B" and type "C" clocks, and the apparatus they control, may be considered to take current for one-half hour per day. That is, the 1440 minute contacts may be considered to amount to one continuous period of one-half hour's duration. Therefore, if your apparatus requires a total of two (2) amperes to operate it it will require 2 x 1-2 = 1 ampere hour per day of battery capacity. That would be 7 ampere hours per week.

Reference to the Edison Storage Battery Company's table of battery capacity will show that a B-1-H battery has a Discharge Rate (8-hour rate) of 2.25 amperes. This cell would therefore, carry the load. The Edison Company rate this cell at 18.75 ampere hours when not discharged faster than at the eight hour rate. It will be apparent then that as our apparatus in the above example takes only 7 ampere hours per week we have ample battery capacity to carry the devices from full charge to discharge of two weeks and a little over.

It is well to note that Storage Batteries, discharged faster than at the eight hour rate, rapidly lose capacity so that in figuring any installation do no fail to take this into account.

It is also well to note that if excessive current is drawn from a battery the terminal and, therefore, the line voltage, will fall, resulting in failure of the clocks and recorders to keep time.

HOW TO FIGURE VOLTAGE LOSS OR "DROP"

Whenever a current of electricity flows through a wire there is a loss of voltage or pressure, just as there is a loss of pressure in a water pipe when the water starts to flow rapidly. This is a self evident fact, but it is a fact often overlooked by otherwise skillful electricians and is of paramount importance in the Electric Time Recording field.

The loss of voltage is always proportional to the amount of current flowing (amperes) and to the resistance of the wire (ohms). Again referring to our analogy of water flowing in a pipe, it is obvious that if a pipe is full of water and it is under a head, of say—ten pounds, if no water is allowed to flow the pressure will be uniform throughout the length of the pipe. If, however one end of the pipe is suddenly opened there will be a drop in pressure at that point and it will be proportional to the size of the opening. Like wise it is evident that a long slender pipe will cause more loss of pressure, or head, for a given flow of water than will a larger pipe.

The loss in volts or "voltage drop" as it is usually called is found by multiplying the current in amperes by the resistance in ohms of the particular circuit under consideration. The resistance of the circuit is found from the standard copper-wire table. Resistances for the more commonly used sizes of wire are given below:

Gauge No.	Diameter	Resistance ohms per 1000 feet
8	.1284	.643
10	.1018	1.023
12	.0808	1.62
14	.06408	2.58
16	.05082	4.582

It will be handy to remember that No. 10 wire is almost exactly 1-10 inch in diameter and measures almost exactly 1 ohm per thousand feet. This is handy to remember for rapid mental estimates.

For example—suppose we have a group of recorders, etc., that are situated 2000 feet away from the battery and we want to know what size wire to use, or what the loss will be with a given size wire. We will suppose we have added the current requirements of our apparatus and found it is 1.5 amperes. Now let us assume that we want to use No. 12 wire. The circuit (two wires) will be 4,000 feet long and its resistance will be 1.62 x 4 = 6.48 ohms. The voltage required then to force 1.5 amperes through 6.48 ohms will be 6.48 x 1.5 = 9.72 volts.

Let us assume that in the example above we were discussing 24 volt apparatus. It is apparent that we could not afford to lose 9.72 volts out of 24 at our battery as it would leave only 24—9.72 = 14.28 volts to operate nominal 24 volt devices.

48 volt devices require approximately one-half the amperage required by a similar number 24 volt devices. Let us see then how this would work out. If we needed 1.5 amperes with 24 volt magnets we would need only .75 ampere with 48 volt magnets. The resistance of the line will remain the same therefore, 6.48 x .75 = 4.86 volts. So you see in this case we have a loss of only 4.86 volts as against 9.72 volts and a much higher initial voltage. The percentage loss is much reduced.

From the above it will be apparent why a 48 volt system is superior to a 24 volt when any distance has to be traversed by the current.

If a number 10 wire was used the loss would be 1.02 x 4 = 4.08 x 3-4 = 3.06 volts.

The above emphasizes the need of sufficient voltage, and the need of wires large enough to carry the load without undue loss.

WHY THE DUPLICATE BATTERY?

A question often asked is why we recommend the use of a duplicate battery, when it is so much simpler and less expensive to furnish one battery and especially simple if the batttery is "floated" as it then requires no special charging board, or special attention.

The objections to the use of a single set of battery (especially the "floated" battery) are threefold.

1st. It is impossible to really "float" a low voltage battery on the line where the line voltage is say anywhere from 110 to 250 volts or so. As will be pointed out later, it is not a "floating" battery in the true sense of the term.

2nd. The great voltage change at the battery terminals between the time of completion of charge and a point near discharge.

3rd. The danger of the line voltage being thrown on to the clock lines which are designed to carry a low voltage) due to "grounds," etc.

Let us consider each of the above conditions.

The idea of "floating" a battery on the line is that when the voltage of the line fails or fails entirely, the battery takes the load and carries it until the line current is restored. Whenever the battery has been carrying a load its voltage naturally falls off somewhat so that when the line current is restored it begins to charge the battery. It may be well to state here that a true "floating" battery is to be so proportioned that when IT IS FULLY CHARGED ITS VOLTAGE JUST BALANCES THE LINE VOLTAGE AND NO CURRENT FLOWS EITHER IN OR OUT OF THE BATTERY. Any current the apparatus requires is taken directly from the line. It is only during interruption periods or emergency periods that the battery is called upon to deliver any current.

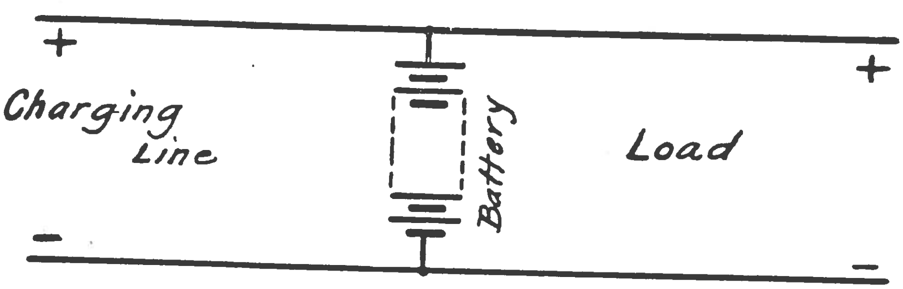


Fig. 1. Scheme of connections of "Floating" Battery.

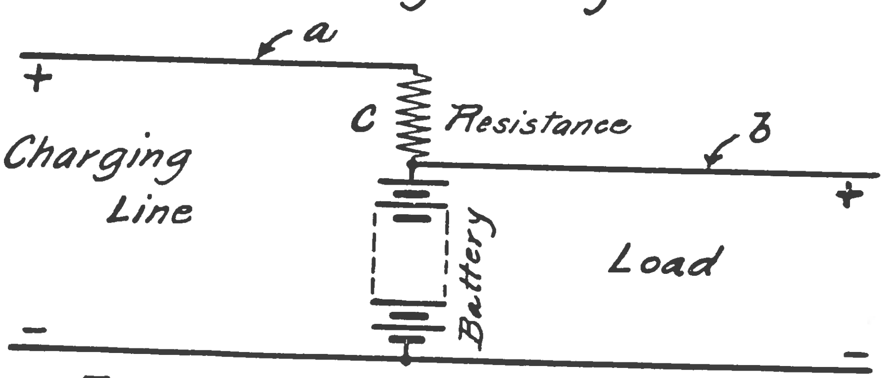


Fig. 2. Scheme of connections of so-called "Floating" Battery.

It can easily be shown that a condition like that outlined above is impossible to obtain with any battery of low voltage, being charged through a resistance. Perhaps an example will help make this clear.

Assume we have a battery of 10 Edison cells, and that we have a D. C. line at a voltage of 120 volts to charge from. We will further assume that we want to charge these cells at a 2.5 ampere rate.

An Edison cell begins to charge when the potential across its terminals rises to 1.4 volts, hence we know that 10 cells of battery will give us 14 counter volts at the start of charge. That means we have 120-14 = 106 volts to be "soaked up" in the resistance. That also means that we have 106 x 2.5 = 265 watts to be dissipated in the form of heat. This latter calculation is only necessary when we want to know what size of resistance unit to use. one that will not get too hot.

The resistance necessary to use to "soak up" 106 volts, charging at a 2 1-2 ampere rate will be $R = \frac{E}{C}$ $R = 106 \div 2.5 = 42.4$ ohms.

As the battery gets nearer to full charge, its voltage rises gradually to approximately 1.8 volts per cell or 18 volts for the 10 cells.

The charging rate therefore falls to 120 - 18 = 102 ÷ 42.4 = 2.40+ amperes. As the battery voltage will not rise higher it is apparent that the charging will continue as long as the line voltage is maintained, and if maintained at a good rate would soon boil away the battery fluid.

Where batteries are wired as indicated in Fig. 2 it is usual to use such a high resistance that the charging rate is very much less than normal. The theory of action is that as the internal resistance of the battery is low and the charging resistance high, the current for operation of the apparatus will be drawn from the battery and not through the resistance.

Let us now examine the question of voltage change where one battery is used. An Edison cell at the time of full discharge is approximately 1 volt per cell. It rises to roughly 1.8 volts per cell when the cell reaches a fully charged condition and just before being disconnected from the charging line. This means that a 40 cell battery may vary from 40 volts to 72 volts. It is asking a good deal of time recording apparatus to expect uniform and correct operation on a line of such wide variation in voltage or pressure. An ordinary incadescent lamp would not stand it long nor would many pieces of electrical apparatus such as motors, etc. The fact that time systems will stand it at all speaks well for the rugged construction of the devices.

Where the duplicate set of battery is used the voltage variation is much less as the battery voltage drops very rapidly to normal as soon as the charging pressure is removed.

Let us now examine the danger of high voltage with one set of battery.

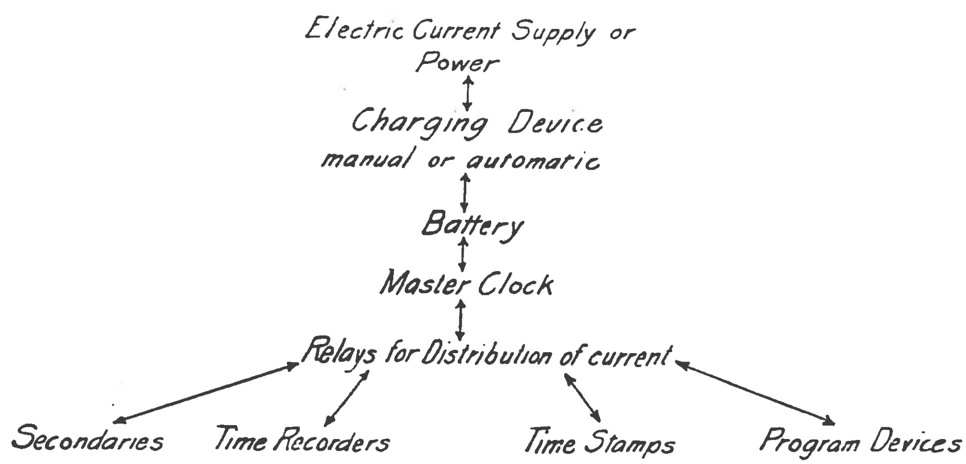
Whether a battery is "floated" or is charged by hand, the condition outlined in Fig. 2 is present and a little study of Fig. 2 will show that if the charging line happens to be grounded at "a" and by any accident a clock line gets grounded at "b" the resistance "c" is "shorted" and full line voltage will appear on the clock lines. Similarly if the battery should be disconnected accidently or otherwise, the clocks instantly get their current from the line through the resistance "c." It will be seen, therefore, that if the line is, say around 250 volts or even 120, a dangerous condition may be presented.

It may be asked why we don't supply protecting devices to guard against this. The answer is because such devices are costly and frequently give more trouble than protection.

A duplicate battery does not remove all danger and is far from a perfect thing, but it does give better voltage regulation and removes a great deal of danger from "shocks" "burn-outs," "skipping," etc.

With type "A" Automatic charging device duplicate battery is of course not used as insulation, etc. is taken care of by the charging device. Similarly with type "B" and an insulated transformer in the rectifier, one battery is all that is used.

A COMPLETE ELECTRIC IMPULSE CLOCK SYSTEM CONSISTS OF THE FOLLOWING ELEMENTS:



The Above diagram simply mentions the essential elements for a practical system of reasonably large size.

In a very small system primary batteries may be used and charging devices omitted.

It will also be obvious that the elements named above may be combined in almost endless variety according to circumstances.

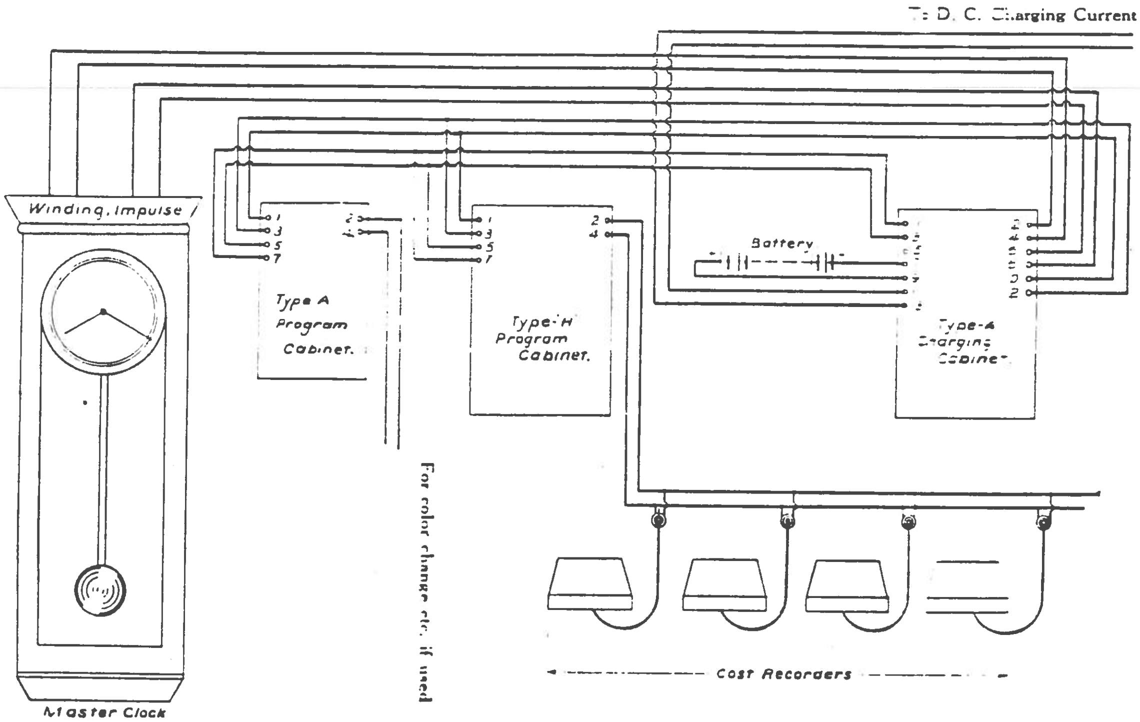

D. C. Charging Current
Winding, Impulse
Type A Program Cabinet.
Type 'H' Program Cabinet.
Battery
For color change etc. if used
Cost Recorders
Master Clock

Fig. 27

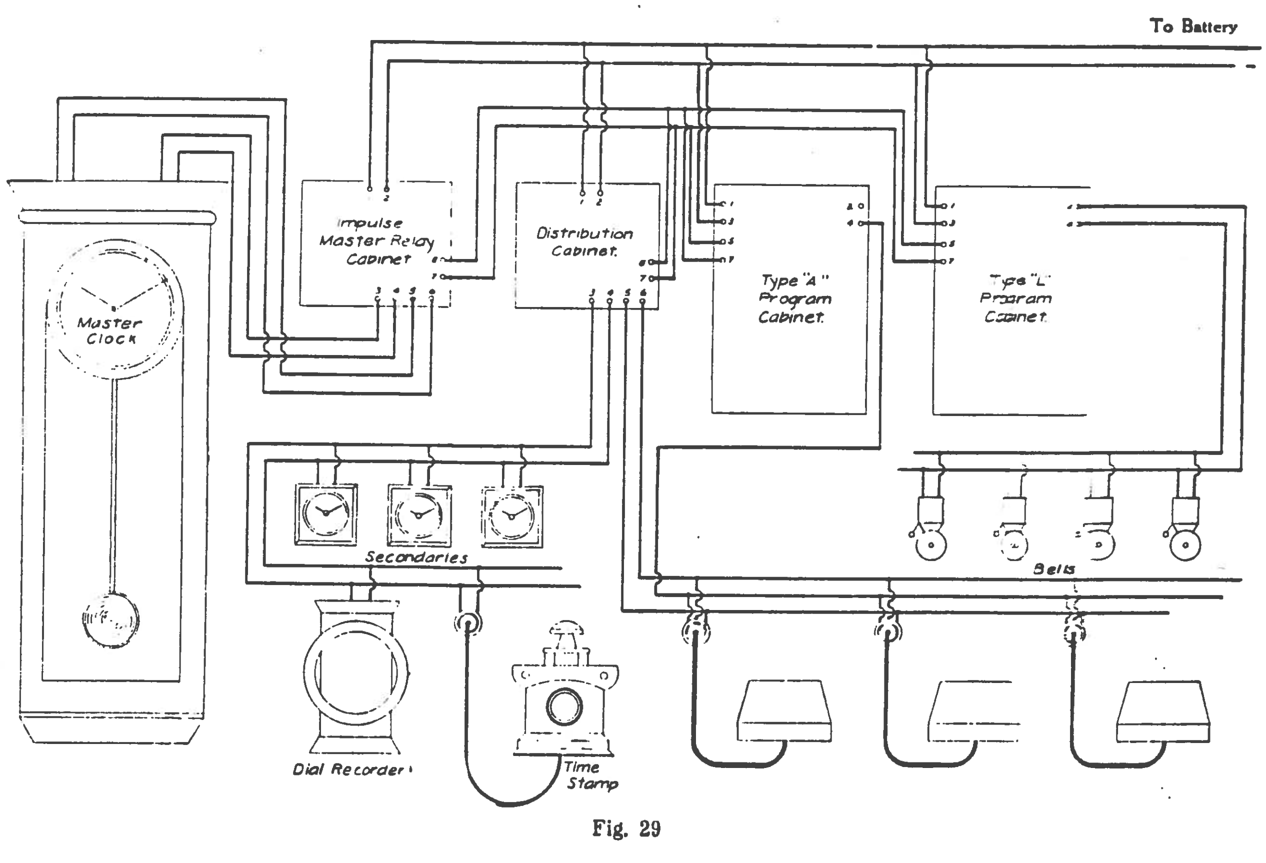
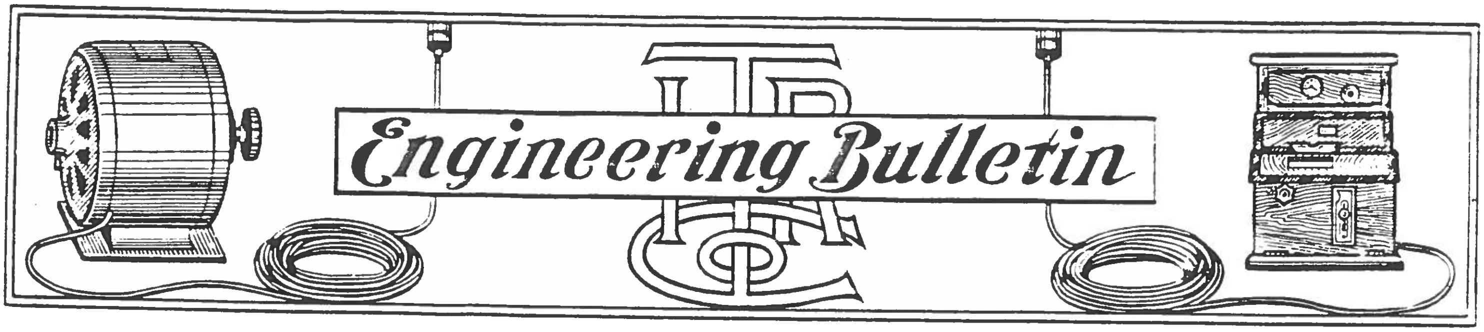

To Battery
Impulse Master Relay Cabinet
Distribution Cabinet.
Type "A" Program Cabinet.
Master Clock
Secondaries
Bells
Dial Recorder
Time Stamp

Fig. 29



No. 16 International Time Recording Co., of N. Y. ENDICOTT, N. Y. January 1, 1920

INTERNATIONAL COST RECORDER WITH DIAL SPACING DEVICE

By C. E. Larrabee

C. E. LARRABEE

As a means for increasing efficiency and registration speed of this recorder, the dial spacing feature and card receiver have been devised and in this article their possibilities and uses are described.

The card receiver is moved from position to position by revolving the knurled knob on top of the number dial, the card receiver being attached by two pins to a rod sliding in the guide tube shown across the front of the recorder.

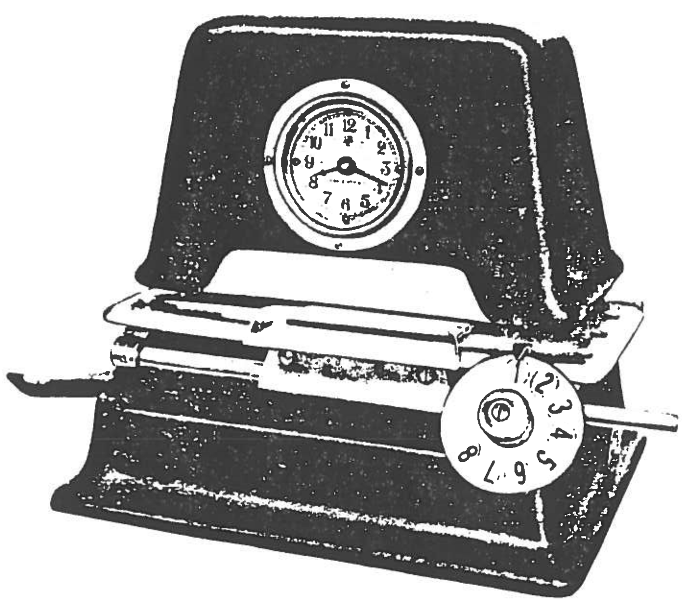


Fig. 1

This rod has a rack near the right end engaging with a pinion on the knob shaft and moves back and forth in unision with the number dial, moving the card receiver at the same time.

With this spacing device it is only necessary for the workman or clerk to move the dial to proper position to ensure accurate location of the printed time record on the card and, unlike the notching device, the card is left in its original form and size. The card is not mutilated in any way.

Fig. 1 is a front view of the cost recorder showing the numbered dial, card receiver, guide tube, etc.

Fig. 2 shows a type of card which may be used in the 3 1-4" receiver.

Fig. 3 illustrates a Hollerith Card arranged for one start and one stop record: i. e. a one job card.

Fig. 4 is a patented form of card on which the stopping time of one job is the starting time of the succeeding job.

It will be seen by reference to Figs. 2, 3, and 4 that two or eight records may be made on any one card. It is obvious that any intermediate number of records may also be printed. On cards 3 13-32" wide as many as 10 records may be printed if necessary.

Card receivers have been provided for two widths of cards, the Tabulating Machine or Hollerith Card which is 3 1-4" wide and our standard card which is 3 13-32" wide. An adjustable receiver undoubtedly will be developed for cards wider than the above sizes.

With a card arranged as shown in Fig. 4 it is possible to record the time on nine (9) separate and individual jobs and with practically one half the number of time records. It will be noted that on this card the stopping time record of each job is the starting time of the succeeding job, thus making every minute apply on some job.

By the use of the Dial Spacing Device the record card is more easily and accurately placed in the recorder, and evenly spaced records are obtained which add much to the appearance and ease with which the records may be read and the elapsed time computed.

Fig. 2

Fig. 3

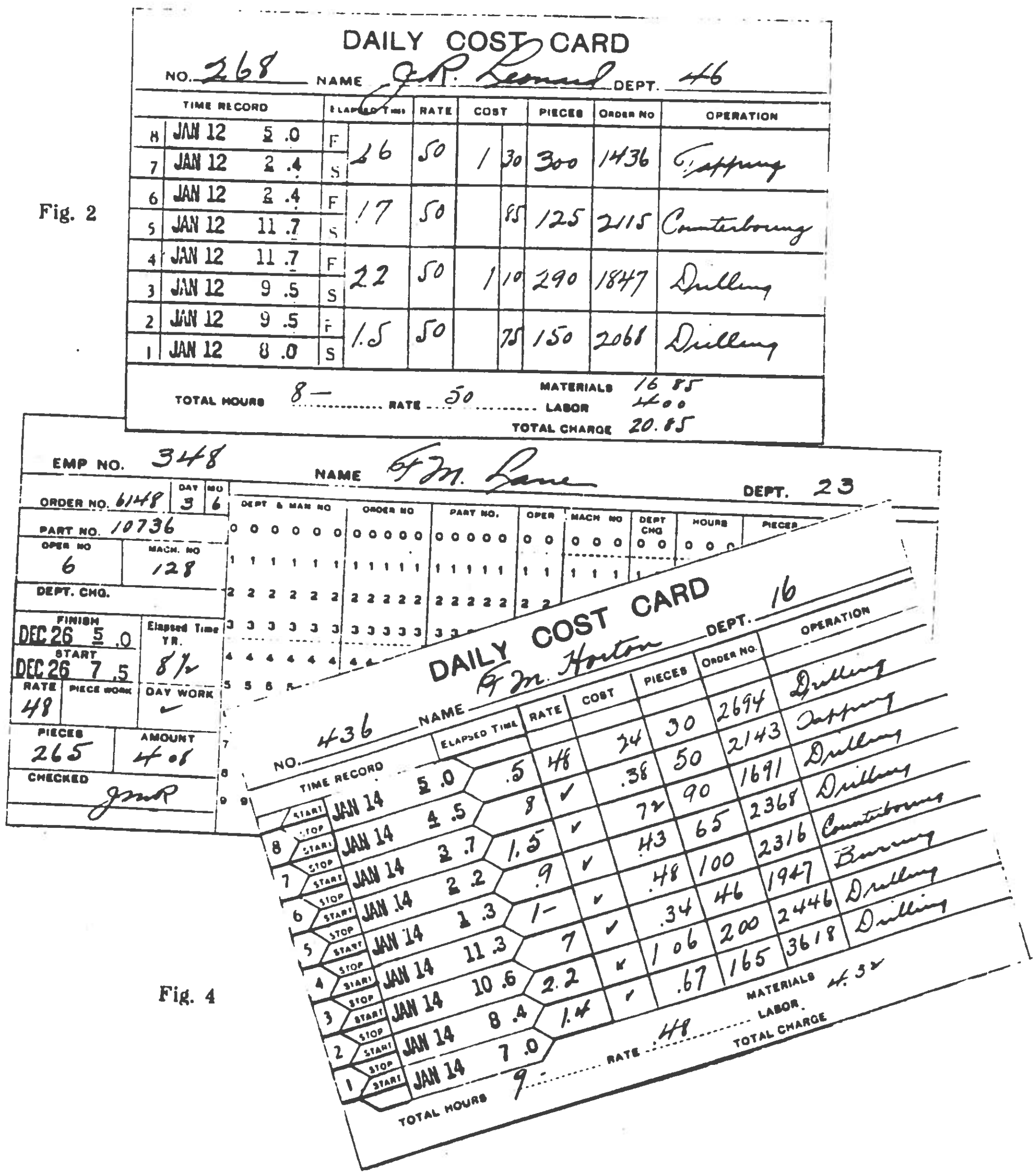
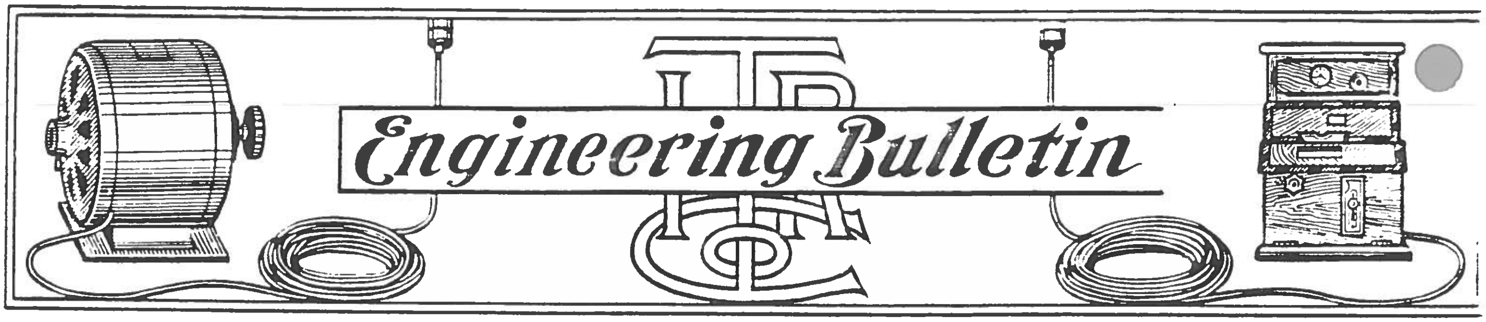


Fig. 4



No. 17 | International Time Recording Co., of N. Y. | ENDICOTT, N. Y. | January 15, 1920

International Self Winding Electric Master Clocks

Types B and C For Impulse Electric Systems

By J. W. Bryce, Supervising Engineer

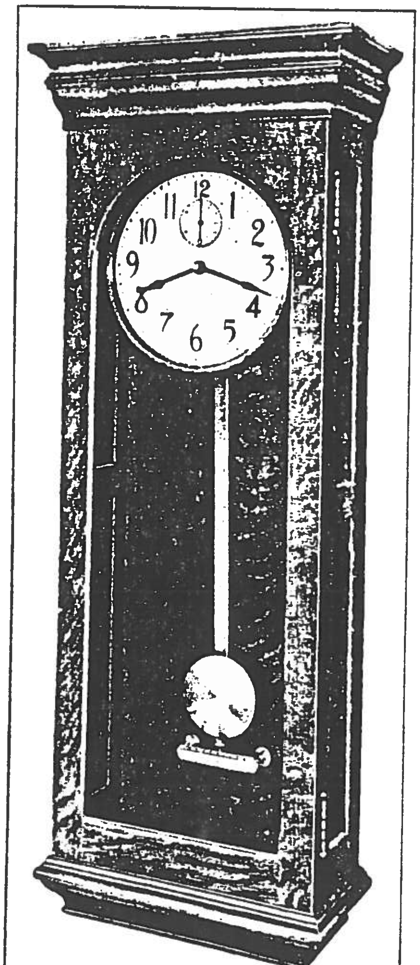


Fig. 1

Clock types B and C are of substantially the same design so far as mechanism is concerned. The difference being largely in the size of the cases, and therefore, size of dials, escapements and pendulums, also in the degree of refinement of finish.

The type B clock is fitted with a 72 beat movement and is furnished with metal ball pendulum only.

The type C clock is fitted with a 60 beat movement and is furnished with either metal ball pendulum or mercurial compensating pendulum.

Each clock movement is fitted with a minute circuit closer. The clock is kept wound by an electro-magnet, ratchet and pawl. The power to operate the movement is derived from a helical spring which at all times is kept wound to even tension by the electro-magnet and ratchet mechanism above mentioned.

There are no switches, relays or other devices mounted in the clock case. This means simplification of wiring, installation, and enables the I. T. R. Company to furnish an entirely up to date and fireproof construction, so far as the electrical features are concerned.

Referring to the cuts:

Fig. 1 is a front view of a type B Master clock.

Fig. 2 is an interior front view showing the clock movement with dial removed. The clock movement is of very simple construction and the gearing is assembled between two brass plates firmly fastened together by supporting posts. The entire movement is then secured to an iron casting which is accurately machined. The back casting rigidly reinforces all parts and is itself secured to the back of the clock case. From the casting the pendulum is suspended. Thus any stress tending to disturb the clock movement is eliminated.

Fig. 3 is a diagrammatic view of the winding mechanism which is common to both type B and C Master Clocks.

The winding ratchet J is connected to one end of the main spring of the clock, is loose on the main shaft of the clock and is restrained from backward rotation by the click pawl K.

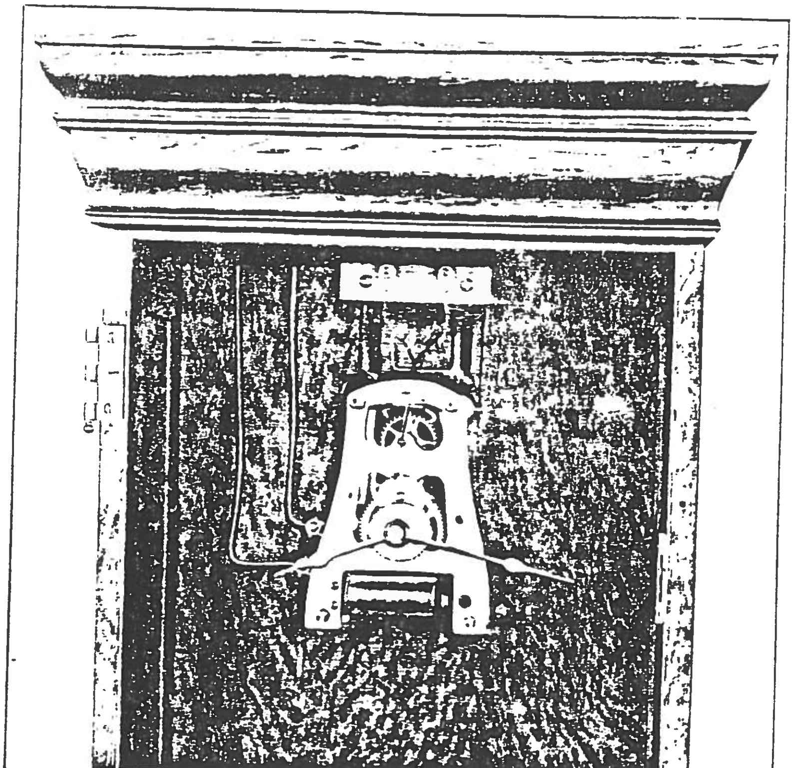


Fig. 2

Magnet O is energized once each minute from the battery by means of the master relay and attracts its armature N. Armature N is pivoted in the clock plates as shown and carries a pawl L on the end of its lever which is adapted to engage the winding ratchet J. An adjustable stop P is provided which keeps pawl L from dropping back too far. The adjustment should be such as to permit pawl L to advance the ratchet a trifle more than one tooth (see Fig. 4) or just far enough to insure click pawl K dropping into the next tooth.

The idea is to advance the ratchet J (which has 60 teeth) one tooth every minute, i. e., every time magnet O receives an impulse.

Fig. 3 shows the position of the parts with magnet O deenergized and Fig. 4 shows the correct position of the parts when magnet O is energized at the time of the minute impulse. When the master clock is first set up the spring should be fully wound either by pulling the ratchet around by the fore finger or by giving magnet O sufficient impulses to do it. If the clock is fully wound down it will take almost 60 impulses to wind it fully. Giving the magnet additional impulses after it is fully wound is unnecessary but will do no harm as stop pins are provided to prevent the mechanism going too far. As stated above one end of the main spring is attached to the ratchet J and the other is attached to the main wheel of the clock.

Fig. 5 shows diagrammatically the circuits of the master clock and to assist in the explanation of their functions the circuits of the master relay cabinet used with these clocks is added.

Referring to the diagram, battery of suitable voltage is connected to terminals 1, 2. A double pole indicating switch A is provided whereby all current may be cut off. A second indicating switch B is provided whereby impulses may be interrupted to the secondary apparatus, recorders, etc., but which still permits the master relay to function and the master clock to wind. A "stepping key" D is provided so that when the apparatus is set up the master clock may be wound by closing switch A and opening switch B and pressing key D the requisite number of times.

In the ordinary use of the apparatus, switches A and B remain closed. Current then flows from terminal 1 wire 11, wire 12, resistance unit(if necessary) 13, wire 14, wire 15, wire 16, to contact in master clock, which closes once every minute.

These contacts 17, 18, are insulated from the framework of the clock. An insulating bushing 19, carries contact arms 20, 21, mounted on the escape wheel staff of the clock. This staff carries the second hand. Current now flows from contacts to wire 22, to relay cabinet, terminal 3. wire 23, relay coils 24, wire 25, switch A, wire 26, back to battery.

This energizes the magnet of the master relay C and causes it to attract its armature and thereby close its contacts which establishes a circuit and current flows from battery terminal 1, wire 11, switch A, wire 27, terminal 6, wire 28, to winding magnet in master clock 29, through its coils, wire 30, to terminal 5, in master relay cabinet, wire 31, wire 32, armature of master relay 33, relay contact 34, wire 35, wire 25, switch A, and wire 26 back to battery. Thus winding the master clock.

It is to be noted that the contacts of the master clock only have to carry the current necessary to operate the master relay (about .020 amp.) The sparking due to the winding magnets is carried by the master relay points.

Simultaneously with the establishment of the circuit just described another circuit in multiple with it is established and current flows as follows.

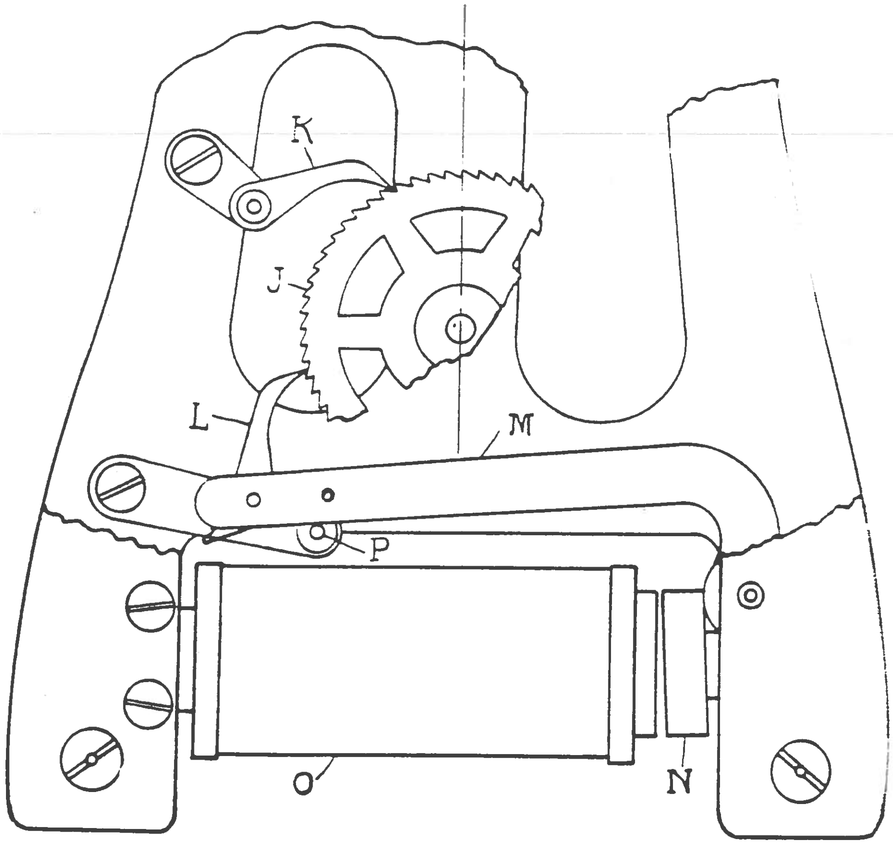


Fig. 3

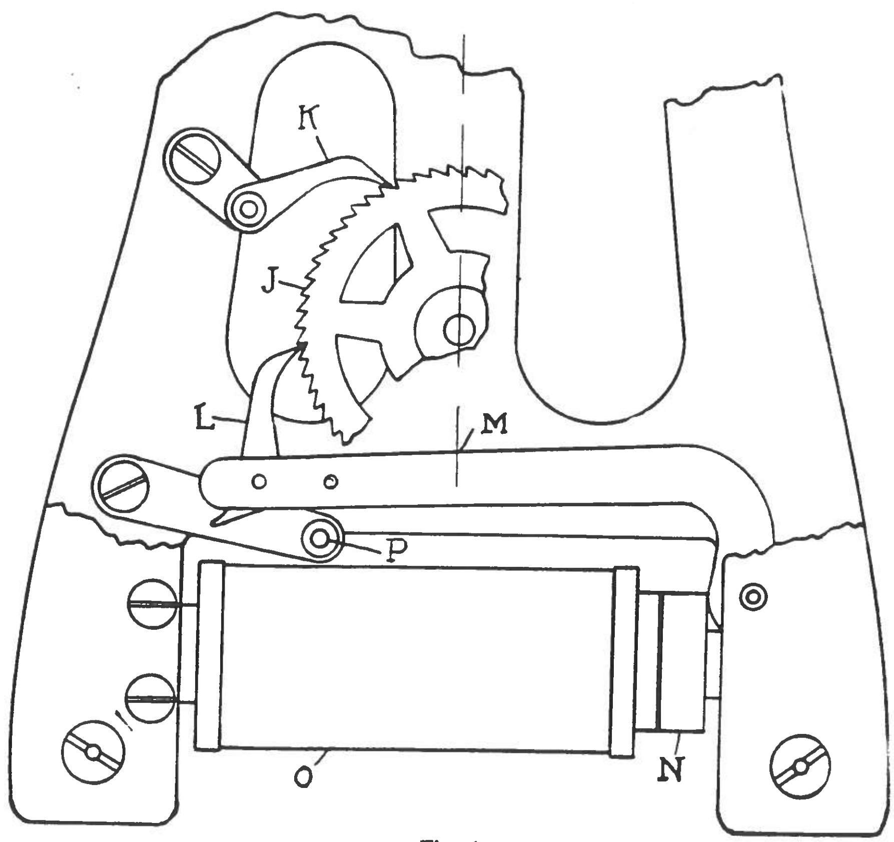


Fig. 4

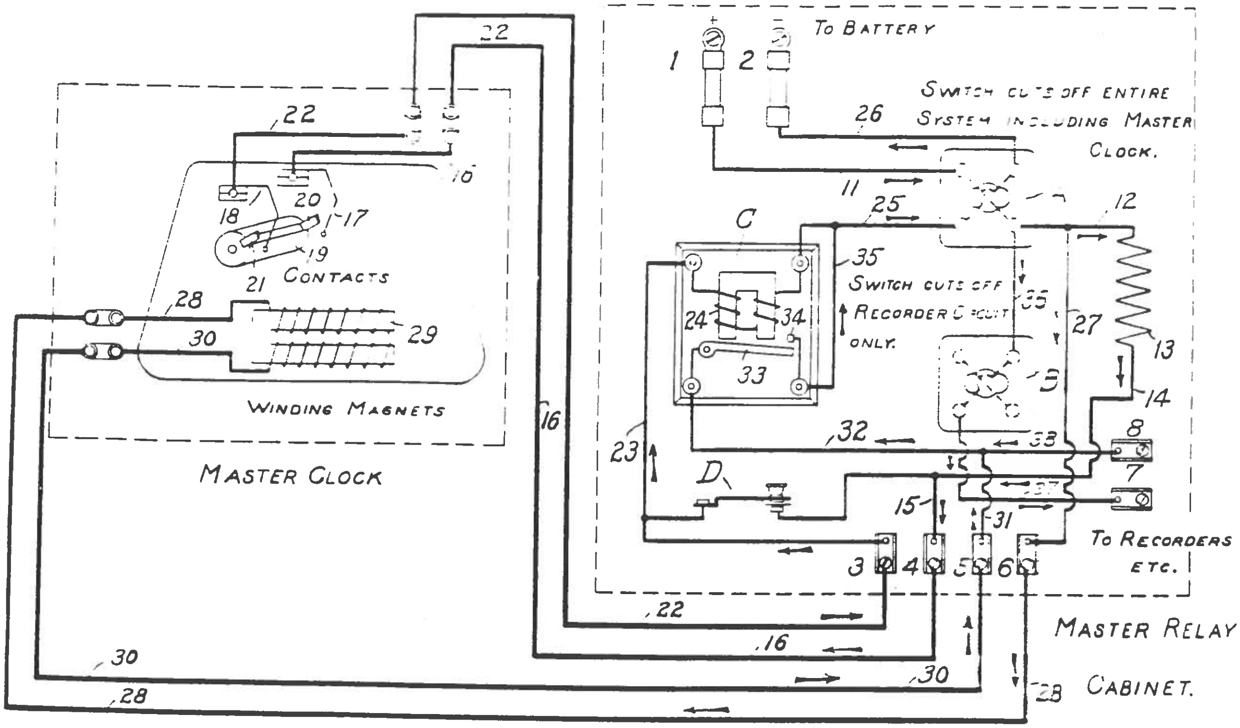


Fig 5

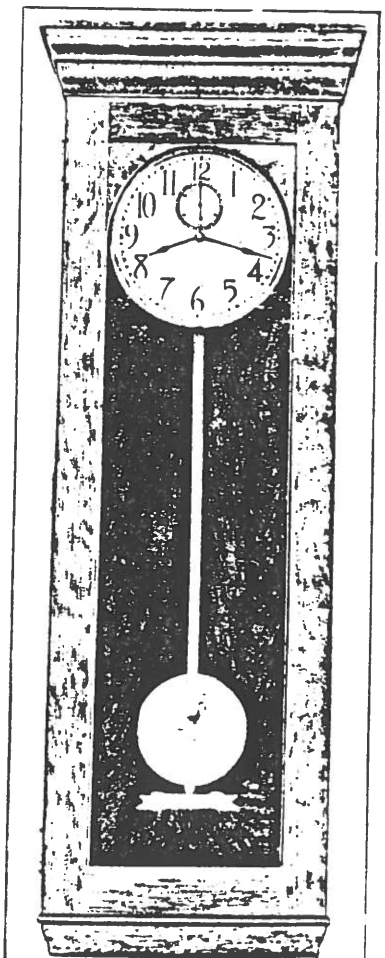


Fig. 6

From battery to terminal 1, wire 11, switch A, wire 36, switch B, wire 37, terminal 7, to circuit to recorders, etc., and returning from recorders to terminal 8, wire 38, 32, to master relay armature 33, contact 34, wire 35, wire 25, switch A, wire 26 and back to battery. It is to be noted that this circuit can only function when switch B is closed.

It will also be apparent from an examination of the diagram that key D is wired in multiple with the contacts in the master clock so that closing this key is in effect the same as closing the master clock contacts.

Fig. 6 is a front view of a type C master clock. It's general appearance is seen to be like type B. It is however, much larger having a 12" dial in place of the 10" dial of the type B. It also has a 60 beat pendulum with larger ball and the movement generally is more finely finished although of the same general design.

Fig. 7 is a front or face view of a type C Master clock fitted with mercurial pendulum. This is the finest time piece of its kind made. The mechanism is the same as all other type C clocks except for the small changes made necessary to accommodate the mercurial compensating pendulum. As is well known to those skilled in the art of making clocks, the pendulum is the unit which to the largest extent controls the time keeping qualities of a clock and the mercurial pendulum is perhaps the most widely known and accepted type of compensating device.

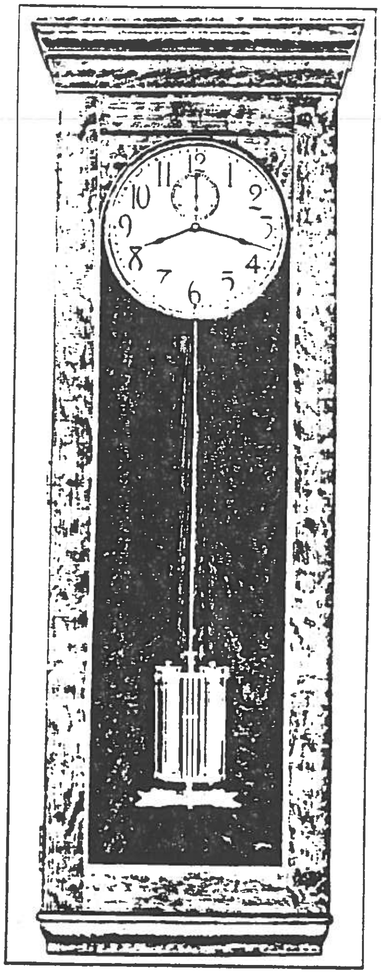


Fig. 7

Fig. 2 also shows the interior view of a type C movement mounted on the iron supporting member similar to that described in connection to the type B clock. The only difference is in the size of the hands and the generally better finish of the C movement as compared with the B movement. It is a more refined construction only.

Fig. 8 is a view of the movement alone viewed from the front and shows its simple accurate and rugged construction.

Fig. 9 is a view of the movement from a direction about at right angles to that shown in Fig. 8.

Fig. 10 is a view similar to Fig. 8 showing the back of the movement as it is supplied for use with metal ball penduium.

Fig. 11 is a view like Fig. 10, from the back showing the movement adapted for use with mercurial compensating pendulum.

The clock movement is of the highest quality.

The International master clock movement is the result of years of deep thought and practical test to obtain the best movement that can be devised for the class of service that it has to perform.

The plates of the clock movement are made from a fine grade of hard brass best suited for this work, and are nicely finished to give the movement a pleasing appearance and harmonize with its general good quality.

The gears are also made from sheet brass of suitable temper and quality for the work they are to perform, the teeth being milled from the solid stock, giving more uniform and even running teeth than can be obtained when the teeth are punched out with punch and die. The pinions, which operate in these gears, are all turned integral with the shafts from a special grade of carbon steel, the teeth being lapped and polished to give them a high finish and insure as near frictionless operation of the parts as possible. In many so-called high-grade clock movements the pinions are made of separate pieces and assembled to the shafts, but as this method does not produce accurate running pinions we use the other and more expensive method.

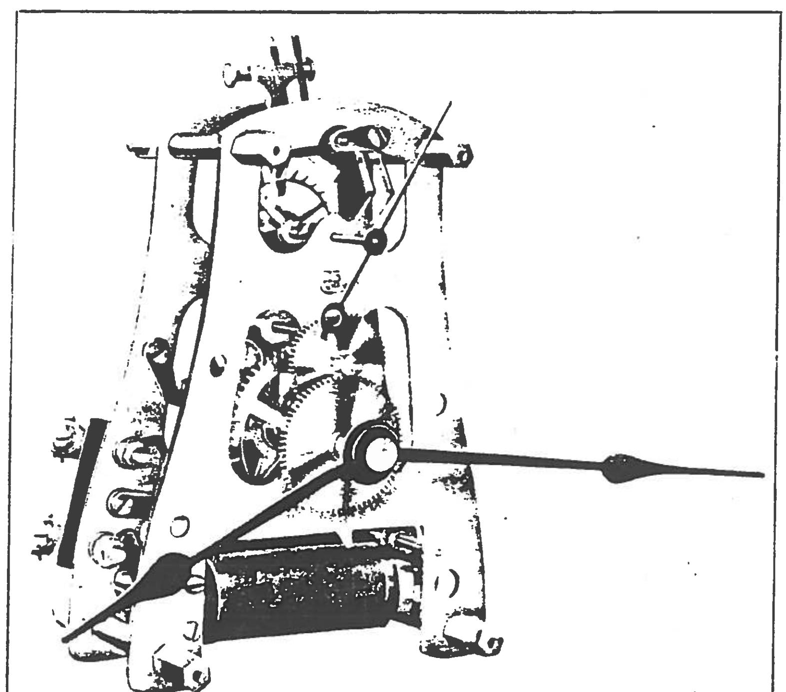


Fig. 8

The Graham dead beat escapement consisting of brass escape wheel and hardened steel verge are used, this type of escapement being best suited for this kind of clock movement. The escape wheel shaft and verge staff carry the contacts for closing the primary circuits and for the automatic winding of the main spring.

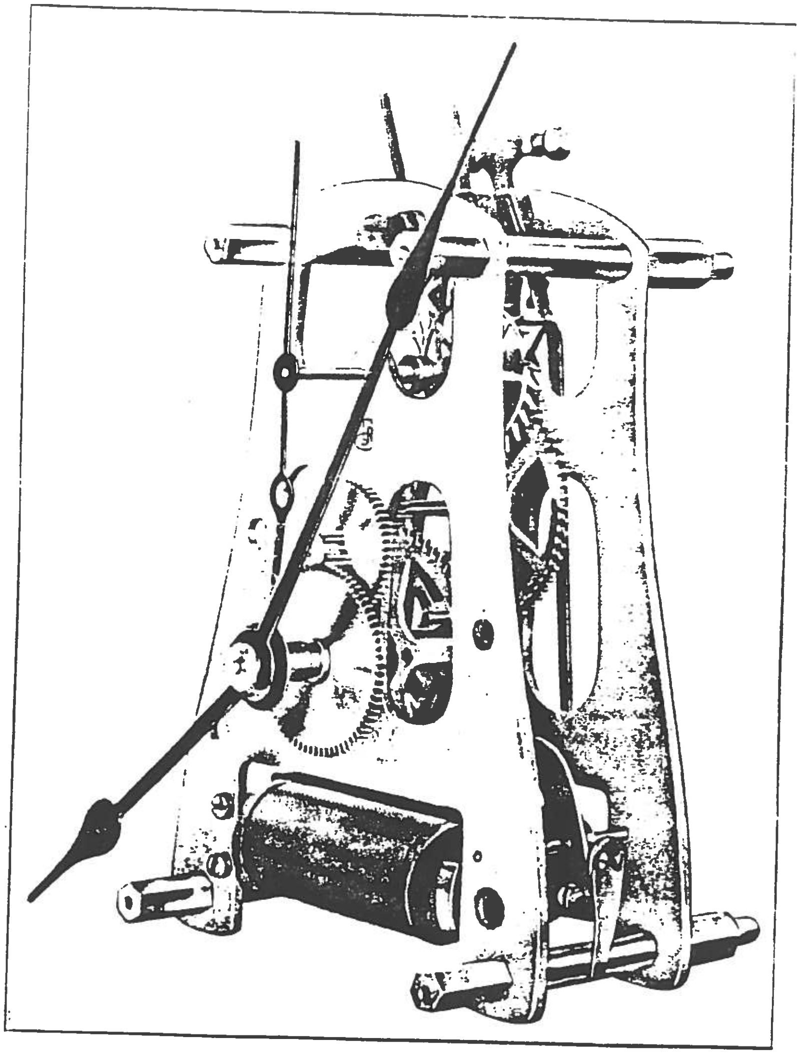


Fig. 9

The main springs are made from an excellent quality of steel piano wire, and are all accurately tested for proper strength when being fitted to the movement.

The magnets for operating the winding mechanism are wound with enameled copper wire on cores of Norway iron, and are all tested to standard resistance to insure proper operation of same.

The clock movements are fitted with blued steel, hour, minute and second hands, while the clock dial is etched with silver plated background and black figures, minute and second dials.

Fig. 12 shows in diagram the type of contact used in these master clocks.

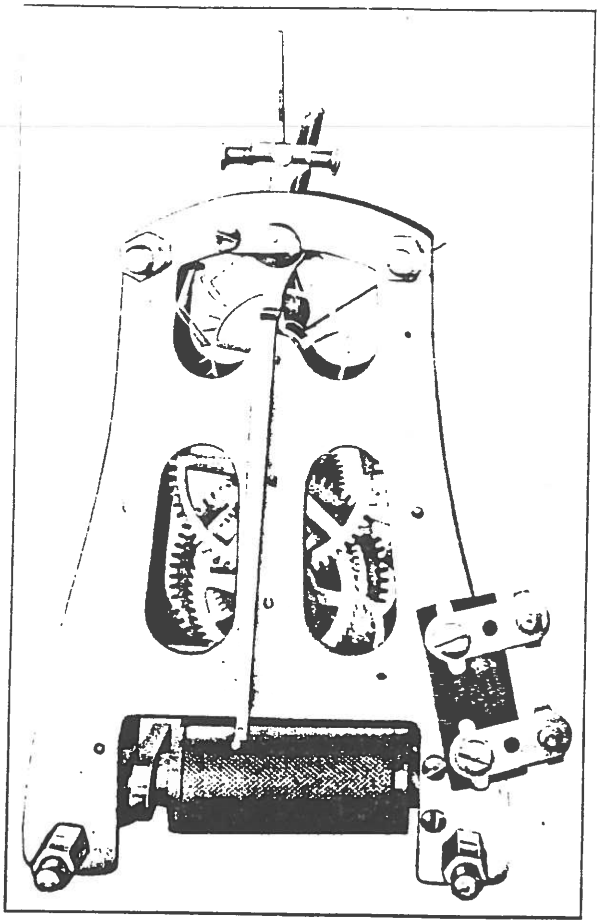


Fig. 10

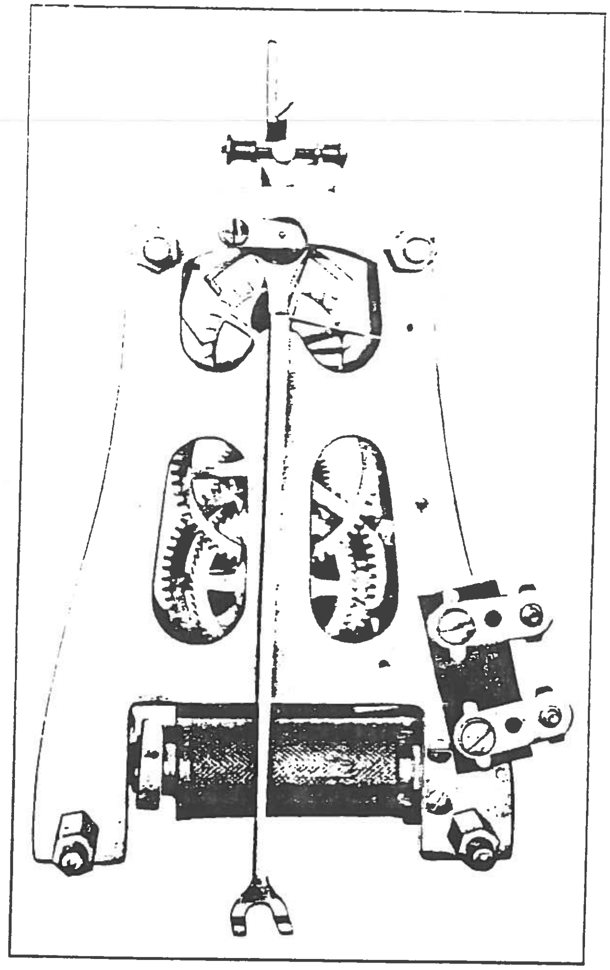


Fig. 11

Fig. 13 shows the escape wheel and parts in proper position when contacts are to be adjusted.

It has been customary in impulse time systems, to ground one side of the circuits to the master clock frame and while this is permissable where very low voltages are to be used, in cases where moderately high voltages are to be employed as for instance 50 to 110 volts, this method of wiring is not advisable or

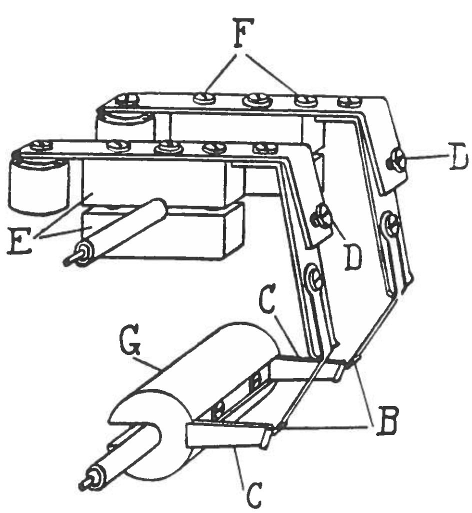


Fig. 12

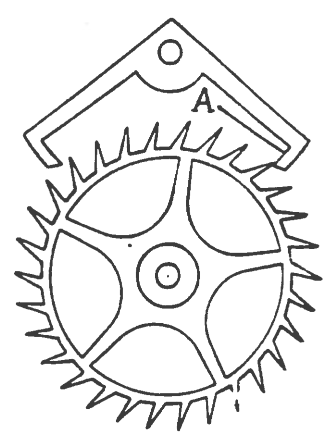


Fig. 13

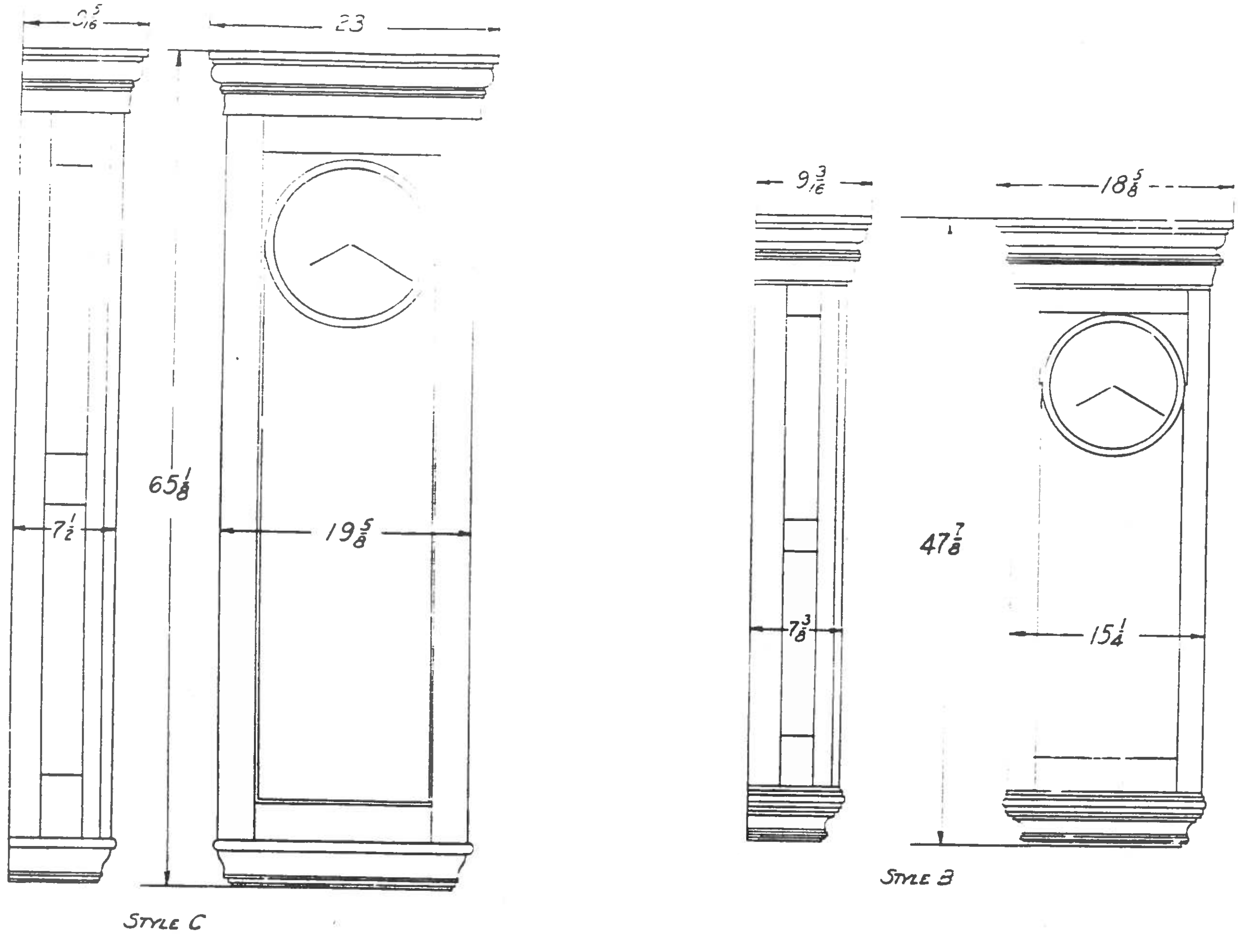


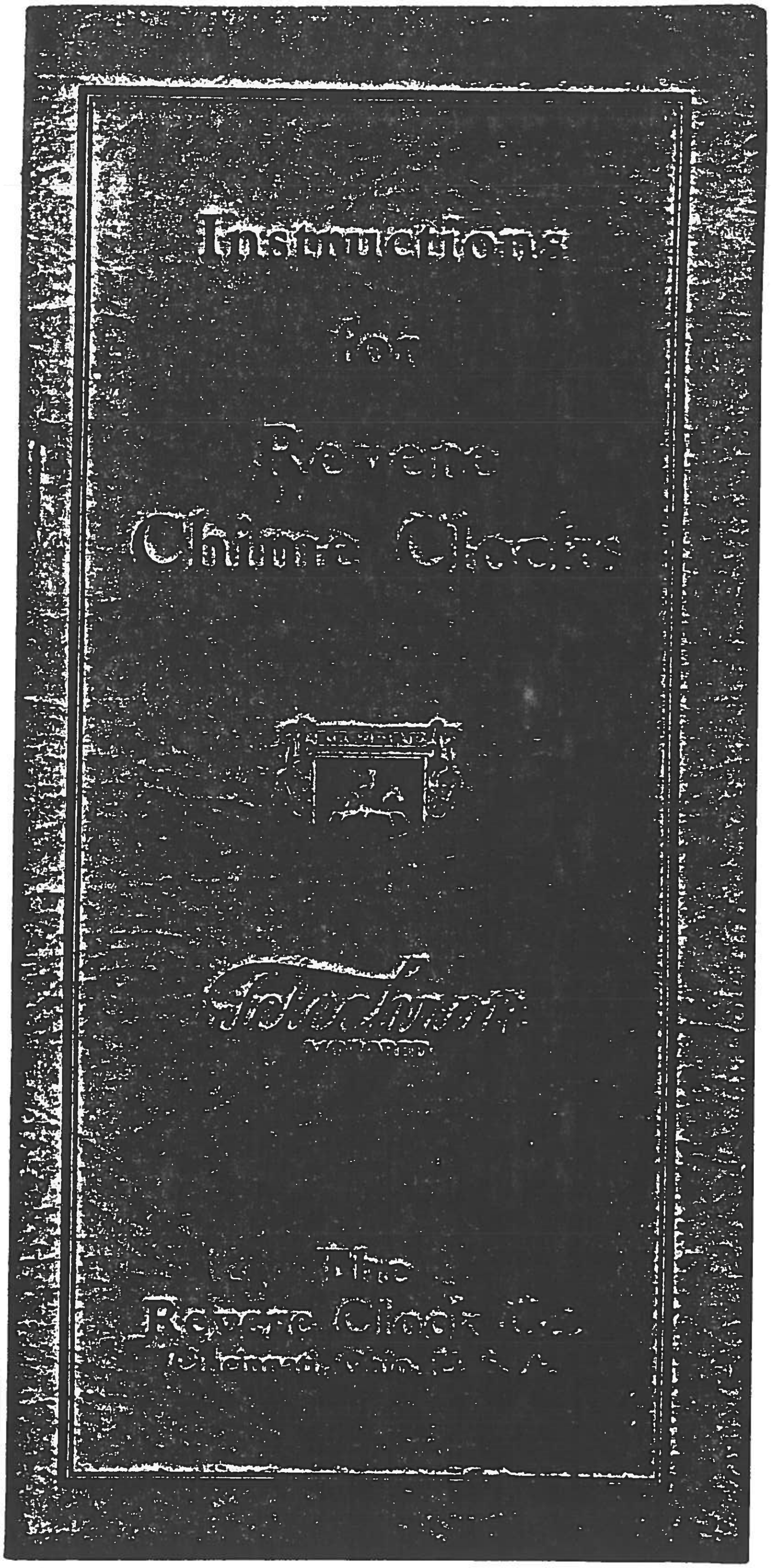
Fig. 14

safe. To avoid these unsafe conditions, the contacts in the master clock movement under consideration are mounted on a block of insulation "G" on the escape wheel shaft, are two in number and made from one piece as shown by Fig. 12. This effectually insulates the current from the metal clock frames.

These contacts close the circuits between the contacts on fingers mounted on the verge shaft, and should be so adjusted that when the escape wheel tooth has advanced until it touches the pallet as at "A" Fig. 13, the contacts will have just touched near the upper end contacts on Arm "C", thus allowing the escape wheel to advance before the contact is made. Both the forward and the rear contacts should engage at approximately the same time. The contacts "B" may be made to engage the contacts on Arm "C" at the proper time by adjusting with the small screw "D" causing the contact to occur sooner or later as the case may require. When the contacts are adjusted as shown insulating blocks "E" should stand approximately horizontal. These blocks are securely clamped to verge shaft by screws "F".

Fig. 14, is a drawing in outline giving the general dimensions of both types B and C Master clocks.

20.



Instruction Book

Revere movements are carefully made and assembled by expert clock-makers, thoroughly inspected and given a complete running test to observe any defects and then they are mounted into cases after which the chime hammers are adjusted and a general inspection of the casing, dial and parts entering into the mounting of the movement into the case. The clock is then given another running test and final careful inspection before it is packed, from which you can see every endeavor has been made to ship each clock to you in the best possible shape.

Occasionally, due to rough handling, it is possible some part may become disarranged and need a little adjustment. Each clock should be tested by the retailer before he delivers it to the consumer; at least, it should be plugged in and the hands moved around for a few hours allowing it to chime at each quarter. When the retailer has alternating current in his store he should endeavor to run each clock at least a few hours and if possible 24 hours. Careful attention should be given to the instruction on inside of back door before attempting to set up a Revere clock the first few times. If the clock operates satisfactorily by moving the hands forward the sound of the chime should be particularly noted. If they do not sound clear, see that all hammers are 1/8" away from the chime bars and are directly over the center of the bar. The chime bar shipping holder must be perfectly clear of the bars. If a bar should touch the case when vibrating bend it down slightly by pressing gently at the point where bar joins chime holder. Bend sideways if bars should touch each other inside the case. All bars should be straight in line.

Revere Telechron Chime will run only on 110 volt, 60 cycle (or cycle marked on motor) alternating current.

The Revere "Chiming Observatory Time" Telechron motored clock is operated by a Telechron synchronous motor. This small motor not only gives Observatory time but also supplies the power to run the hour strike and chime mechanism, by giving constant power to center wheel Y.

This Telechron motor takes its impulses from the alternating current supplied by the Power Station where the cycles of the alternating current are kept absolutely correct through the control of the speed of the generators (which makes the current) by means of a Warren Master Clock which is checked every day with the time signals from the Government Observatories.

You will appreciate the fact that there are quite a few million dollars worth of equipment and a trained man guarding with pride the assurance of Observatory time to all Revere Telechron motored clocks on his lines. This accuracy is maintained whether there are only one or a million Revere Telechron Clocks on his lines. Therefore there is no regulating to be done to the clock.

The motor unit is hermetically sealed, containing oil and never needs oiling. The motor is very easily removed, if it should ever be necessary, by loosening the two main fastening screws.

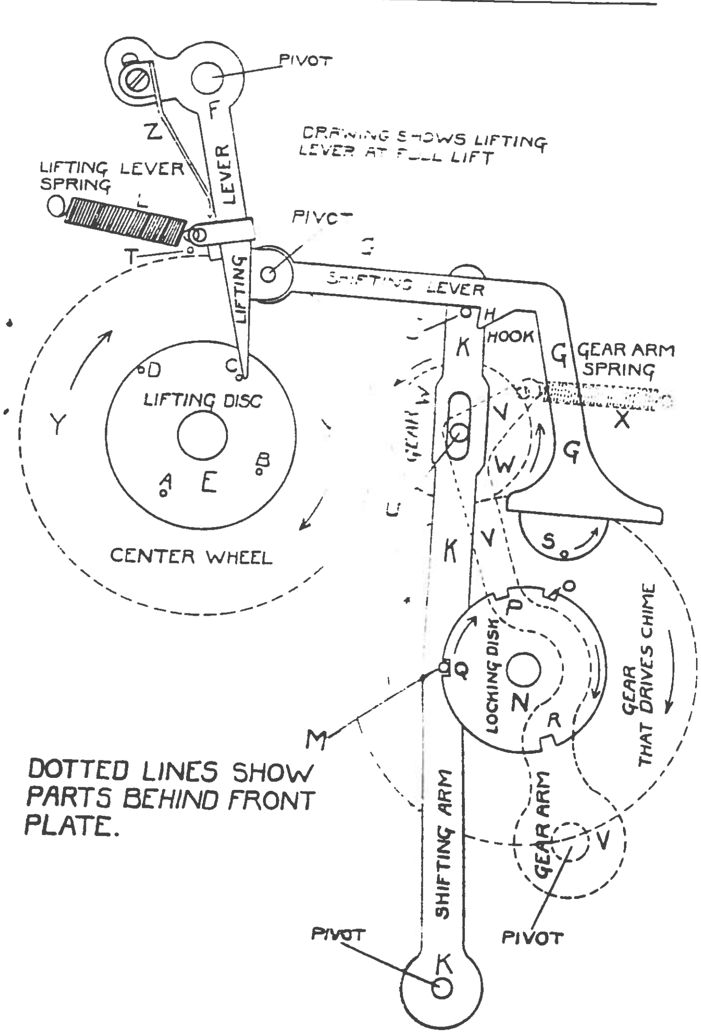
Chime Control

(Right Side of Movement)

The chime is controlled by the four pins, A, B, C, D on the lifting disc "E". A, B, C and D operate the first, second and third and fourth quarter chimes respectively.

These pins move the lifting lever "F" to the right, permitting the shifting lever hook H to drop over pin J on the shifting arm K. The lift should be far enough to permit 1/32" clearance between the pin J and hook H *and each pin should be tested.*

Pin D operates the self-adjusting feature at the hour which will be explained later. If the lift is not enough to afford the above clearance the lifting lever F should be bent slightly to the left and if too much bend to



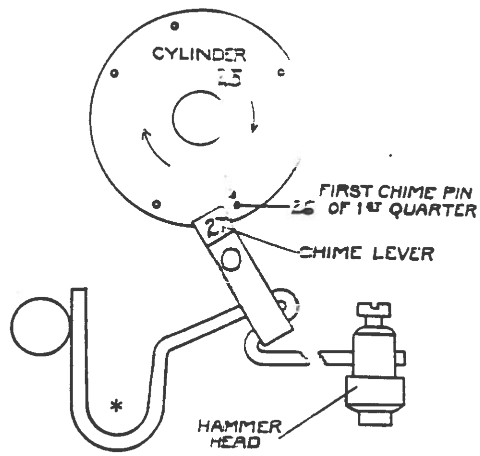
right at the end that comes in contact with the lifting pins, A, B, C and D.

As the lifting lever F drops off one of the pins on the lifting disc E it is pulled back almost to its original position by the small coiled spring L and since the shifting lever G has hooked the shifting arm K by its pin J, the shifting arm K is pulled with it towards the left of the movement. The lower pin M on the shifting arm K is then pulled out of the slot in the locking disc and is held out until the locking disc has turned far enough to be sure that when the shifting lever G is released the pin will *not* drop back again into the same slot but will rest on the circumference of the locking disc N. The shifting lever G is released by the pin S which makes one revolution for each bar (four notes) chimed and lifts the lever so that the hook H is released from the pin J. The lifting lever will then go completely back to its original position against its banking pin T. When it is in this position the hook H should rest on top of the pin J while the clock is chiming.

The shifting arm K has a double duty. It engages the chime gear arm pin U through its slot; also the lower pin M holds this gear arm gear W into mesh while chiming by resting on the circumference of locking disc N. There should be slight play between the locking disc N and pin M. The locking disc turns as the chimes operate and as the slots come into position the pin M will drop and the gear W on gear arm V, is pulled out of mesh by the coiled spring X attached to it on inside of movement plate. This spring should be just strong enough to safely disengage the gear W from the center wheel Y. The lift lever spring L which pulls the chime gear arm gear W into mesh can be as strong as desired but *must* be strong enough to pull the chime gear W safely into mesh. If the gear arm spring X is too weak the gears will not come out of mesh and the clock will continue to chime. If the gear arm spring X is stronger than the lifting lever spring L it will resist the lift lever spring L and Pin M will not be completely pulled out of the slot in the locking disc and as the gears are in mesh the disc will turn, and bind itself on pin M and the clock will stop.

The locking disc N determines the proper quarters on the chimes by the distance between the slots. Three of these slots, O, P, Q are the same depth. These three represent the first, second and third quarter chimes respectively. The fourth or deep slot R represents the hour or fourth quarter chime. When the pin M of the shifting

arm K is in the slot R it takes a longer movement of the lifting lever F to disengage it from the slot than it does to disengage the pin M from slots O, P, Q. Pins A, B, C on the lifting disc will disengage the shift arm pin M from the three quarter slots O, P, Q, but will not disengage it if it is in the deep or hour slot R. The hour pin D because of its position on the lifting disc has a longer throw and is the only pin that will permit the shifting lever hook H to drop behind the pin J when pin M is in the hour or deep slot on the locking disc. This is the self-adjusting feature as the four quarter bars will only chime at the hour.



CORRECT POSITION OF CYLINDER PINS IN RELATION TO CHIME LEVER 27

* **Important: Do not bend this lever**

Setting Cylinder

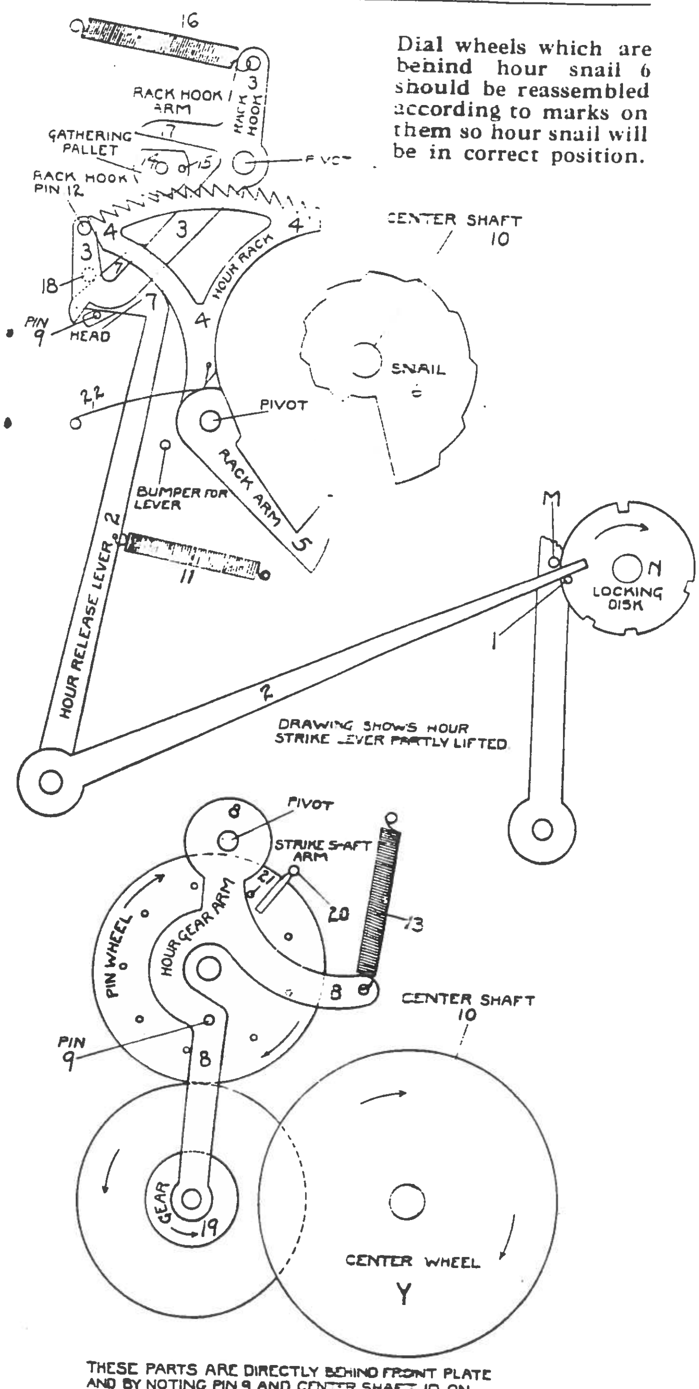
Because of the angle on which the gear arm gear W enters the center wheel care must be used in setting the cylinder 25. If the cylinder is not set correctly and the last chime lever has not dropped off cylinder pin 26 or the first chime hammer of the next quarter begins to rise before the shift arm pin M can drop into the slot on the locking disc N, the chime will continue to operate, as there must be no load on cylinder or chime train of gears when pin M is ready to enter slot in locking disc N to let gear W come out of mesh with center wheel Y. To set the cylinder all the slack or back lash should be taken up and pin M on the shifting arm K should be at top of the slot O in locking disc N. The first pin 26, of the first quarter which is marked with an arrow should be set 1/16" away from, or in front of the chime lever 27. Cylinder is set by meshing the cylinder shaft gear with the drive gear and use two screws in slots on drive gear bushing for fine adjustment.

Hour Control

(Left Side of Movement)

As the locking disc N revolves and starts on the fourth quarter chime, pin 1 raises the hour release lever 2, whose head 7 raises rack hook 3, by engaging pin 18, permitting the rack 4 to fall the correct number of teeth and the rack arm 5 to take its position on the snail 6, corresponding to the correct hour. The hour release lever head 7 holds the hour gear arm 8 out of mesh by sliding over pin 9 when the rack hook starts to leave pin 9. As the chime is ended the hour release lever 2 drops off the pin 1 in the locking disc N and permits the rack hook pin 12 to fall in the teeth of the rack 4. The hour release lever 2 is moved back to its original position by spring 11 and the hour gear arm 8 is released and the small gear 19 is pulled into mesh with center wheel Y by the coiled spring 13 attached to arm 8 and the strike begins. This spring 13 should be just strong enough to pull the gear 19 safely into mesh. The gathering pallet 14 begins to turn and makes one revolution every time the hour strikes once and its pin 15 gathers one tooth every revolution. As each tooth on the rack 4 is gathered the rack hook pin 12 drops behind it and prevents the rack from returning to its original position. After all the teeth have been gathered the rack hook 3 drops to its original position, striking hour gear pin 9, disengaging the hour gear arm wheel 19 from the center wheel. The spring 16 on

Dial wheels which are behind hour snail 6 should be reassembled according to marks on them so hour snail will be in correct position.



THESE PARTS ARE DIRECTLY BEHIND FRONT PLATE AND BY NOTING PIN 9 AND CENTER SHAFT 10 ON BOTH DRAWINGS, THE POSITION OF THESE PARTS IN RELATION TO EACH OTHER CAN BE UNDERSTOOD.

the rack hook 3 should be strong enough to overcome the spring 13 on the gear arm 8 and disengage gear 19 from the center wheel Y. If the hour gear arm spring 13 is stronger than rack hook spring 16 it will be impossible for the rack hook 3 to push the gear 19 out of mesh and the strike will continue to operate.

The rack hook pin 12 should rest in the bottom of the rack teeth when rack arm 5 is properly set to engage a step on snail 6. Adjust this when minute hand is at 12 by slightly moving rack arm 5, being careful not to loosen friction. The gathering pallet pin 15 should engage each tooth fully and toward the bottom of the tooth and gather just enough so the rack hook pin 12 safely moves over one tooth but not over two teeth. (If pin 15 hits top of tooth the movement will bind and stop.) Adjust this by slightly bending pallet pin 15 forward or backward. Both of above adjustments should be tried at 1, 3, 6, 9, 12 o'clock. You will note there are 5 teeth between rack hook pin 12 and gathering pallet pin 15.

The hour gathering pallet 14 when locked should permit the rack hook arm 17 to rest on its flat side so pin 15 is free of rack teeth. When pallet 14 is properly locked the strike shaft arm 20 should be about 1/8" away or in front of the pin 21 on the pin wheel, which is to lift it next. If shaft arm 20 is not set correctly, the pallet 14 should be pulled off of its shaft and reset. In operation, the hammers should fall first and then the pallet should gather. If the pallet does not lock on the flat, the pin 15 should be bent slightly towards the center to give the pallet more time to lock.

Indicator

The indicator on front of movement and showing through opening in dial is turned to silver at which point the segment on back of indicator shaft should have its smallest end pointing directly to the field of the motor and should be attracted by the magnetism when the current is on and hold the silver part of signal in place. If current

is turned off the indicator will move to red showing an interruption in current which is a warning that the current has been off and the hands should be reset and the signal reset to silver.

1. If clock stops and silver part of signal will not stay up the current supply has been cut off. Look for fuse blow out or switch opening or loose connection in wiring.

2. The bezel with dial is easily removed. First take out second hand and then unscrew hand washer and take off hands. Unscrew the fastening screws in rear of case and bezel will come out.

If Clock Fails to Chime

1. Lifting lever F may not throw over far enough to let shifting lever hook H drop behind pin J in shifting arm K. Bend lifting lever F slightly to the left at the end where it comes in contact with the lifting pins. Each pin should be tested. See lines 32 to 48.

2. Lifting lever spring L may be broken or too weak and will not pull gear arm gear W into mesh. The lifting lever spring L should be strong enough to overcome the spring X on the gear arm V. Cut one or two coils to make spring L stronger.

3. Chime gathering pallet pin S may not be set correctly. Pin should be at bottom. See lines 138 to 141.

4. Cylinder drive gear on rear of movement may be loose on its shaft and the cylinder won't turn. Tighten cylinder drive gear by the set screw in the bushing, and reset cylinder. See "Setting Cylinder" lines 125 to 148.

5. The meshing of the chime gear arm gear W with center wheel Y should be about 2/3 of the tooth so they will not bind. This is controlled by the slotted ex-center behind shifting arm K.

If Clock Continues to Chime

1. Cylinder may not be set correctly. See "Setting Cylinder" lines 125 to 148.

2. Gear arm spring X may be too weak and will not pull it out of mesh. Strengthen spring X by turning eccentric slightly to left.

3. Gathering pallet S may be loose on shaft and won't release shifting lever hook H. Reset with pin to bottom and tighten pallet by driving it on its shaft. See lines 138 to 141.

If Clock Stops on Chime

1. Lifting lever spring L may not be strong enough to overcome gear arm spring X to pull pin M completely out of its slot in the locking disc N. The teeth may be slightly in mesh and the disc N will turn, locking the pin M against the slot in disc N. Tighten lever spring L by cutting off a coil or two.

If Clock Fails to Strike

1. The meshing of the hour gear arm gear 19 with center wheel Y should be about ⅔ of the tooth, so they will not bind. This is controlled by the slotted ex-center behind hour release lever head 7.

2. Hour release lever spring 11 may be too weak to return lever to its original position. Strengthen spring by cutting off a coil or two.

3. Hour release lever 2 may fail to raise rack hook 3 high enough to let rack 4 fall. Correct this by bending hour release lever 2 at point it contacts pin 1.

4. Rack may fail to drop. (a) The hour gathering pallet pin 15 may not be set correctly, resting in teeth keeping rack from dropping. Reset hour gathering pallet 14. See lines 206 to 214. (b) Strike shaft pin 20 may be resting on pin 21 which load backs up gathering pallet pin 15 into rack teeth when rack is ready to fall. Reset as per lines 206 to 214. (c) The rack spring 22 may be broken or too weak to make rack fall into position. Strengthen spring.

Note: Gear arm spring 13 may not be strong enough to pull gear arm gear 19 into mesh with center wheel Y. Strengthen spring by turning eccentric slightly to left.

If Clock Continues to Strike

1. Hour rack hook spring 16 may be too weak to disengage the gear arm gear 19 from the center wheel Y. Strengthen spring 16. See lines 180 to 188.

2. Hour gathering pallet may be loose on its shaft and won't gather the rack teeth. Reset see lines 206 to 214.

If Clock Stops on Strike

1. Hour rack 4 may not be set correctly and gathering pallet pin 15 may be hitting on top of the teeth. Reset hour rack lines 189 to 205.

If the hands do not move or there is any variance of time, but the clock is running, tighten the friction on the minute tube by tapping the bushing on the side opposite the tube. This friction washer is behind large gear next to lifting disc E.

If the minute hand moves at the same speed as the second hand remove the minute tube and ream it out a little so that it spins freely but without play on the center shaft.

If the hour gathering pallet 14 continues jumping when hour should strike it is due to spring 13 not being strong enough to hold gears 19 and Y in mesh. Strengthen spring 13 by turning eccentric slightly to left, so it will safely pull gears 19 and Y into mesh. There also may be a bind between the two gears on the gear arms. Bend the arm slightly towards the front plate to give more play between the gears.

If there is a rattle in clock (a) see that signal pin does not rest on edge of dial; if it does the segment in back of movement must be moved around very slightly. (b) The segment may be a little too close to field—bend slightly upward.

If *signal does not fall freely* (a) see that signal does not rub against dial or pin is not behind dial. (b) That neither front or back end of shaft is bent. (c) That adjusting screw over shaft hole in back plate is not binding shaft.

Due to rough handling in shipment the movement may shift slightly and the center arbor touch the side of hole in dial. This should be observed for a full minute and if arbor touches hole use a good sized screw driver to shift movement to correct position.

26

Mantel Chime Clock

Setting-Up Directions

Release chime bars by turning metal holder on inside of back of case. Release chime hammers by cutting string and removing wood block, being careful not to bend hammer levers.

Bottom of hammers should be 1/8" from top of bars and should strike the center of bar.

This Revere Telechron Chime will run only on 110 volt, 60 cycle (or cycle marked on motor) alternating current circuits and should be connected to a circuit which is constantly alive. Make sure that there is no switch which is likely to be opened so as to deprive it of current.

Turn the Current On

Setting hands: Because of the self-adjusting chime feature which automatically corrects the sequence of the chimes within an hour there are various ways of setting the hands. Probably the easiest is to turn the minute hand backward to about an hour before the correct time and then forward, letting the clock chime at each quarter. The hour hand should point to the hour struck. Note—when the chime is in the operation of self-adjusting it sometimes does not chime.

If this clock is set to the absolutely correct time, it will remain correct. Any error in setting will continue, so be sure to set correctly.

The red indicator on front of dial should then be moved by means of the pin to show silver. The indicator will remain thus as long as the current is on. If the current fails at any time the indicator will turn to red. This is a warning that the current has been off and the hands should be reset and the indicator reset to silver.

If clock has two chimes, either Westminster or Canterbury chimes can be used by inserting small key on the square shaft in front of dial and turning slightly in direction marked. Clock can also be silenced by turning square shaft (marked silent and chime on dial) with key. This key is attached to inside of back door.

Floor Chime Clock

Setting-Up Directions

Unpacking the Case

The greatest care should be taken in removing the Clock Case from the packing box. First, the nails that hold the braces in place should be carefully removed before attempting to release them from their fastening. Damage to the Case is chiefly due to careless removing of the braces. Keys for doors are wrapped in package tacked on center brace. Look carefully for case ornaments.

Removing Top of Case

Place the Clock Case in the position selected for it. If the Case is one that has a removable hood, take it off preparatory to receive the Movement. If the Case, so to speak, is a one-piece Case, the top or roof, with or without the front moulding attached, should be removed. It gives free access to the space to be occupied by the Movement. Under no condition remove the back of a Case. It is not necessary.

Placing Movement

This Revere Telechron Motored Tubular Chime Movement will run only on 110 volt, 60 cycle (or cycle marked on motor) alternating current circuits and should be connected to a circuit which is constantly alive. Make sure that there is no switch that is likely to be opened so as to deprive it of current. Movement is marked with name of case. Place the Movement in position on the brackets and fasten the screws in the holes provided for them. The thin cords that are attached to the hammers on the rack should have sufficient slack to allow the hammers to be one-eighth of an inch from the bell when at rest. The Dial should not be removed for this or subsequent assembling.

Hanging Tubular Bells

Be careful to keep tubes in sets as they are packed. Each set is tuned in harmony to a predetermined pitch and may vary, even if only slightly, if mixed with other sets packed in the same box. If sets should accidentally get mixed together place them in sets according to small numbers stamped on top of tubes. Hang the bells on the racks provided for them, beginning with the shortest bell at the right and ending with the longest one at the left of the rack as you face the clock. The bell marked (hour strike) on the 9-tube movements hang on the rack provided for it to the right of the chime rack and on the 5 or 7-tube movements it hangs on the left of the chime tubes. Stretch the cord well over the two (2) round head pins, and in such a manner that the knot comes above the center of the bell. Each bell should then be directly behind a hammer. The cord should not touch the bells except at the points where it passes through. Each bell should hang perfectly perpendicular to avoid striking each other when vibrating while chiming. This can be done by pulling the knot one way or the other.

Level Clock

The clock should stand firmly on the floor and level enough so tubes do not strike back of case while chiming.

Testing the Chimes

The Clock is now in position to test the Chimes. After turning on the current move the minute hand forward till it passes the next quarter and it will begin to chime. If any of the bells produce a tone too loud or too weak, adjust the hammer springs either closer to the bell, which produces a louder tone, or away from the bell, which will weaken the tone. Use our patented adjusting thumb nut, which greatly simplifies the adjustment of the springs. *Do not adjust the springs too tight as the hammer will produce a thud when striking the tube.*

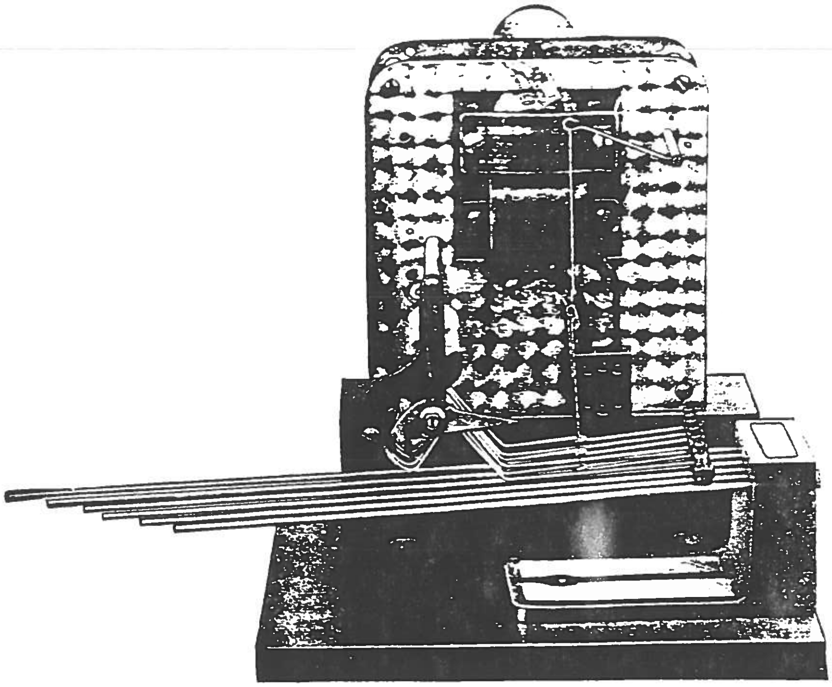
Be sure the hammers are 1/8″ from the tubes. If a louder tone is wanted the leather tips of hammers can be hardened by rubbing a smooth piece of wood or metal over leather using pressure.

Setting Hands

Because of the self-adjusting chime feature which automatically corrects the sequence of the chimes within an hour there are various ways of setting the hands. Probably the easiest is to turn the minute hand backward to about an hour before the correct time and then forward, letting the clock chime at each quarter. The hour hand should point to the hour struck. Note—When the chime is in the operation of self-adjusting it sometimes does not chime. If this clock is set to the absolutely correct time, it will remain correct. Any error in setting will continue so be sure to set correctly.

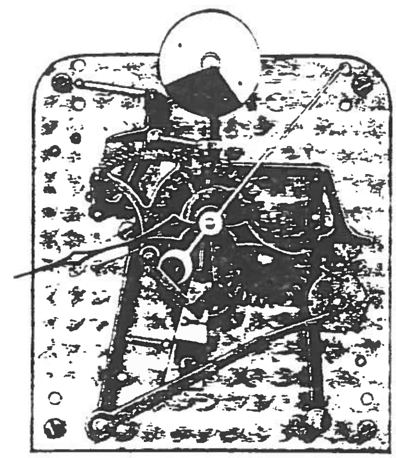
Setting the Moon

Be sure the moon spring and shift lever are not wedged between the face of the moon disc and dial. The figures and lines on the moon arch do not indicate a calendar month, but do indicate a lunar or moon month, which has 29½ days. Should the moon phase not correspond with the correct age, which may be obtained by consulting an almanac or calendar, then revolve the moon disc, which is done by a slight pressure of the finger on the disc, turning to the right, and proceed until an imaginary line drawn through the center of the moon phase comes in the right position with the arch. For example, if the moon is 12 days old and the arch indicates it 20 days old, revolve the disc until the imaginary line comes in line with 12 on the arch. When the moon is once set correctly it will remain so if the clock is kept running continuously.



Back of 2 Chime Mantel Clock Movement

Dial wheels which are behind hour snail 6 should be reassembled according to marks on them so hour snail will be in correct position.



Front of 2 Chime Mantel Clock Movement

— MART —

All MART Ads are FREE. Send copy to the attention of the Editor:
Harvey Schmidt, 75-80 179th St., Flushing, NY 11366. Limit 3 lines.

WANTED: **HOROLOGICAL LITERATURE**. Repair info, Catalogs, etc. for the Journal
PORTESCAPSecticon Clock or Movement. Antique Watch & Clockmaker's Tools & Machinery.
(718) 969-0847 Harvey Schmidt, 75-80 179th St., Flushing, NY 11366

Junker **EARLY BATTERY CLOCKS**, Movements, Parts, etc, send details.
Martin C. Feldman, 6 Stewart Pl., Spring Valley, NY 10977

STANDARDELECTRIC Master Clock, 120 Beat, Eye Brow or Square Case. Also Slave Clocks in Eye Brow Case's. David Lee, P. O. Box No. 171, Knox, NY 12107

ITR, **STROMBERG**, **STANDARD**, & **SWCC** Movements and Parts for Master Clocks. Also Wood Cased Slaves. Call or send photo (914) 997-5670
Mitch Janoff, 3 Stratford Ave., White Plains, NY 10605

STANDARD ELECTRIC Square Dial, 13 ½" X 13 ½" & a Set of Hands.
Roy Crowe, 9257 Appleby St., Downey, CA 90240, (310) 861-8788

Master Clock with Tape or Drum Program Control & Internal Pilot (slave) Clocks by **STANDARD ELECTRIC / SELF WINDING / HOWARD** etc. Early / unusual Time Recording Clocks / Watchmans Clocks. (508) 448-5547
Robert A. Simon, 930 Townsend Road, Groton, MA 01450

Dial for **ITR** master clock: 12-1/2" O.D. with wood bezel surround on outside edge of dial; minute track diameter 11"; independent seconds bit. (713) 554-7387
Kenn Koerber, 105 Royal Drive, League City, TX 77573-1951

ELECTRO-MECHANICAL Clocks, Fancy & Simple Cased. Unusual Clocks, Movements. Books. Day or Night (516) 541-2400 or 351-5869
Elliot B. Siegel, 930 Broadway, Massapequa NY 11758

Dial for **BULLE** Clock, Approx. 5½" Diameter, 1½" hole in center, "rolled" brass outer edge.
Jerry Hahn, 2714 Hampshire Ave., Cincinnati OH 45208

The electrical unit that goes on a small **WALLACE** & Tiernan Wall Clock. The "Ears" have been broken off my armature. Source for domes that fit the large two contact **TIFFANY**. The casting that mounts the pendulum on a seconds beat **GENTS** and the pendulum assembly or any piece of it. Richard B. Pridham, 10402 Bellman, Downey CA 90241 (310) 862-3086 Call collect.

HANDS for a 13 inch Chapter Ring. (312) 238-3294 - evenings or 445-5381.
G. Frederickson Sr. 1716 W. 100th Pl. Chicago IL 60643

Tapped Coil for Transistor Driven **JUNGHANS** Battery Clock. John McGrory (908) 537-4575

SYNCHRONOME Master Clock. William F. Baker (212) 560-2013

Original Glass Battery for **BRILLIE** Electric Clock as shown on pg. 87 of "150 Years of Electric Horology." Kenneth Erlenbusch, 124 North Avena, Lodi, CA 95240

SESSIONS Synchronous Motor (or repair thereof) for WM Chime Clocks of mid 1930's.
JEFFERSON GOLDEN HELM Synchronous Motor (different from Golden Hour Motor).
REMPE 80 beat movement for #44 case. Or will sell/trade case.
Len Brenner, 1127 Towne Lake Dr., Longview, TX 75601, (903) 758-0638 late evenings

STANDARD ELECTRIC "Eye Brow style case" for 60 beat movement, 65"x22¾"x9¾".
Don Mills, P.O. Box 124, Bonner Springs KS 66012 (913) 422-5014

ELECTRO-MECHANICAL Clocks: One or a Collection. Any Condition.
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230 (800)221-0424 X206

REPAIR: ALL EARLY BATTERY CLOCKS Specializing in **BULLE** using orig. parts.
Martin C. Feldman, FNAWCC, 6 Stewart Pl., Spring Valley, NY 10977

FOR SALE: **TIFFANY NEVER WIND**, Double Contact Model, Replacement Castings for Pendulum Suspension & Contact Arms (Brass not Pot Metal) $20 each, $37 for both. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

Repair Parts for **TIFFANY NEVER-WIND** Clock Co., **CLOISTER** Mfg. Co., & **NATIONAL MAGNETIC** Clock Co. David Lee, P. O. Box No. 171, Knox, NY 12107

SCOTT BATTERY Electric Shelf Clock (London Stereoscopic Co.) Circa 1905. Photo & Details in A. & R. Shenton "The Price Guide to Collectable Clocks." Fig. 404. (800) 221-0424 X206
Martin Swetsky, 1910 Coney Island Ave., Brooklyn NY 11230

BULLE Electric Gallery Clock w/ 12" dial, 17" square overall, walnut wood case w/ pendulum.
BARR Electric Mantle Clock w/ Glass Dome. **SWCC** Dials and other electric dials.
(312) 238-3294-evenings or 445-5381
George Frederickson Sr., 1716 West 100th Place, Chicago IL 60643

SWCC Western Union, 15-1/2" convex "glass". Actually it is plastic, but it beats a naked dial.
$20.00 (I'll pay UPS up to $5.00) (205) 967-1237
Paul M. Hopkins, 2717 Millwood Rd., Birmingham, AL 35243

Requests for reprints of previously published material should be directed to the Chapter Historian:
Dr. George Feinstein 75-19 195th Street Flushing, NY 11366

THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78 NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

RENEWAL MEMBERSHIP or APPLICATION FORM

The ELECTRICAL HOROLOGY SOCIETY, Chapter 78 was formed in 1972 to provide a means whereby members of the NAWCC who have a primary interest in Electrical and Electro-mechanical clocks would have a means to meet and communicate with other members with similar interests. Due to the non-geographic nature of the group, the cohesiveness of the chapter depends upon two factors. One is the JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY, published quarterly with an annual content of approximately 100 pages of material. This includes a FREE MART which lists items for sale, parts needed, and other services of interest to members. Additionally, technical articles, original items and articles, and reprints of important material, and questions and answers are included. The information is intended to provide a mixture of historical as well as technical information, thereby offering something for everyone. Secondly, the encouragement of branch chapters to provide local facilities for meetings provides a forum for the exchange of information as well as an opportunity to socialize with kindred souls. Meetings are also scheduled at various Regional meetings and the NAWCC National Convention, whenever the programs provide an opportunity for Chapter 78 members to get together... these may include programs on subjects of interest along with informal questions and answers.

Any NAWCC member in good standing is eligible for Chapter 78 membership. The fiscal year begins in January, and a member joining at any time after January 1st will receive all of the Journals for that year, with membership expiring at the end of December. There are no provisions for less than full year memberships, and membership in Chapter 78 is separate from branch chapter dues and memberships.

ATTENTION MEMBERSHIP: DUES... ARE DUE

DETACH ALONG THIS LINE

RENEWAL MEMBERSHIP or APPLICATION FORM

Please print all information:

NAME ______________________________ NAWCC# ________________

ADDRESS ____

I wish to become a member of the Electrical Horology Society--#78 and enclose my $10.00 dues for the year 1996

__________ check here

I wish to renew my current membership in the Electrical Horology Society--#78 and enclose my $10.00 dues for the year 1996

__________ check here

SIGNED: ______________________________ DATE: ________________

HARVEY SCHMIDT, SECRETARY-TREASURER 75-80 179th STREET, FLUSHING, NY 11366