THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXX #1, MARCH 2004

Fellow Horologists:

I would like to begin with a brief museum report. I recently had the opportunity to visit "The Bakken Library and Museum" located in Minneapolis, MN about 15 minutes from downtown Minneapolis. This museum is a fascinating experience for electrical clock enthusiasts (although unfortunately, there are no electric clocks displayed in the museum). The museum is dedicated to the study of electricity and has examples of the devices that experimenters of the 1700's and on used to learn about this newly recognized force. The devices are works of art in themselves and several can be used to duplicate early experiments with static electricity and magnetism. There is also a good section on early batteries and voltaic piles.

On Saturdays, the museum has a very complete electrical laboratory that is primarily intended for younger students where visitors can get all "charged" about science. Fortunately, there is no upper age limit in the laboratory and adults are welcome. As an example of what is available, you can duplicate and experience the monks' experiment where a string of 250 monks were used to demonstrate the speed that electricity traveled in a conductor (the monks). One of the results of this experiment was the conclusion that electricity could be used to distribute a time signal. Of course, Alexander Bain was one of the first to apply this conclusion in developing a time service. The Self-Winding Clock Company was a more recent user to the conclusions drawn from this experiment.

Finally, the museum is located in a very interesting old house that is open for visitors to explore. Be sure and visit the Bakken Museum the next time you are in the Minneapolis area. You can obtain more information about the Bakken Museum on www.thebakken.org.

The Editor of this Journal asked me to ask you to submit materials suitable for the Journal. Please check over your information. We are always looking for new information concerning electric clocks.

This issue of the Journal completes the reprinting of Catalog #32 of the Standard Electric Company. Articles on the Silent Electric Clock Company, Limited and on the Sangamo Electric Clock Company are continued. We are also publishing a reply from our member Michel Viredaz, to our request for information on the Landis & Gyr clock.

Enjoy this issue of the Journal.

Bill Ellison.....President
Harvey Schmidt, FNAWCC,.....Secretary-Treasurer) Co-Editors
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Continued from December, 2003 issue.

GENERAL DESCRIPTION OF ELECTRIC CLOCK SYSTEMS.

(With special diagrams illustrating older types of Electric Clocks.)

THERE is no establishment, whether it be a factory, an office, hotel, public building, or private house, where PERFECT UNIFORMITY OF TIME ON EVERY CLOCK in the place would not be an immense boon. This uniformity of time can never be attained by the use of separate independent mechanical clocks. The only method of providing uniformity of time is an electric clock system in which one "Master" clock controls all the clock faces of the establishment, which are merely indicators of the time kept by the "Master" clock. An Electric Clock System consists, therefore, of one "Master" clock and as many subordinate "Receiving" clocks as are required in the establishment.

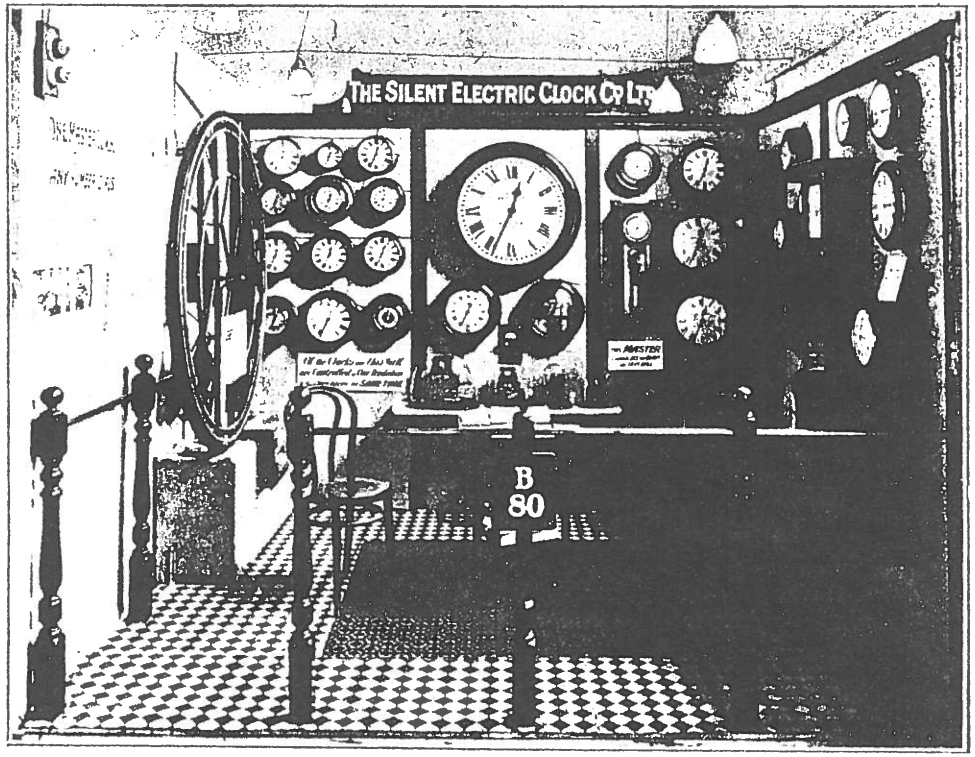


Fig. 1. Our Stand at the British Industries Fair of 1915, held at the Agricultural Hall.

The advantages of this system of ABSOLUTELY UNIFORM TIME INDICATING are particularly apparent for large Works, Railways, Hotels, Schools, &c., &c.

In an electrical clock system each dial has an electric

General Description of Electric Clock Systems (*continued*).

action, which moves forward the hands at intervals sufficiently frequent—generally half-minutes. These electric dials are connected momentarily by a "Master" clock to a battery, and thus THE ONE "MASTER" CLOCK SHOWS ITS TIME ON AN UNLIMITED

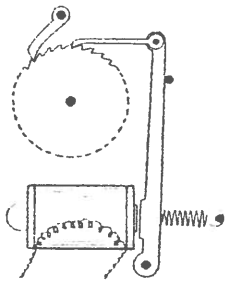


Fig. 2.

NUMBER OF SECONDARY DIALS, and winding and individual regulation are abolished.

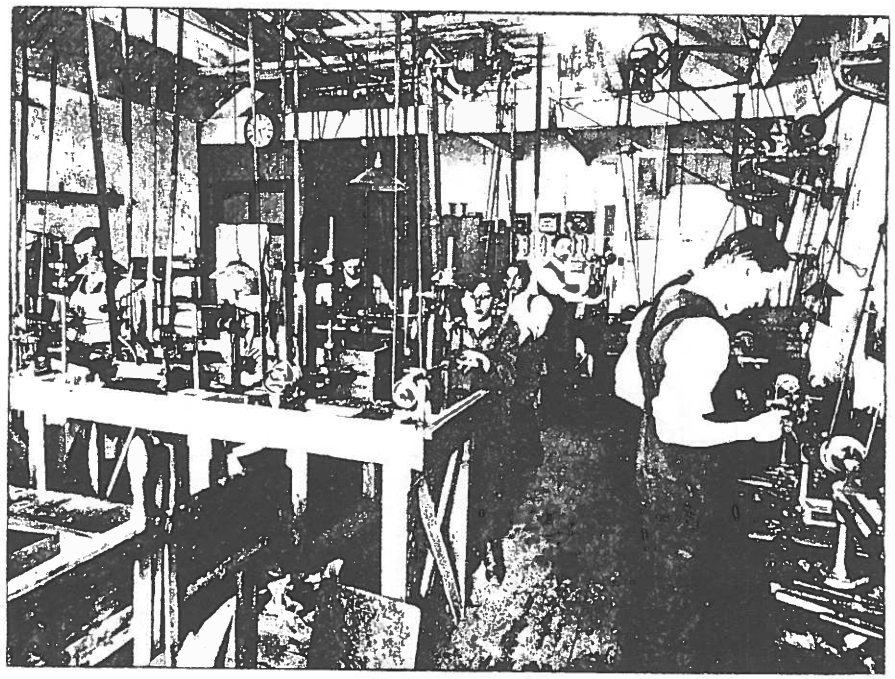


Fig. 4. View of a Machine-shop at our Works.

About fifty years ago the first such system was attempted. In those days progress was handicapped by lack of a suitable battery, but, quite apart from this, the earlier forms of electro-magnetic mechanisms were too crude — in fact, were fundamentally unworthy to supersede the steady-going clock.

The following brief summary describes various older designs of 'receiving'

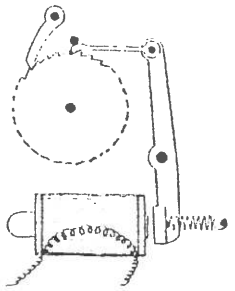


Fig. 3.

mechanisms, now superseded by the "Silectock" system.

Fig. 2 might almost be taken for an allegorical electric clock, but it is, nevertheless, a faithful representation of a style of dial movement that was seriously attempted

by quite a large number of designers, and was patented very many times over. The ratchet wheel is intended to be progressed one tooth at a time when ever the electro-magnet is energised. Some forms had a spring added over the retaining click, while others had a fixed

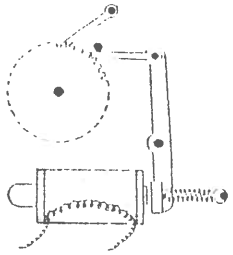


Fig. 5.

stop, under which the nose of the driving click came to rest at the end of its feeding travel.

Now, one admirable feature of the ordinary "old-fashioned clock" is that its parts are free from *violent blows.* The fall of the 'scape wheel teeth upon the pallets is the worst offence, but the gentleness of these blows is very marked when compared with those delivered by the parts of a ratchet-actuated electric dial movement. Such parts should not exist. They have to hammer against themselves over a million times a year!

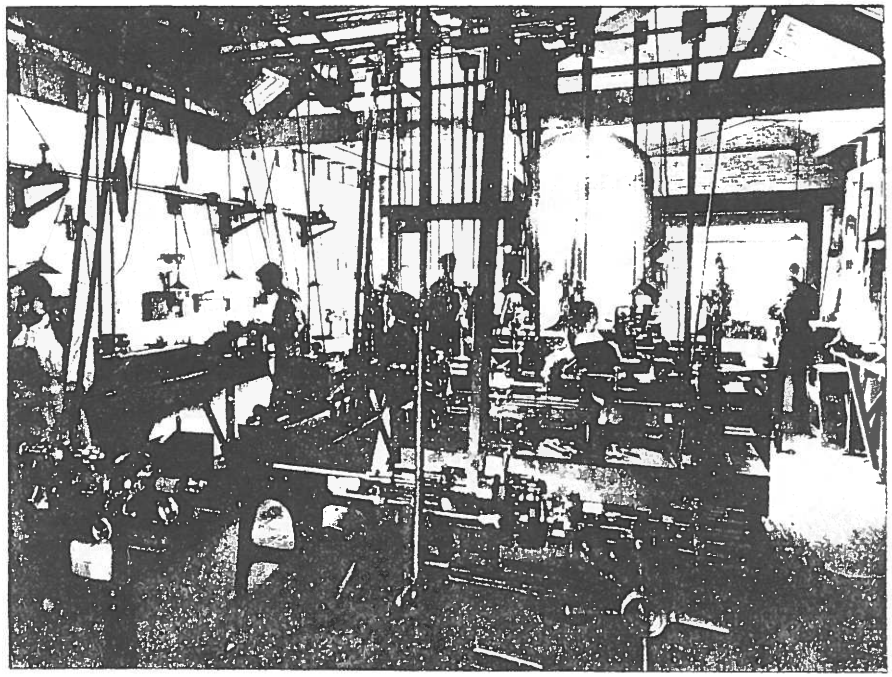


Fig. 7. Another View of a Machine-shop at our Works.

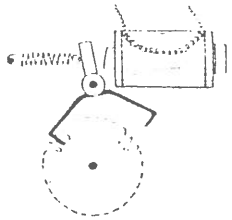


Fig. 6.

Fig. 3 shows a form of later date. In this the severity of the blow is lessened because the magnet withdraws the driving click, and upon release the spring drives the hands. In this form it will be noticed that normally the wheel is locked.

General Description of Electric Clock Systems *(continued)*.

Fig. 5 is similar, but has the click driving at about 45 deg. to the circumference of the wheel, thus allowing of a slightly easier action in unlocking.

Fig. 6 illustrates another class in which the wheel is fed forward by pallets acting on the inclined surfaces of

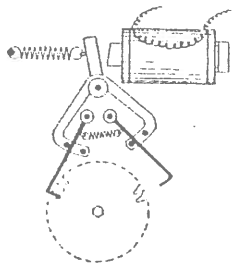


Fig. 8.

the teeth. This has the advantage that "over-shooting" is not possible; but unless means are also added to prevent recoil, it is possible for progression sometimes to be omitted because the one pallet leaves the wheel before the other can enter. Fig. 8 shows a modification in which this is avoided, at, however, the expense of simplicity.

Another style is shown by Fig. 9. Here the magnet's pull performs the work of moving the hands, the motion for turning the wheel being derived from

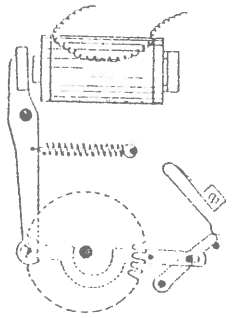


Fig. 9.

the radius rod; and the pallets do not both leave the wheel at once.

The foregoing six are very fairly representative of the great number of electric dial movements, which may well be termed "pick-up-one-tooth-at-a-time" mechanisms.

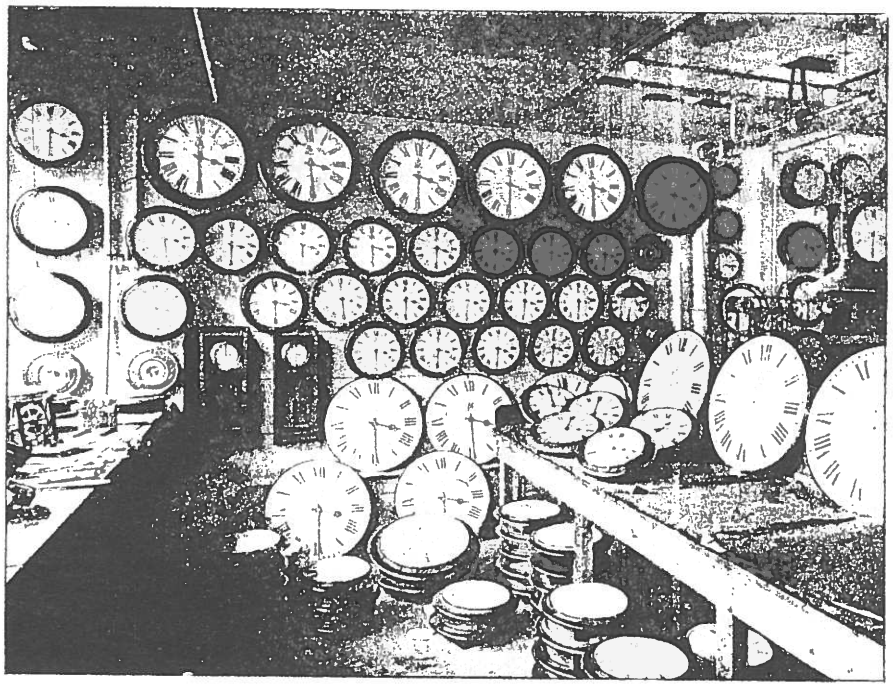


Fig. 10. A View of G.P.O. Clocks in our Testing Room.

General Description of Electric Clock Systems (*continued*).

Fig. 11 shows another action upon quite different lines. The magnet imparts a sharp blow to an unevenly balanced flywheel, which consequently proceeds forward about three-quarters of a turn, and when the armature is released the other quarter-turn is produced by reason of the out-of-balance nature of the flywheel. Pins placed in the side of the wheel act in combination with the formation of the end of the armature lever as an escapement to prevent more than one turn of the wheel on each occasion, the weakest point of the movement being that the wheel has most of its journey to accomplish on momentum only.

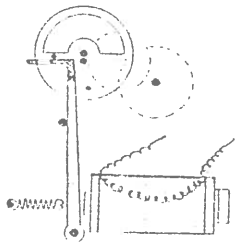


Fig. 11.

All these dial movements are necessarily very noisy, and whilst quite admitting that there are many places where clocks must be, and where noise *per se* is not an evil, yet the fact remains that the noise merely signifies that the vital parts of the mechanisms are suffering by being sharply knocked against each other. Silent action, therefore, *is* a desideratum, and has been sought by some designers by the mere addition of pads of soft and perishable material to the working parts.

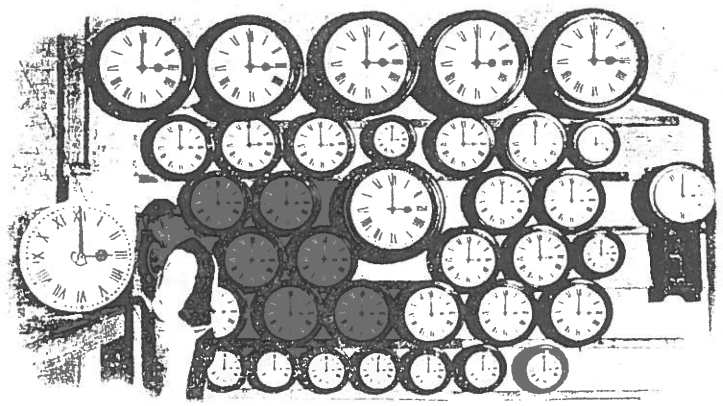


Fig. 12.
Clocks for H.M. Home Office being tested in our Works.

The invention of the "SILECTOCK" *silent* "Receiving" mechanism (Patents by G. B. Bowell of 1905, 1909 and 1911) marks, therefore, a *very real advance* in the history of Electric Clocks. Full descriptions and illustrations of the "SILECTOCK" mechanisms now follow.

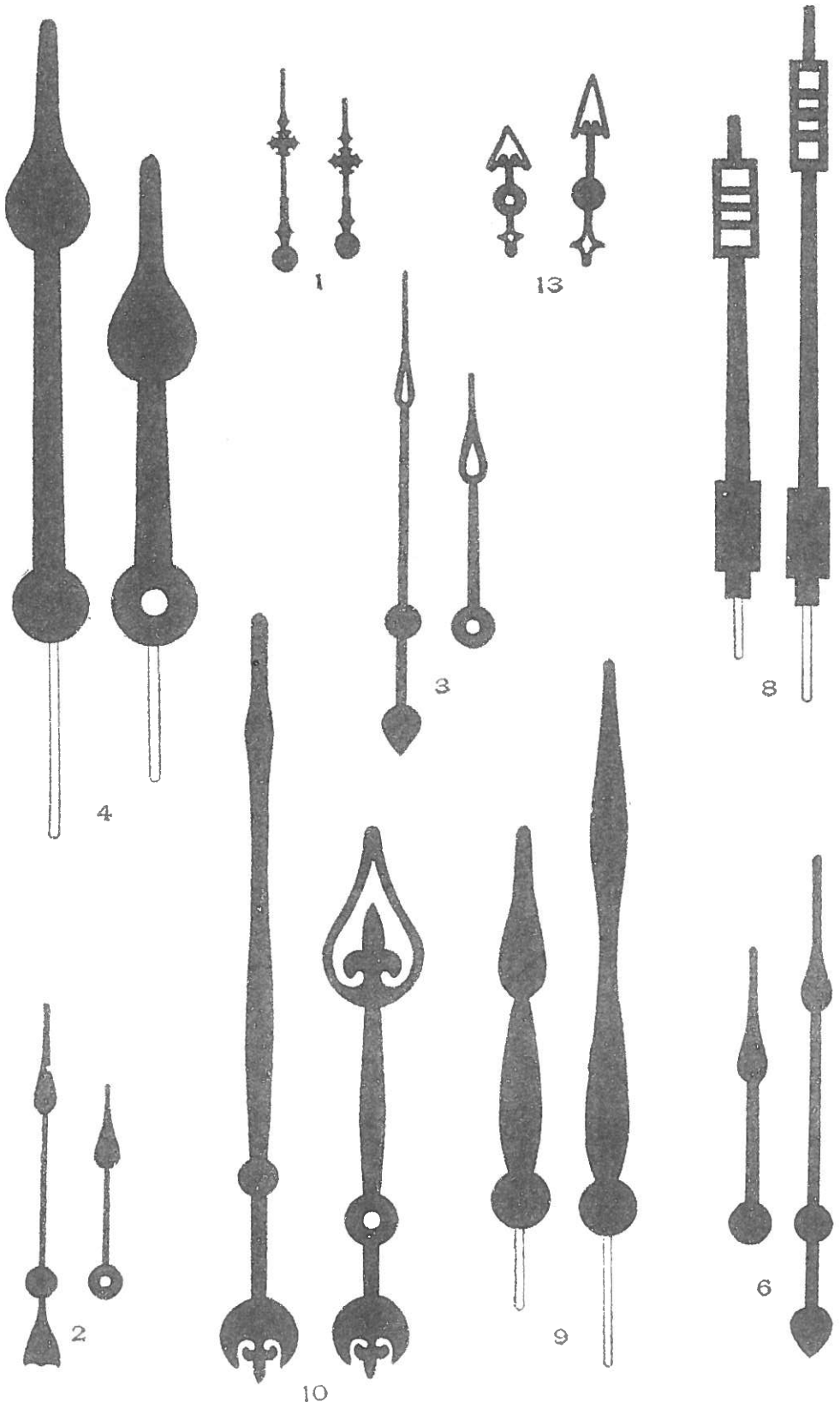
To be continued.

STYLES OF HANDS

Continued from December, 2003 issue.

Order by Number

Dimensions, page 70



STYLES OF HANDS

Order by Number

Dimensions, page 70

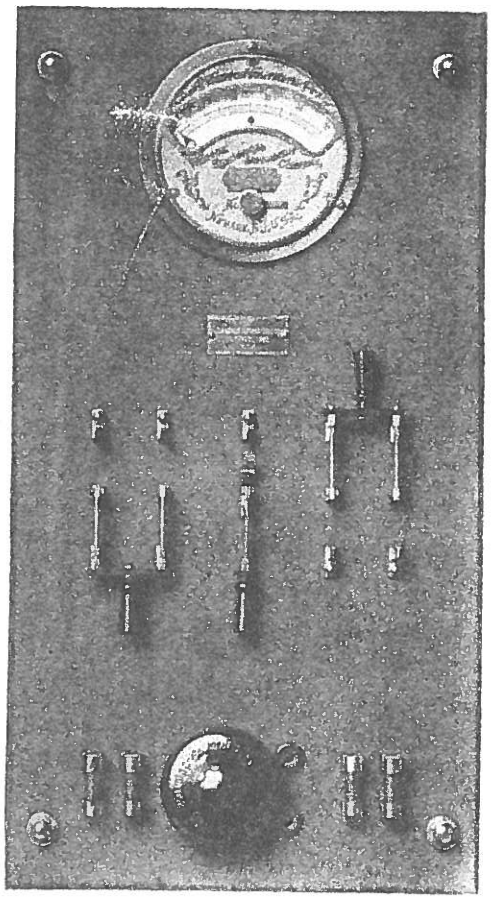


Fig. 616
For duplicate sets of storage batteries.

Standard Charging Panel

WITH FLUSH TYPE VOLTMETER

List Numbers

With Angle Iron Support	*With Wall Bracket*	*Material*
231	239	Oiled Slate
232	240	Marbleized Slate
233	241	Black Enameled Slate
234	242	White Italian Marble

WITH BACK CONNECTED VOLTMETER

235	243	Oiled Slate
236	244	Marbleized Slate
237	245	Black Enameled Slate
238	246	White Italian Marble

Voltmeter is furnished in black Japan finish with polished nickel trim. Special finishes to order.

Each panel has the following equipment:

2 D. P., D. T., polished copper finished Switches.
Fuses — National Electric Code Standard.
1 Voltmeter Weston Model 24 or other types.
1 Voltmeter Plug and Receptacle.
1 Circuit Breaker, underload type.

Board is 1″ x 16″ x 30″. Space occupied when equipped with wall brackets 16″ wide, 44″ high x 12½″ from wall.

Voltage of charging source and type of storage cell should be specified on order, so as to determine proper resistance for mounting on back of panel for reducing voltage for charging battery.

Standard Control and Charging Panel

For 3-time circuits, Series operation of clocks, duplicate sets Storage Battery

Not Illustrated

MATERIAL

Oiled Slate, Marbleized Slate, Black Enameled Slate, White Italian Marble.

Angle Iron Frame and Wall Braces.

TIME EQUIPMENT

3 Indicators, back connected, polished nickel finish.

1 Gauge, back connected, polished nickel finish.

3 D. P., S. T. Switches, polished copper finish.

3 Keys for connecting Gauge in any one of the circuits.

1 Relay.

1 Push Button for setting clocks.

CHARGING EQUIPMENT

2 D. P., D. T. Switches, polished copper finish.

Fuses — National Electric Code Standard.

1 Voltmeter Weston Model 24, or other type, back connected. Black Japan, nickel trim.

1 Voltmeter Plug and Receptacle.

1 Circuit Breaker, underload type.

List Numbers

Covering Above Equipment and Different Materials

227 Oiled Slate	**229** Black Enameled Slate
228 Marbleized Slate	**230** White Italian Marble

Size, 1¼″ x 24″ x 62″

Voltage of charging source and type of storage cell should be specified on order, so as to determine proper resistance for mounting on back of panel for reducing voltage to proper value for charging battery.

Special finishes of Indicators, gauge and voltmeter to order.

When Designing

SPECIAL CLOCKS

Engineers, architects, and others interested are earnestly requested to adhere when possible to standard parts as far as possible; that is, a special form of hand may be desired some time but the case and dial could be regular, thus effecting much saving in time and cost.

To facilitate this intelligent layout of other than strictly regular clocks, attention is called to the following table:

STANDARD DIMENSIONS AND HANDS

Use as Many Standard Parts as Possible in Special Clocks

Style of Stock Hands	*Dial, Nominal Diameter*	*Outside Diameter of Dial*	*Diameter of Minute Circle*	*Outside Diameter of Mat*
No. 1	8″	$7\frac{7}{8}$″	$7\frac{7}{16}$″	$8\frac{7}{8}$″
No. 2	10″	$9\frac{5}{8}$″	$8\frac{7}{8}$″	$10\frac{3}{4}$″
No. 2	12″	$11\frac{5}{8}$″	11″	$12\frac{1}{2}$″
No. 3	14″	$14\frac{1}{2}$″	$13\frac{1}{8}$″	
No. 4	18″	18″	$16\frac{3}{4}$″	
No. 4	24″	24″	$22\frac{1}{2}$″	

The above styles of hands are shown on pages 66 and 67, also several different forms of regular and special hands. In designing special hands "tails" should be supplied on all to allow for balancing; that is, every hand should be balanced about its center of support, except style No. 1, used on 8″ clocks, which has no "tail" for balancing, since the movement is balanced to compensate for weight of hands.

Special Hands	*Diameter of Minute Circle*
5	20″ and $23\frac{1}{2}$″
6	$10\frac{1}{4}$″ and $14\frac{1}{4}$″
7	$18\frac{3}{8}$″
8	11″, 14″ and $20\frac{1}{4}$″
9	$21\frac{1}{4}$″ and 31″
10	22″
11	11″, $13\frac{1}{2}$″, 16″ and $20\frac{7}{8}$″
12	$16\frac{1}{2}$″, $18\frac{1}{2}$″ and $28\frac{1}{4}$
13	$4\frac{3}{4}$″
14	$17\frac{1}{2}$

The nominal diameter of a dial is usually the outside diameter of the blank if it is a metal dial, or of a marble slab if it is a marble dial.

The diameter of the minute circle is necessarily smaller than the dial diameter, in order to leave a margin outside the dots and numerals. The diameter of the minute circle is always the diameter of the circle described by the end of the minute hand; hence, a 24″ dial might have a 22″ or 21″, etc., minute circle, according to the margin left outside the numerals and dots.

The Installation of Apparatus

Is usually performed by our men, or special agents, and so specified in the order. If this is not desirable on account of great distance or other circumstances, the work can be done by any local electrical contractor, when furnished with directions from us. Many very extensive systems have been so installed with complete success.

The simplicity of STANDARD clocks, and the fact that they operate by electricity, instead of hydraulic or pneumatic pressure, facilitates their erection, even in old buildings which are not wired. It is highly desirable, also economical, to wire buildings for "Time" during construction, whether or not a system is to be immediately installed. Complete data to guide in wiring such buildings will be furnished on request.

When STANDARD Systems are to be installed by purchasers or local electricians explicit instructions for wiring buildings, unpacking equipment, installing and connecting clocks, and regulating them, are sent. Therefore the installation of STANDARD Clocks involves no obstacles or great expense, even if the manufacturers do not perform the work.

Prices

Since no two systems are exactly alike in every detail, and since prices also depend upon the character of finish, the question of net cost for any particular installation is figured upon request.

This request need only be in the briefest form, stating the result that is desired, or the size, type, and quantity of Secondary Clocks, Master Clocks, Program Gongs, Time Stamps, Tower Clocks, etc. Our estimators, with the benefit of long experience, will then be able to submit specifications, suggestions, and at least approximate prices for your guidance.

No hesitancy should be felt in writing for information, even if an installation of STANDARD Time is not immediately planned, for we are always ready to answer questions which may arise.

It may be said that in general our prices are figured so as to cover good work with a reasonable profit to us. When a number of accurate timekeepers are desired, or when there are other timing devices to be controlled, the STANDARD Electric Time System is the logical, scientific, and economical one.

SIMPLE

RELIABLE

AUTOMATIC

EXACT

Continued from December, 2003 issue.

PART TWO

SANGAMO IN PEACE AND WAR

BY

BENJAMIN P. THOMAS

II

SANGAMO

IN PEACE AND WAR

FOR Robert C. Lanphier, the writing of *Forty Years of Sangamo*, which is reprinted as the first part of this book, was a labor of love, undertaken as a personal memorandum of his experience with Sangamo and as a means of recognizing what others had done in helping to build the company. Four hundred copies were printed and distributed, and almost every copy bore his personal inscription on its fly-leaf. For several years, moreover, Mr. Lanphier had been ill, and perhaps he wished to be certain that the history of Sangamo, as he had known it, would be available to those who would come after him.

Plant additions in Springfield 1936 and 1937

DESPITE recurring ill-health, Mr. Lanphier remained active in company affairs almost until his death. During his last years Sangamo continued to expand its plant facilities. A second warehouse and a substantial addition to the tool and die shop were erected in Springfield and many modern machines were installed. In line with his belief that the growth and prosperity of the company must de-

pend largely upon research and experimental development, the space allocated to the engineering department was doubled by the addition of a second story to the building in which it is housed.

Acquisition of Weston Electric Company Limited.

IN October, 1936, Sangamo acquired from the Weston Electrical Instrument Corporation of New Jersey a controlling interest in its English subsidiary, Weston Electrical Instrument Company Limited. A manufacturer of ammeters, voltmeters and other indicating instruments, Weston had developed a line of products ideally suited to supplement the meter production of British-Sangamo, and to make possible a considerable diversification of Sangamo's English output. With consummation of the purchase, manufacture of Weston products in England was transferred to Sangamo's Enfield plant, where new buildings were at once put under construction. Within a year Mr. Lanphier was enabled to announce with pride: "It can be truthfully said that British-Sangamo stands first in its field, in plant, in equipment, and in quality and diversity of product."

British-Sangamo changed to Sangamo Weston Limited —1938.

WESTON had earned such an enviable reputation in the electrical instrument business that it was thought desirable to retain the Weston name. Consequently, the corporate title of British-Sangamo was changed to Sangamo Weston Limited. The following year Sangamo acquired full ownership and at the same time negotiated a reciprocal engineering

agreement with the Weston Electrical Instrument Corporation of America.

Sangamo Limited prospers.

SANGAMO'S Canadian business continued to expand, and in 1937, sales of Sangamo Company Limited passed the one million mark. Such rapid development brought need of additional working capital, so the Canadian affiliate sold the parent company 10,000 shares of its common stock at a price of ten dollars a share.

Sangamo splits its stock— April, 1937.

SOON after this, Sangamo Electric Company split its own stock two shares for one, so that it now had 300,000 shares of no-par-value common stock authorized with 278,000 shares outstanding. As a further indication of the company's growth, employment reached a new high of 1,475.

Purchase of the Watch Company buildings— June, 1937.

ORGANIZED in 1869, the Illinois Watch Company had progressed from beginnings not much more auspicious than those of Sangamo to a position as a leader in fine watch manufacture whose timepieces were esteemed throughout the world. Sangamo, from the time of its inception, had enjoyed the most cordial relations with the Watch Company. It was Jacob Bunn, president of the Watch Company, who sponsored and encouraged Mr. Lanphier's original experiments with the Gutmann meter, and who, upon the organization of Sangamo, became its president, while at the same time continuing as head of the older company. The

Watch Factory had attracted skilled craftsmen to Springfield, and it was from the Watch Company personnel that Sangamo, with the generous cooperation of the Watch Company officials, was able to recruit the key men of its original working force. For the first three years of its corporate existence, Sangamo operated in the Watch Factory, where it was known as "the meter department." The Watch Company built Sangamo's first building for it; and throughout the junior company's developmental years it could always turn to the officials of the older company for guidance and help.

In March, 1928, the Illinois Watch Company was purchased by the Hamilton Watch Company, which operated it as a division in Springfield. During the depression of the 'thirties, Hamilton discontinued its Springfield operations, and in 1937 offered to sell its Springfield property to Sangamo. The proposition was attractive from a long-range point of view and a deal was consummated; and since Sangamo had no immediate need of the buildings it rented space in them to small manufacturing concerns as a means of encouraging industrial development in Springfield.

The tachograph —1937.

DURING this year, Mr. Lanphier learned of a new device which had been developed in Germany. Known as a tachograph, it was an instrument designed to reveal the complete performance record of a truck—the distance traveled, its speed at all times, the number and duration of its stops—

by means of a graph drawn upon a circular chart. In an effort to diversify the company's products, Mr. Lanphier obtained the manufacturing rights, imported six or seven of the instruments for experimental purposes, and installed them in trucks. Results were promising, some refinements were worked out, and Sangamo decided to tool up for the production of about 500 tachographs. Further improvements have since been made and the instrument is now one of the company's standard products.

Employee Relations—1936-1938. The Pension Plan.

EVER mindful of the welfare of its workers, in 1936 Sangamo instituted a plan of paying Christmas bonuses when business conditions permitted, a practice which it is pleased to have been able to continue ever since. Early to acknowledge the validity of the principle of collective bargaining, in June, 1937, it recognized the Selco Employees Association as the bargaining agency of its workers with respect to wages and working conditions. In the summer of 1938, the company discontinued the Service Warrant Plan, introduced in 1935, in favor of a contributory Pension Plan set up through an arrangement with the Travelers Insurance Company. Based upon sound principles of annuity insurance, it provided for 50–50 contributions by the company and employees and for automatic retirement at age 65.

Death of Robert C. Lanphier.

THIS, then, was Sangamo's position at Mr. Lanphier's death, which came on January 29, 1939. His passing marked the end of an era for Sangamo, for he was the last of that illustrious trio of Bunn, Lanphier and White, who had so ably guided the company during its difficult years. The brain and heart of the company since he succeeded Jacob Bunn as president upon the latter's death in 1926, Mr. Lanphier had followed in the traditions of Mr. Bunn's organizational and managerial genius to demonstrate in abundant measure the qualities essential to successful business management. Patient and considerate toward his fellow officers and employees, he had inspired devotion and respect. A pioneer in the field of meter development, his brilliance as an inventor and technician was recognized throughout the engineering world. The city of Springfield mourned his loss no less than Sangamo, for he was active in many movements for civic betterment.

Directors and Officers—1939.

THE directors elected after Mr. Lanphier's death were Mrs. Jacob Bunn, Willard Bunn, Donald S. Funk, J. Henry Hodde, Frederick C. Holtz, Mrs. Robert C. Lanphier, Herbert I. Markham, Robert E. Miller and Walter Robbins. Donald S. Funk, who had served as vice-president and general manager, was elected to succeed Mr. Lanphier as president. Re-elected to the offices they had previously held were Mr. Holtz, Charles G. Lanphier and Russell C. Bennett, vice-presidents; George W. Good, treasurer, and Mr. Hodde, secretary. Robert C. Lanphier, Jr., who had served for eight years as works manager and a director of Sangamo Weston, returned to America to be a vice-president. Later, in June, 1941, Charles R. Horrell was elected a vice-president in charge of sales. The following year, Mr. Good, treasurer for many years, retired because of ill health and was succeeded by Charles H. Lanphier.

Absorption of the Lincoln Meter Company—1940.

THE Lincoln Meter Company, since its organization in 1928, had been operated as a separate corporation, although its product was manufactured at the Sangamo plant with Sangamo equipment. Inasmuch as the Lincoln stock was largely owned by Sangamo, it was thought desirable, from the standpoint of efficiency and economy, to merge the two concerns. Negotiations with the minority stockholders of the Lincoln company were begun at once and within a year the company was taken over by Sangamo and liquidated.

The new type meter—1940.

FOR thirty years, Sangamo's type H meter had proved its all-round excellence, not only by performance, but also by demonstrating its adaptability to all the demands imposed by technological advancement in a highly competitive field. Modified first to compensate for overload, then for variation in temperature, and finally to conform to standardization of electrical connections, it was truly a quality product. Due to the many changes it had under-

gone, however, Mr. Lanphier and Mr. Holtz had recognized for some time the need for a new meter and had begun experimental developments as early as 1935. Consequently, a new alternating current, singlephase, watthour meter was now ready for production. Incorporating all the refinements of the old type H meter, whose manufacture was now discontinued, the new meter, designated as type J, was put into production in April of 1940.

The change-over to the new meter necessitated many new departures in manufacturing methods with resultant training of operators in new processes and a short period of manufacturing difficulties such as are inevitably involved in major product changes. There were no serious complications, however, and the new meter soon established a service record that met every expectation.

Sangamo Weston feels the effects of war.

WHILE the foregoing developments were taking place in Sangamo, sullen thunderheads of war were thickening over Europe as Adolph Hitler reoccupied the Ruhr and brought Austria and Czechoslovakia under German subjection. In the summer of 1939, Hitler massed 77 German military divisions and 4,000 war planes for a blitzkrieg against Poland; and Great Britain, resolved at last that further German aggression could not be tolerated, was rearming frantically. As early as 1937, British-Sangamo had received government orders requiring increased production of Weston indicating instruments for aircraft and other military apparatus, and in January, 1938, the British company received a contract from the British government to make an improved indicator designed to guide a pilot in making a blind landing in fog.

This led to the development of other special-purpose instruments, and when Hitler struck at Poland, and England declared war on September 3, 1939, Sangamo Weston already had a considerable volume of military business and was prepared to take on more. At the September meeting of the board of directors of the parent company President Funk read a telegram from Sumner B. Rogers, managing director in England, saying that "they had so many things to do that they did not know which proposition to tackle first." The acquisition of Weston Electrical Instrument Limited proved to have been fortunate, as the company now discontinued the production of watthour meters and devoted itself entirely to the manufacture of electrical instruments and accessory equipment, particularly for the Royal Air Force.

The situation of the British plant in the heavily industrialized Enfield district, in North London, put it under hazard of enemy bombing raids and rendered precautionary measures obligatory. Air raid shelters were provided for all employees and the plant was heavily camouflaged.

Sangamo Company Limited embarks on war work—1939-1940.

CANADIAN manufacturers also went on a war footing, and Sangamo Company Limited, at Toronto, began production for military require-

ments. It continued to manufacture a limited quantity of meters, especially for export, but more important was the production of Wagner motors for military and machine tool purposes, pneumatic fittings and gauges for aircraft controls, and radiosondes, a device for recording temperature, humidity and barometric pressure, which was installed in balloons sent aloft for weather predictions.

Further expansion at Springfield—1939.

MEANWHILE, the only impact of war upon the parent company in the United States was a substantially increased meter business as public utility companies laid in reserve stocks of meters and other essential devices and materials in anticipation of possible later shortages. The directors were concerned with the problems the European war was posing, but none of the difficulties had become critical as yet. A new, single-story building, 200 by 145 feet, with a saw-tooth roof, was constructed at the Springfield plant to permit the more economical processing of raw materials which were formerly passed back and forth between fabricating departments on different levels. The new building also released space to provide more suitable accommodations for the administrative offices.

War threatens the United States—Spring of 1940.

IN the spring of 1940, the dangers inherent in the European situation were brought home to Americans as Hitler ended the quiescent period, known as the "phony" war, by overrunning Norway and Denmark, and pushing with lightning speed

through Holland and Belgium to turn the Maginot Line. By the end of June, France was prostrate, and the British Expeditionary Force had barely escaped annihilation at Dunkirk. With Hitler firmly established on Europe's Atlantic coast and apparently preparing for the final stroke at England, the United States was taking belated and urgent measures for national defense. Manufacturers were alerted and urged to find a place for themselves in the defense program.

Sangamo seeks a place in the defense program—1940.

UNTIL this time, Sangamo, like most other manufacturers of peacetime products, while willing to cooperate with the government, had not been eager for war business. Now, however, the management realized the necessity of helping in the fullest measure possible. Officials of the company made contacts with such agencies as the Chicago Signal Corps Procurement Depot, the Chicago office of Army Ordnance, Wright Field, the Frankford Arsenal at Philadelphia, the Springfield Arsenal and the Washington Navy Yard. Manufacturers in the East and Middle West who already had contracts for war materials were corresponded with or visited with a view to possible subcontracting arrangements which might be adaptable to Sangamo's equipment and personnel. Several possibilities were considered, but for one reason or another none of them materialized. By the year-end, Sangamo had yet to find a place for itself in the ever extending pattern of defense production. Even without mili-

tary business, however, sales of the company's products reached a record figure of $5,000,000.

A new plant projected in Canada—1940.

FOR several years the directors of the parent company and those of the Canadian subsidiary had recognized the inadequacies of the plant facilities in Canada and from time to time had considered the feasibility of purchasing a new site and erecting a modern plant. Heretofore, the financial position of the Canadian company and the difficulty of disposing of the existing plants had rendered such a move impossible. Now, under the pressure of war, however, manufacturing space in Canada was at a premium and manufacturing plants were readily salable. Accordingly, the Canadian directors authorized the purchase of a new site at Leaside, a suburb of northeast Toronto, and the erection of new buildings, to be followed by the sale of the old properties.

Sangamo Weston is bombed—December, 1940.

AT this time the British plant suffered its first damage from bombs. Bomber attacks were destined to continue almost to the end of the war, but fortunately no serious damage was sustained. There was never a direct hit on the factory, although one bomb struck within eight feet of the building, blowing out the windows, and several others exploded close by. The only casualty occurred one day when a German bomber made a power dive on the plant with two British Spitfires, their machine guns at full chatter, riding hard on his tail. A machine gun bullet clipped the leg of an air raid warden employed by Sangamo, thus giving him the distinction of being the first homeguard casualty in all England.

Sangamo's first war contracts—1941.

ON March 3, 1941, Sangamo received its first military business when it signed a contract to convert a number of fire control solenoids for the Navy. This was an extremely simple undertaking, involving merely the winding of new coils and replacement of the old ones in the solenoids. Later in the same month, Sangamo received a small order from the Frankford Arsenal at Philadelphia for the manufacture of $16,000 worth of parts for mechanical time fuzes, a contract that was to give the company no end of trouble. Not only were the manufacturing procedures entirely novel to the company, but it now had its first experience with the rigorous specifications of the military services and with their traditional and often inflexible ways of doing things. Thus Sangamo embarked on war work—a modest beginning, to be sure. But these diminutive initiatory contracts were to be followed soon by larger orders requiring more involved techniques.

The BC-608 contactor—1941

AS the government accelerated the defense program, engineers from the Wright Field Signal Corps Depot, knowing of Sangamo's long experience in the manufacture of fine clocks and time switches, called at the Springfield plant to inquire whether Sangamo could manufacture a precision clock mechanism for regulating the sending of signals from a plane. These signals were to be picked up by ground

stations whose triangulated arrangement enabled the station operators to determine the plane's position. The mechanism was originally developed by the Royal Air Force, but the U. S. Signal Corps envisioned certain improvements and asked Sangamo to make six models on trial. These were entirely satisfactory, and resulted in the Signal Corps' soon placing a substantial order with Sangamo and authorizing purchase of the necessary tools. New and larger orders for contactors were received from time to time and the company continued to manufacture these instruments until April, 1943.

Indicating instruments for the Royal Air Force.

BY now, the British company was engulfed in war work, and at the request of the British Air Ministry, Mr. Rogers flew to the United States to discuss with officials of Sangamo and Weston Electrical Instrument Corporation the possibility of those companies manufacturing five selected basic indicating instruments for the Royal Air Force. The purpose of Rogers' trip was to insure an uninterrupted supply of these essential devices in case Sangamo Weston should be bombed out of production in England, for the Luftwaffe was blasting London unmercifully. To assure continued production, such tooling must be done as would make possible the exact duplication of the English-made instruments, including English type threads and other special requirements. A limited quantity of these instruments was produced, but the balance of the order was cancelled when the danger had passed.

Sangamo Limited and the Range Recorder.

ONE of the major accomplishments of the Canadian company during the war was the manufacture of range recorders for the British Admiralty. This instrument was a dual purpose device, whose primary function was to record graphically electrical impulses received from echo ranging underwater sound equipment (ASDIC to the British and SONAR to the U.S.). The recording was performed in such a manner that a time range plot of echoes was provided, the second function of the device being to time, from this record, the release of the depth-bomb barrage in an antisubmarine attack. The Admiralty had approached Sangamo Limited early in 1940 on the subject of making this instrument and shortly thereafter the enormous task of converting the drawings from British standards was launched. It was by far the most complex manufacturing task ever attempted by Sangamo Limited and the redesign and tooling was completed with remarkable dispatch. Instruments were in production by the spring of 1941.

Entry into the field of Underwater Sound Apparatus—July, 1941.

IN midsummer of that year, the United States Navy began negotiations with Sangamo Limited for the purchase of a number of range recorders. Since the Canadian company was already working at the absolute limit of its capacity, it was suggested by George Lawrence, president of Sangamo Limited, that the parent company approach the Navy with the idea of manufacturing the U. S. requirements in Springfield. After three days of discourag-

To be continued.

New publication: 60-page booklet with facsimiles of instructions and drawings re: **FAVAG** clocks with Hipp-toggle, period 1930-1960 (all in French). $25 including postage. Rare French book on CD-Rom, easily printable (in .tif format: "Horlogerie electrique-1ere partie-Horloges-meres et installation horaires" by **Ch. Poncet**, Cluses, 1905, 227 pages. 25 USD or 25 EUR. Order email, viredazepal @bluewin.ch, or address Michel Viredaz, Chemin du Raidillon 48, CH-1066 Epalinges, Switzerland.
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Landis & Gyr.

A predecessor of Landis & Gyr was formed in 1896 in Zug, Switzerland, for the production of electric meters, telephone magnetos and phonographs. The Landis & Gyr name was established in 1905, following which they expand with offices in major cities in Europe, New York, and Melbourne, Australia. The company is still in existence. (Ed. Note.)

I don't know many details, but I have a somewhat similar clock under the brand name Inducta, dated 1929. My clock is for AC, with adjustment for 3 different ranges of voltage. Landis & Gyr of Zug took over the Magneta company from Fischer (originally in Zurich, later in Zug) around 1920, I am not sure exactly when. In 1922, they introduced the name Inducta through international registration, and the Magneta name was cancelled, at least in Switzerland, in 1935, but apparently stayed with different companies in Germany, England, and perhaps US and or France (there is still today a company named Magneta in Paris who apparently took over the service from Brillié, I ignore the relation with Fischer's Magneta if any). During the following decades, they made under the brand Inducta 2 ranges of clocks, some with inductor (Magneta type), and some usual self-winding clocks with contacts. The business went for some time to Saia of Murten and then to Wittwer-Baer of Gwatt, still in existence. This sort of non-industrial clocks for home of office usage are inspired from the master clocks, but to my knowledge not mentioned in the literature. What is not clear to me is the fact they were already making such clocks in 1915, and the relation with Hershede.

Kindest regards, Michel Viredaz

--- MART ---

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THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXX #2, JUNE 2004

Fellow Horologists:

This issue of the "Journal of the Electrical Horology Society" continues with the information on the Silent Electric Clock Company and on the Sangamo Clock Company. Also, this issue begins a series on the ECO Magneto Clock Co. A special thank you is in order to Mr. W. G. Kapp who loaned the EHS a great deal of very good information regarding ECO. For more information on ECO see the article "ECO Magneto Clock Co." by W. Kapp and P. Haselton in the October, 2003 issue of the Bulletin. We are able to reprint very rare information such as the ECO material due to the generosity of our members. Please look through your records and your library to see if you might have information that you could loan the Journal for reprinting.

If you are going to the NAWCC National Convention in Oklahoma City, OK your are in for an electrical horology treat as there are three talks that will be presented at the Convention concerning electric clocks:

1) Len Brenner will give a presentation on Tiffany Never-Wind Clocks. This talk is an update of his very thorough talk about Tiffany that Len gave at the NAWCC Symposium held in St. Louis last year. This talk will be given at a joint meeting between Chapters 78 and 168 (International 400-Day Clock Chapter),
2) Rodney King will give a presentation on "Electric and Self-Winding Clocks," and
3) Dale Sowell will give a presentation on "Electro-Mechanical Clocks."

Please support your fellow electrical horologists by attending and participating in these meetings. Think about preparing a talk on some aspect of electrical horology that interests you. Meetings and talks such as the talks given at the National are excellent opportunities to recruit new members for Chapter #78. I will provide brief write-up on these talks for the next issue of the Journal.

Have a good summer and good collecting and enjoy this issue of the Journal.

Bill Ellison.....President
Harvey Schmidt, FNAWCC,.....Secretary-Treasurer) Co-Editors
Dr. George Feinstein, FNAWCC..Chapter Historian)

Continued from March, 2004 issue.

SPECIAL DESCRIPTION OF THE "SILECTOCK" SYSTEM.

WHILE all electric clock systems claim the advantage of uniform time over an equipment of independent mechanical clocks, it is highly important to bear in mind that the success of an electric clock system depends upon the SOUNDNESS of the MECHANISMS and their freedom from possible failure in action.

The "Silectock" System of Electric Clocks is in many essential points very different to any other system offered to the public. The principal difference is in the patented mechanisms (Patents by G. B. Bowell, of 1905, 1909 and 1911) that actuate the hands of each subordinate "Receiving" Clock.

Fig. 13.
View through one of the 10-ft. Dials of the Hovis Clock.

Our "rotary armature" principle is an enormous advance on any previous method, and as an electric clock only moves its hands *at each half minute*, it is most important that this movement should be *quiet in action.*

The "Silectock" "rotary armature" method has solved this problem in an ingenious but exceedingly simple manner, a full description of which is given on page 15.

Apart from the design of clock mechanisms, a very important point is the method of their manufacture. The "Silectock" Electric Clock Mechanisms are manufactured entirely in this country at our own works, and every

Special Description of the "Silectock" System (*continued*).

part has been most carefully standardised to the smallest detail. This has not only brought their price to a very moderate level but has vastly improved their efficiency.

We have at various times exhibited our system at large and important exhibitions. In 1913, a year before the War, we exhibited the system at the Ghent International Exhibition, where we were awarded a gold medal, and Fig. 14 illustrates the handsome four-faced hanging clock which occupied the centre of the British Post Office stand at the Ghent Exhibition, and which was controlled as one of the clocks in our circuit.

Fig. 15 is a typical example of an Overseas order. In this illustration will be seen the Control Clock, a 5-ft. outside tower clock, built of wrought iron and glazed opal, and fitted with one of our heavy worm-driven turret mechanisms. The remaining clocks are of various standard patterns for ordinary indoor use. In this installation, the circuit of "Receiving" clocks was divided into two parallel circuits, in each of which was placed a special sliding resistance and milliamperemeter (seen on the left hand of the illustration) in order to balance equally the resistance of each circuit.

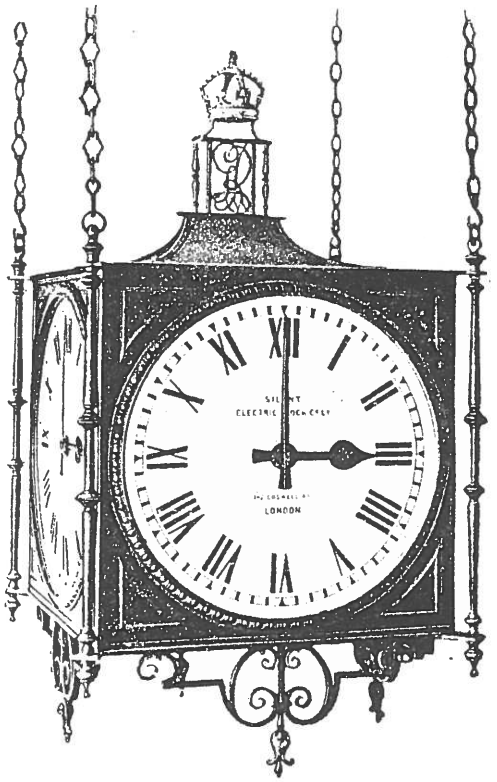

Fig. 14.

For export, our mechanisms stand unrivalled—this because of the soundness of the invention combined with the care taken in their manufacture.

At all times we welcome visits to our Workshops, and are proud to show every detail of manufacture to those who appreciate sound engineering construction. An hour spent in personal observation is better than unlimited description.

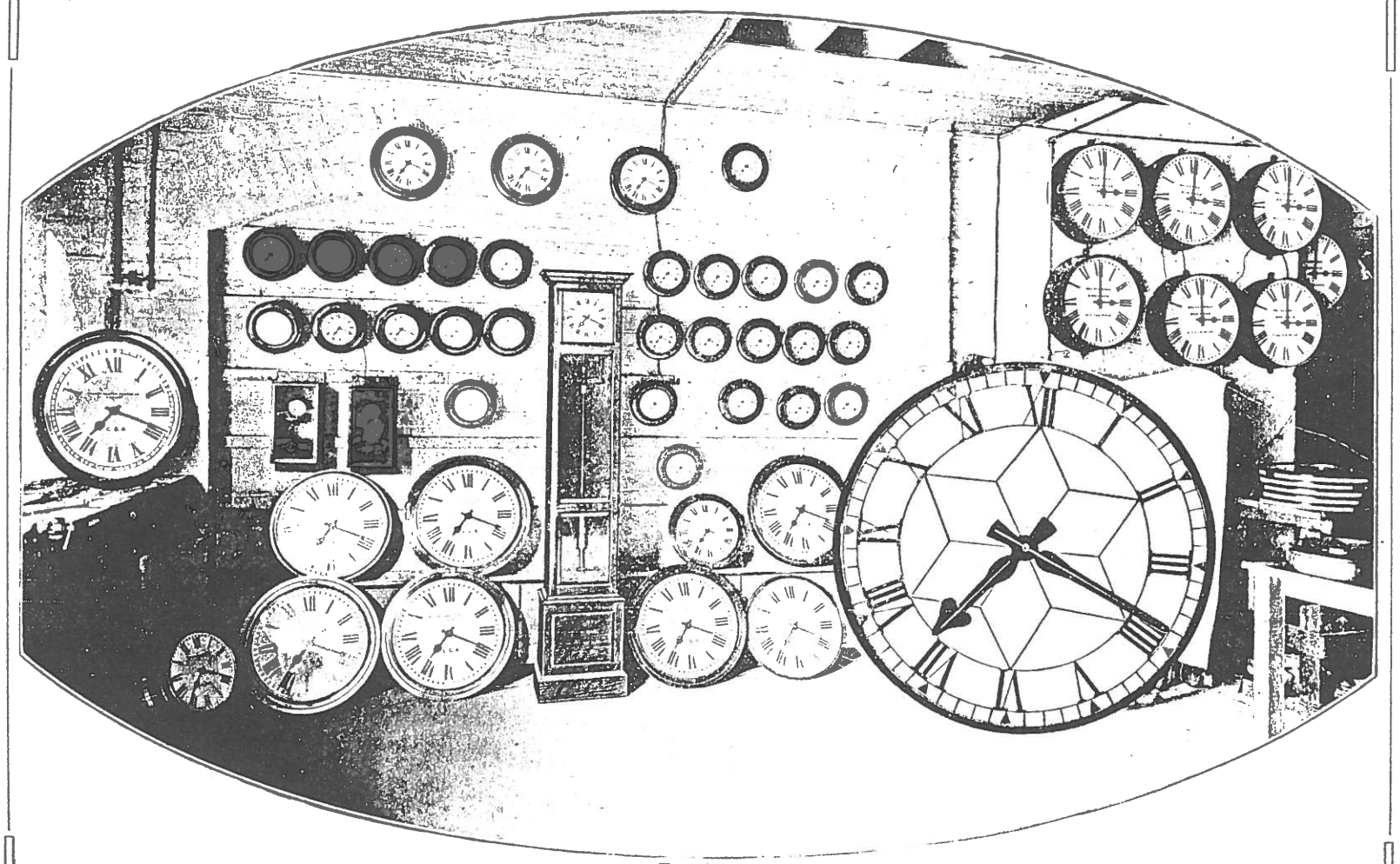

Fig 15
Installation supplied to the Central Argentine Railway, on test at our Works.

"SILECTOCK" MASTER CLOCK MECHANISMS.

OUR "Master" clock of ordinary standard pattern consists of a pendulum arranged to be always kept swinging by occasional impulses from an electro magnet, the good time-keeping of which is probably due to the fact that it works with just enough impulse to maintain a predetermined arc, while its practical immunity against stoppage, its perfect simplicity, and its freedom from violently - moved parts render it eminently suitable for its duties as master clock in an electric system.

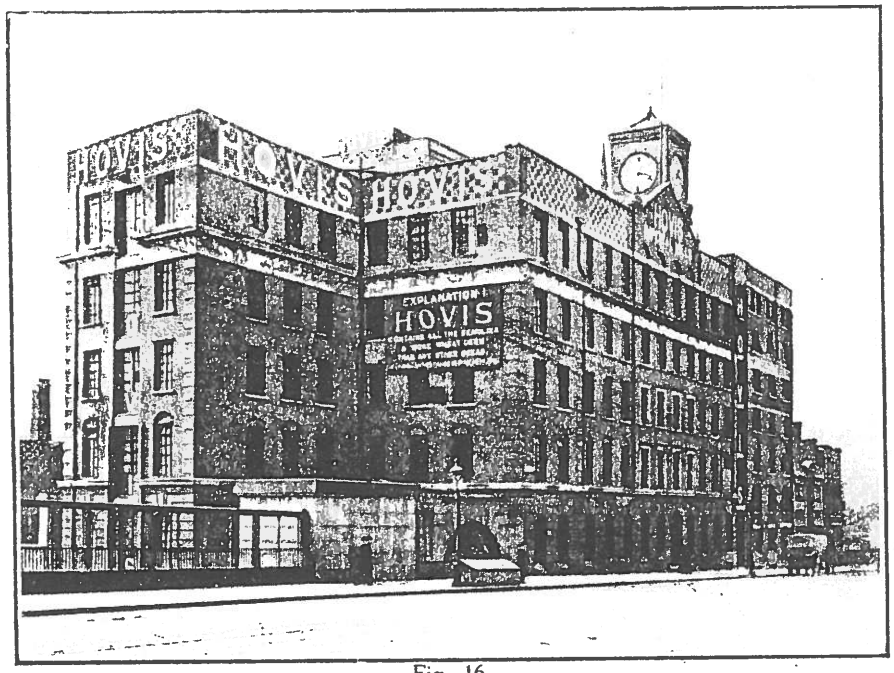

Fig. 16.
View of the Hovis Mills. The Largest Electric Clock in London.

The pendulum rotates a count-wheel which at each half-minute allows a set of contact springs to be deflected by the motion of the pendulum. This insures plenty of pressure on the contact surface without robbing power from the pendulum, because the springs act like gravity arms (only with less inertia) and give back power to the pendulum on the return swing. The contact arrangement consists of two pairs of platinum points—one being for the line circuit to the dials and the other for the shunt or short circuit, according to whether the clocks are operated from battery or from electric light supply. The motion given to the contact springs in conjunction with this method of cutting out the shunt, except for the instant prior to

"Silectock" Master Clock Mechanisms (*continued*).

breaking the circuit, results in sparkless action.

We manufacture two separate designs of standard "Master" clock mechanisms, one being fitted with a short pendulum beating exactly half a second, and thus usually termed a "half-seconds 'Master' clock," and the other with a long pendulum beating exactly full seconds and termed a "seconds 'Master' clock." Fig. 17 shows the complete pendulum and count-wheel action for a half-seconds "Master" clock. It is built with an accurately machined cast-iron base to which the various parts are secured. Jewelled pivots are provided and all steel parts are hardened and polished. The pendulum bob is a handsomely polished brass cylinder filled with lead and the rod is made of steel in tubular form. The time-keeping of these small half-seconds "Master" clocks is marvellously accurate, and their mechanism is so simple as to render them easily erected by those who have never handled electric clocks before. The pendulum rod can, of course, be supplied in special steel with negligible coefficient of expansion if required.

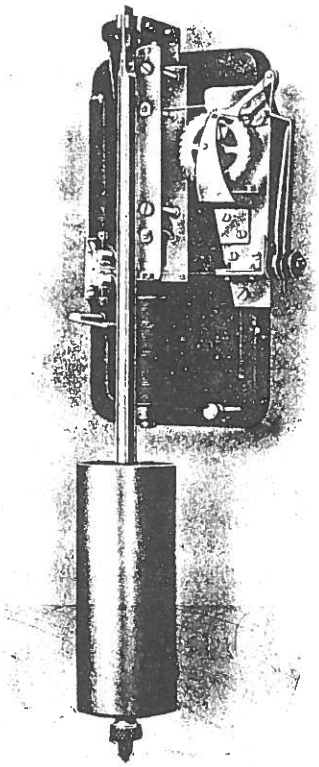

Fig. 17.

Fig. 18.

Fig. 18 illustrates the longer pendulum of the full-seconds clock. In this instance, also, the mechanism is built on an accurately machined cast-iron base, and the finish of the workmanship is of the very finest quality throughout.

"SILECTOCK" RECEIVING CLOCK MECHANISMS.

HITHERTO, the electro-magnetic mechanism behind each "Receiving" clock of an electric clock system has consisted briefly of a "ratchet wheel" operated by steel claws moved at each half-minute by an electro-magnet; but our system—the outcome of many years careful study of the subject—is based upon an entirely different plan. The steel claws and other oscillating parts are abolished, and in their place reign (1) a simple train of wheels whose sole function is to transmit the proper advance to the hour and minute hands, and (2) the "rotary armature" and its appertaining electro-magnetic parts.

Fig. 19 shows a general view of our No. 1 Standard Silent "Receiving" mechanism. The armature is mounted so as to rotate freely inside a circle of four pole pieces. Two of these are magnetically connected to a permanent magnet, whilst the other two are similarly connected to an electro-magnet. At each half-minute, when the current is sent through the electro-magnet, the armature takes a new position—a quarter of a turn forward—and directly the current ceases, is pulled forward another quarter of a turn and is held there securely locked by the permanent magnet.

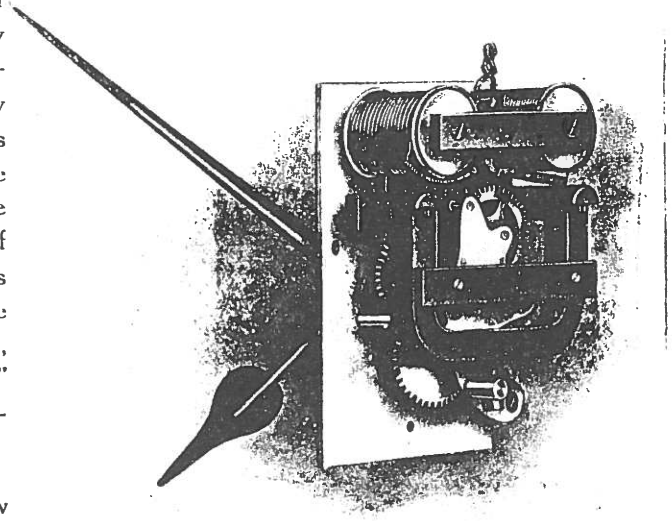

Fig. 19.

The simplicity of this action, and the *consequent trustworthiness of the complete dial mechanism*, will be clearly shown by the following facts:—

(1) Either magnet can impart a positive forward motion for over a third of a revolution, though neither, under any circumstances, is called upon to do so for more than a quarter of a revolution.

(2) In all its positions, the armature is securely locked magnetically.

(3) The design of even the smallest detail, and the quality of the finished article throughout, are such as to

"Silectock" Receiving Clock Mechanisms (*continued*).

ensure the perfect performance of every movement we turn out.

We make *five different standard sizes* of "Receiving" mechanisms, and for large outside clocks the mechanisms are constructed with special worm gearing to drive heavy exposed hands.

Fig. 20 gives an illustration of a Tower Clock mechanism, of the standard "Receiving" pattern.

Fig. 21 shows an example of a "Self-contained" Tower Clock mechanism, in which the pendulum is attached to the dial. For Small Tower Clocks with accessible clock chambers, this is frequently a convenience.

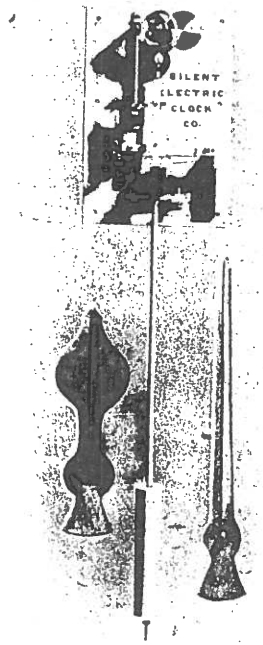

Fig. 21.

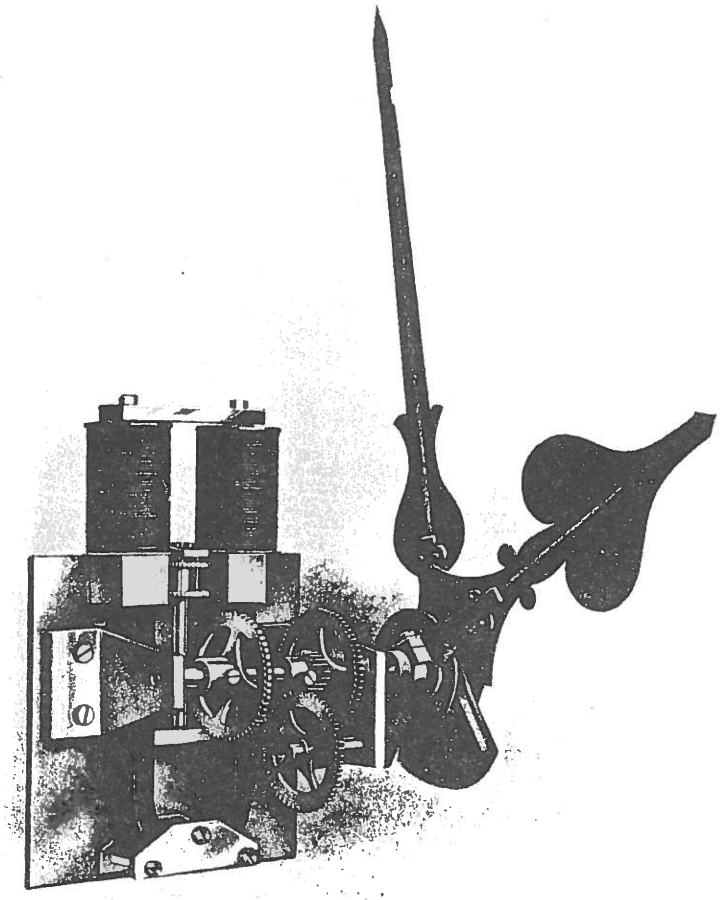

Fig. 20.

To be continued.

Continued from March, 2004 issue.

ing search in the labyrinths of Washington, Sangamo officials located that section of the Bureau of Ships concerned with recorders, only to be informed, however, that the Navy intended to have one of its regular suppliers of underwater sound equipment design and build a recorder superior to the British device. But just as the door seemed about to close on Sangamo, the watthour meter provided the necessary wedge to keep it open. A civilian technician in the underwater sound section had many years earlier been an engineer employed by a competitive watthour meter manufacturer. He told the officer in charge that anyone who could make watthour meters as well as Sangamo could certainly make range recorders. It was then decided that Sangamo should produce at once a model satisfying the U. S. requirements. A model, which was fundamentally the British instrument, was quickly put together and tested at sea in late August. In September, a contract for a modest number of instruments was granted. After Pearl Harbor, additional contracts were awarded and eventually Sangamo made many thousands of these instruments. Thus Sangamo Limited's war effort and the excellent reputation earned by Sangamo's watthour meter led to Sangamo's entry into the underwater sound equipment field, an activity in which it has been continuously engaged to the present day.

Development of the Attack Teacher—October, 1941.

AS a result of the contact established with the Navy in the manufacture of range recorders, Sangamo was asked to consider the manufacture of a device that would train the crew of a destroyer in antisubmarine operations. The Navy proposed that Sangamo consider making a "Chinese copy" of an equipment developed by the Royal Navy, an extremely complex apparatus involving a multitude of precision mechanical features which represented a hopeless manufacturing task so far as Sangamo was concerned. Again the watthour meter came to the rescue; for, after thorough study, Sangamo proposed to the Navy that the basic design of the equipment be based upon the watthour meter, inasmuch as that instrument, which had already proved its merits in so many instances, would provide for the necessary motion integration in a far more efficient manner than would the various friction drives in the British design. In the device as it was eventually developed a "souped up" J meter element worked fully as effectively as the company engineers had believed it would; and in the further evolution of the attack teacher more watthour meter elements were introduced until, in the final model of the equipment, a total of twenty watthour meter elements were contributing to its successful operation.

The plant protection system

BECAUSE of the defense business upon which it was embarked, Sangamo was required to spend some $50,000 for protective facilities such as wire fence, lights and guard houses around the plant.

Uniformed guards were employed, a system of badge identification of employees was instituted, and evidence of American citizenship, or government clearance in the case of the foreign-born, was required of all employees. This strict plant security program was maintained throughout the war, and owing to the company's continued participation in defense work has remained in effect ever since.

A prosperous year—December, 1941.

BY December, 1941, the management of Sangamo could look forward to the conclusion of an extremely prosperous year. The company was not only manufacturing commercial products at the fastest rate in its history, but in spite of disappointments and vicissitudes was establishing itself in the defense program. Eighteen thousand square feet of manufacturing space had been added by the construction of an addition to the building completed in 1939. Sales promised to reach a new high of $6,000,000 by the end of the year.

War.—A challenge to American industry.

AND then came suddenly and stunningly the news! The Japs had attacked Pearl Harbor! In the days that followed came stark realization of what lay ahead. With the U. S. Pacific Fleet largely sunk or disabled, with vast quantities of shipping needed to fight a war on many fronts around the globe, with huge stores of military equipment of every sort urgently demanded to meet the omnivorous needs of the Army, the Navy and the Air Force, which would now expand as never before in history,

there would be unprecedented demands upon American industry and upon the American worker. Sangamo, as well as almost every other American manufacturer, must gear for total war. For this conflict would not be won by men alone. This was a war in which industrial production and "know-how" would play a part equaling or perhaps surpassing that of manpower, a struggle in which the brains and manufacturing capacity of American industry would be a means to victory.

By providing the Allied military forces with more and superior equipment, American industry could save innumerable lives and hasten the day of victory. But to do this was no simple undertaking. The Axis powers were off to a formidable head-start and were producing at full thrust. Their war plans had been carefully matured over a long period of years and their whole economy was harnessed for war. Despite the acceleration of the last two years, the United States was far behind. It must catch up and go ahead, and it must do so quickly if at all.

Industry goes for total war 1942.

PRODUCTION of non-essentials was curtailed at once. Strict governmental controls were imposed in order that each manufacturing unit might be fitted into the overall production scheme, that raw materials might be allocated where they were most seriously needed, and that skills and manufacturing knowledge might be pooled. Some of industry's top men took positions with government to help administer the program. While the controls

were often irksome, they were never applied to the point of stifling scientific or technological initiative. Working under a cloak of censorship, the armed services called upon industry to meet production goals that would have been thought fantastic in time of peace. Lacking confidence in industry at first, the procurement officers of the armed services eventually abandoned unnecessary "spit and polish," and brought their procurement policies into closer conformity with practical manufacturing procedures as manufacturers and workers demonstrated what they could do. Soon industry and the military services were working as a team. Technological advancement was phenomenal, especially in the field of electronics, where Sangamo was destined to make its own most significant contributions to the national war effort.

First order for submarine attack teachers—December 6, 1941.

JUST the day before Pearl Harbor Sangamo received its first order for antisubmarine attack teachers to be built according to the principles worked out by the company's own engineers in the weeks since the Navy first broached the project. This apparatus enabled a submarine detecting crew to be trained on shore, so that by the time the men were assigned to a ship they knew how to handle the detecting apparatus and to maneuver into position to attack a submarine. Without the teacher, they would have been obliged to learn on shipboard, through long hours of practice and with all the expense and tie-up of desperately needed vessels involved in taking a surface ship as well as one or more submarines to sea for practice maneuvers.

Sangamo delivered its first attack teachers to the Navy in May, 1942. Their test performance was wholly satisfactory and the Navy put them into use at once. They were the first product involving complicated electronics ever to be manufactured by Sangamo. The company was justly proud of them, and especially of its contribution to their design. Many more of these teachers were manufactured throughout the war, and as a result of their success the Navy turned again and again to Sangamo for help in developing and manufacturing other electronic devices.

Subcontractor for manufacture of Kollsman instruments—1942–1947.

SIX days after Pearl Harbor, Sangamo was requested to make a self-synchronous motor or synchro as manufactured by the Kollsman Instrument Division of the Square D Company. Subsequent discussions with Kollsman revealed the practicability of Sangamo's producing a type of extremely sensitive aircraft tachometer, an instrument for measuring the revolutions per minute of an aircraft engine which enabled a pilot to regulate and synchronize engine speeds. Kollsman, as well as every other supplier of aircraft indicating instruments, was overwhelmed with orders as the expanded aircraft industry bent every effort to meet President Roosevelt's call for the production of 85,000 warplanes a year. Consequently, as a result of its connection with Kollsman, Sangamo now

undertook the manufacture of other Kollsman products until eventually the plant was turning out a multiplicity of special aircraft electrical units, among them motors to drive radio compass tuning loops, transmitter and receiver radio compass indicators, and a complete electrical instrumentation for Link trainers. This work ran into large volume throughout the war, and Sangamo continued to manufacture products for Kollsman until the end of January, 1947.

Total production for war.

WITHIN three weeks after Pearl Harbor Sangamo made its first cut in watthour meter production and by September 23, 1942, it had ceased producing commercial items altogether. The changeover to total war production was effected so efficiently that no employee lost a single day's work, and as Sangamo swung into line behind the national war effort employment rose from 1,550 in January to 2,075 in October. The purchase of the old Watch Factory buildings now proved itself to have been a most fortunate move; for with the increase in production and employment Sangamo was in pressing need of manufacturing space. Tenants in the old buildings were requested to find other accommodations, the whole plant was reconditioned, and the facilities for the assembly of war products were located in the Watch Factory buildings.

Expansion of capacitor operations—1941–1943.

SINCE the beginning of the war, Sangamo had experienced a steadily increasing demand for capacitors, inasmuch as this device is a component

used in a wide variety of electrical circuits. In its simplest form, it consists of two conductors separated by an insulating medium such as mica or paper, ranging from this through types requiring exacting manufacturing procedures. Sangamo had been manufacturing mica capacitors for almost eighteen years, although heretofore they had been a relatively unimportant item in the company's total output. As early as 1941, however, in response to requests from large users of this device, Sangamo began tooling for increased production. Since then, with the urgent need for all types of electronic equipment, the capacitor business had tremendously accelerated, until now, foreseeing an even greater demand from the armed services, Sangamo proposed to the War Production Board that facilities be immediately expanded. Nothing came of this proposal in Washington; but the Chicago Signal Corps Procurement Office, aware of the urgency, approved the necessary priorities for Sangamo to install equipment for a fourfold increase in production, and in March, 1942, the company undertook the expansion with its own capital.

Within five months the enormous demand for mica capacitors induced the Signal Corps and the War Production Board to sponsor a Defense Plant Corporation facilities contract with Sangamo, providing a further expansion of capacitor production. Within a little more than a year, not only was the production of mica capacitors fifty times what it had been two years before, with dollar volume great-

er than the entire sales of the company prior to 1941, but, at the request of the War Production Board, in 1943 the company began the manufacture of paper capacitors, a line which was continued in production through the balance of the war and further developed in the postwar period.

Subcontractor for Weston—summer, 1942.

THE demand for electrical indicating instruments such as ammeters and voltmeters was still increasing, and there was also some concern that east coast manufacturing installations might be bombed. Accordingly, the Weston Electrical Instrument Corporation was requested to expand its facilities somewhere west of the Allegheny Mountains. By reason of the close relations subsisting between Sangamo and Weston for many years, Weston proposed that Sangamo act as a subcontractor for the manufacture of some of its products so that Weston might concentrate upon the manufacture of certain devices that it alone was qualified to make. Consequently, in the summer of 1942, a facilities contract, sponsored by the Navy, was negotiated in the amount of $330,000 to provide Sangamo with special purpose tools and equipment. The arrangement contemplated the production of some 35,000 instruments per month, and from the beginning of production in June, 1943, until the termination of the arrangement in December, 1944, Sangamo turned out almost 400,000 of these instruments.

Purchase of Allied Tool and Machine Company—August, 1942.

EVEN with government sponsorship and aid, tools and dies were difficult to obtain, so, in order to have a controlled supply of these essentials, Sangamo purchased the Allied Tool and Machine Company, a Chicago corporation employing skilled tool and die makers. Within a year the big job of tooling was accomplished, and with an assured supply of further requirements from its own plant and other sources, Sangamo resold the Allied company to its former owners.

Loyalty and skill of Sangamo workers.

BY this time, the draft and the insatiable manpower demands of industry were creating or threatening labor shortages in many areas. In September, 1942, Sangamo's directors rescinded their ruling with respect to compulsory retirement of employees at age 65, inasmuch as many of the workers who would have been affected possessed irreplaceable skills, and all could be used to advantage in the stepped-up production program. As a matter of fact, while Sangamo faced serious employment problems, it experienced less trouble than did many other companies because it had always employed a high percentage of women on light machine work and assembly. Many manufacturers were plagued by absenteeism, but this was never very critical at Sangamo. There was some increase, to be sure, but it was due mainly to the fact that people were working long hours and must take time off for their normal personal affairs. When the banks and stores began keeping open on certain nights each week, the situ-

ation was eased at Sangamo as it was all over the country. The company posted monthly reports of absenteeism, male and female, by departments, with three percent marked as the danger line. Employees responded loyally, without the rewards some companies found it necessary to offer, and absences seldom reached the danger point.

Need for more working capital —August, 1942.

THE volume of war business became so great that an increase in working capital became imperative, and the directors authorized borrowings not to exceed $2,000,000 under Regulation "V" of the Federal Reserve System. Later the authorization was increased to $4,000,000, a sum that would have seemed staggering a few years before; but no more than $2,000,000 was ever drawn..

Manufacture of many novel products—1943.

BY the beginning of 1943, Sangamo was working three shifts around the clock, and was manufacturing and developing products with which it was entirely unfamiliar just a few months before—portable anemometers to indicate wind speed and direction for the Signal Corps, extremely sensitive relays for use in mines and depth charges and a special timing mechanism for Navy Ordnance, a variety of electrical indicating instruments of one sort or another. It was an undertaking calling for the best in engineering and manufacturing technique, for all the instruments must be precise, and some of them must be shock proof and impervious to quick changes in temperature, air pressure and humidity.

Renegotiation contracts—1943. A year tremendous production.

SO critical was the need for war materials of all sorts and so novel were some manufacturing procedures, that neither the government nor the prospective manufacturer could estimate costs with any degree of accuracy. Consequently, the government was protected by a stipulation of the National Defense Appropriation Act that provided for examination of the manufacturer's records, with renegotiation of contracts and recapture of profits in cases where they proved to be excessive. Like other companies, Sangamo was subject to these provisions. Even after renegotiation, however, sales for 1943 reached a new high of over $11,000,000. Employment was at a wartime peak of 3,080. Three hundred and fifty Sangamo employees were now in the armed services, 45 of whom were women.

Increase in number of directors—April, 1943

AT the annual meeting of the stockholders in 1943, Sangamo increased the number of its directors from nine to eleven. Mrs. Jacob Bunn and Mrs. Robert C. Lanphier, who had served faithfully since replacing their husbands as directors, resigned. Walter Robbins and Robert E. Miller also retired from the board after many years of useful service. The following were elected as the new board: Herbert B. Bartholf, George W. Bunn, Jr., Jacob Bunn, Jr., Willard Bunn, Donald S. Funk, J. Henry Hodde, Frederick C. Holtz, Charles H. Lanphier, Robert C. Lanphier, Jr., Herbert I. Markham and Carl A. Sorling.

To be continued.

THE

ECO MAGNETO CLOCK CO.

Manufacturers of

ELECTRIC AND PORTABLE

WATCHMAN'S CLOCKS

GENERAL OFFICES AND FACTORY

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BRANCHES AND AGENCIES

NEW YORK RICHMOND BUFFALO

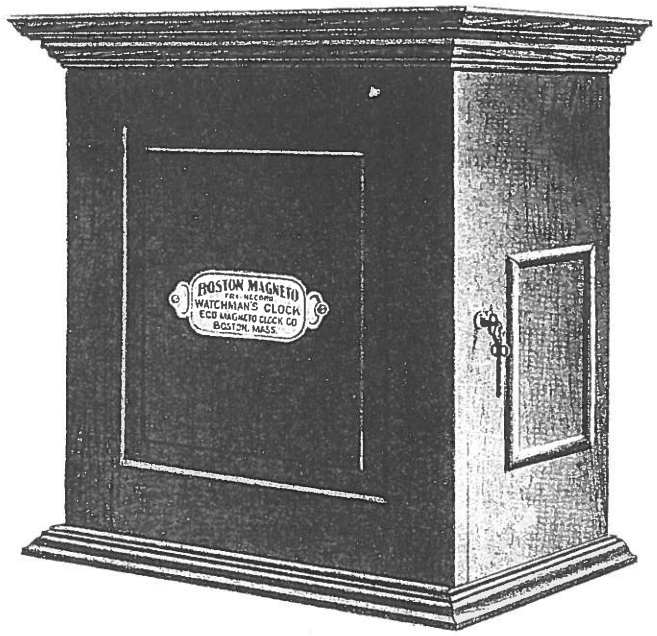
CHICAGO MONTREAL

ETC., ETC.

THE

BOSTON MAGNETO
STANDARD RECORDER

For any size up to 60-stations



Regularly furnished in Light or Dark Quartered Oak Cases

Special cases to match finish

Dimensions—10 to 20 stations, 18 inches high, 17½ inches wide, 12½ inches deep
" —21 to 40 stations, 18 inches high, 23½ inches wide, 12½ inches deep
" —41 to 60 stations, 18 inches high, 29½ inches wide, 12½ inches deep

Regulators in combination with Recorders as illustrated on page five, furnished when desired

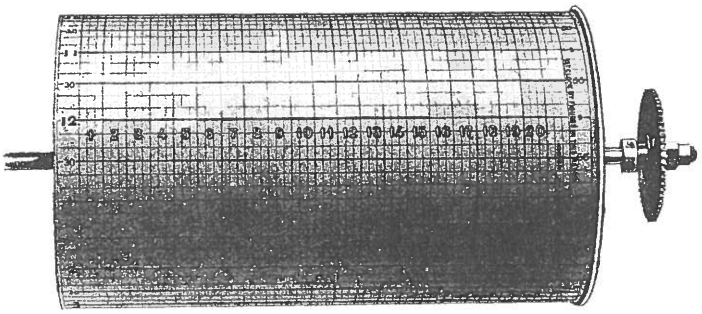
THE BOSTON MAGNETO

TRI-RECORD ELECTRIC WATCHMAN'S CLOCK

TO meet the desires of many users of Electric clocks, for an arrangement by which the watchman's trips, over Sundays and holidays could be properly taken care of without the necessity of changing dial on such days, or having triplicate records on the one dial, we have perfected this Tri-record Watchman's Clock.

This clock fulfills all the requirements of a clear and separate registration, from Saturday afternoon to Monday morning, without changing the dial; and in addition to this decided advantage has features of mechanical superiority, which commend its use in preference to any other watchman's clock made.

A rectangular dial is used, thirteen inches long and of varying widths according to size of clock. The twenty-station clock requires a dial seven inches wide, the forty-station clock requires a dial thirteen inches wide, and the sixty-station clock requires a dial nineteen inches wide, for the three consecutive watching periods, making a very compact, yet intelligible record. The sheet is ruled so as to give three columns for the registrations, and is fastened over a corrugated hard rubber drum. This drum is automatically shifted every twelve hours, a space to the right, so that each day's or night's record appears in its own respective column. By arranging the watchman's trips on Saturday afternoon, to begin at a quarter past each hour the records for that period appear in the first column entirely distinct from the regular Saturday night records.

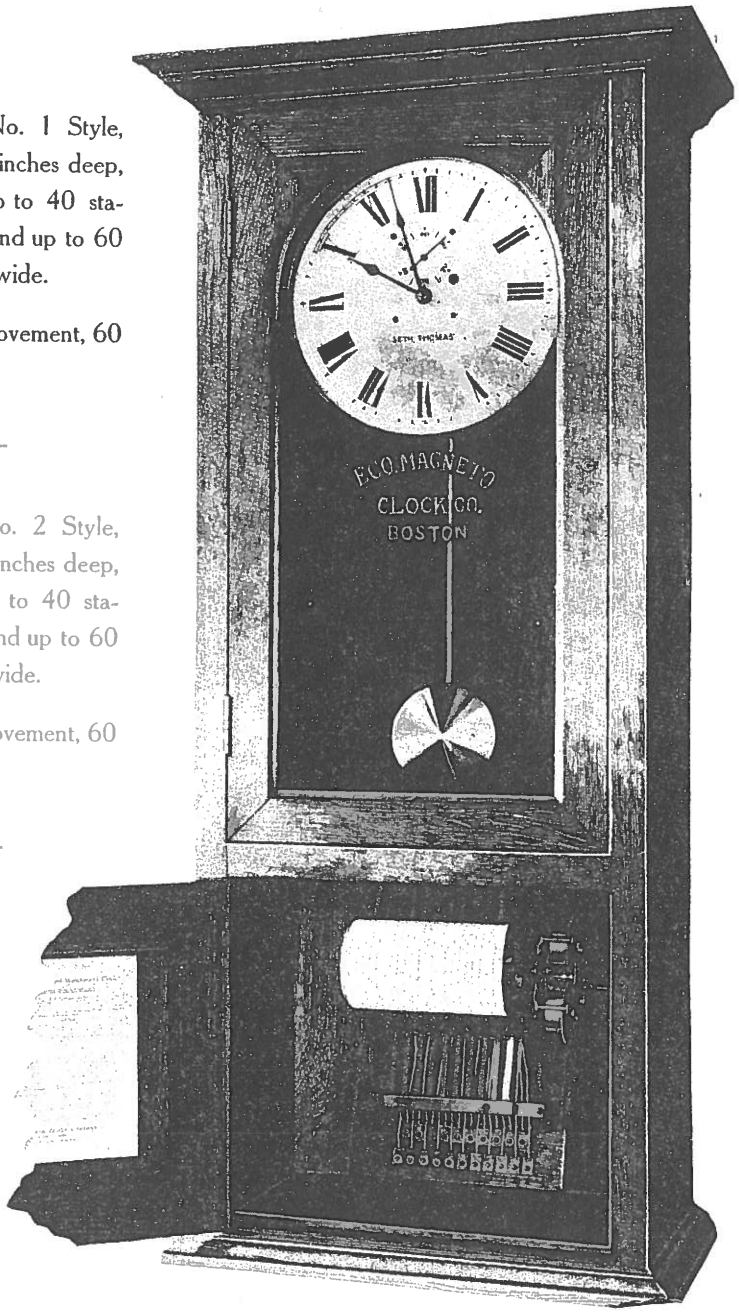


Dial and Drum

The unique arrangement of the magnets and armatures accomplishes this triple purpose, without the necessity of the cumbersome space required, where a circular dial is used.

Office Regulator Combined With Boston Recorder

For any size up to 60 stations



Dimensions — No. 1 Style, 73 inches high, 11 inches deep, 23 inches wide, up to 40 stations; beyond 40 and up to 60 stations, 29 inches wide.

Seth Thomas Movement, 60 beat, 14 inch dial.

Dimensions — No. 2 Style, 53 inches high, 11 inches deep, 20 inches wide, up to 40 stations; beyond 40 and up to 60 stations, 29 inches wide.

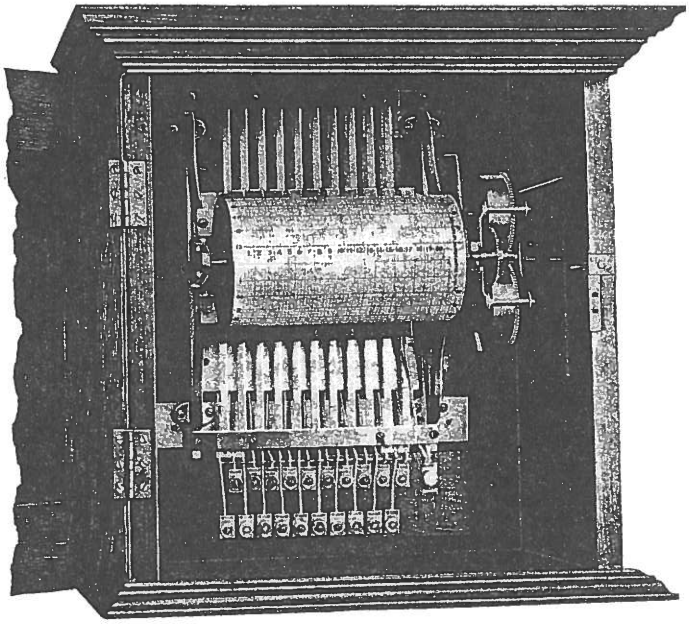
Seth Thomas Movement, 60 beat, 12 inch dial.

Recording mechanism in lower portion of cabinet is entirely separated from Regulator.

Our long experience in manufacturing various kinds of watchman's clocks impressed us with the desirability of simplicity, and this has been made possible (even with the many advantageous features) in our Tri-Record clock, to a greater extent than is shown by any watchman's time recording apparatus heretofore produced.

Boston Magneto

(Mechanism Exposed)



When the drum is removed, every part of the electrical mechanism is visible and accessible. All the magnets, needles and armatures are interchangeable, and can be easily removed without disarrangement of the rest of the mechanism. The absence of springs to restore needles after recording, is another valuable feature of this device.

The method of registration (by perforation of paper dial), is very much clearer than on circular dials, or on any other rectangular dial, owing to the fact that the dial is solidly held in place on the drum. which has a corrugation for each needle, and by reason of the ample space allotted for each station.

Recorders are regularly furnished in quartered oak cabinets but can be furnished in different woods of any special design and can also be combined with Office Regulators, when desired.

THE
ECO MAGNETO
STANDARD RECORDER

For any size up to 30-stations

Regularly Furnished in Light or Dark Quartered Oak Cases

Special cases to match finish

Dimensions—2 to 6 stations, 14 inches high, 12 inches wide, 8 inches deep.

Dimensions—10 to 20 stations, 18 inches high, 14 inches wide, 8 inches deep.

Dimensions—21 to 30 stations, 22 inches high, 18 inches wide, 8 inches deep.

Regulators in combination with Recorders as illustrated on other pages, furnished when desired.

The

Eco Magneto Watchman's Clock

WAS THE PIONEER OF MAGNETO-OPERATED CLOCKS AND USES THE CIRCULAR DIAL

Our experience with Electrical Watchman's Clocks before the Eco was perfected, impressed us with the necessity of

First. Adopting a plan to eliminate the sticking of the perforating needle, in the dial. This we do by having the needle entirely separate from the armature, and restoring both needle arm and armature to their original positions by gravity instead of springs, and also by using a needle, only of sufficient length to perforate the exact weight of paper used in our dials. The old style needle, long or short, depends entirely on spring motion to restore, and these springs will rust and stick with the least dampness. In some types of clocks having a large number of stations, the needles are several inches long, and in addition to the trouble above mentioned, cannot be held in alignment owing to their own weight.

Second. To reduce the dial to the smallest size consistent with accurate and easy reading; and this is accomplished by the use of flat magnets systematically arranged, all accessible and interchangeable.

Third. To produce at the lowest first cost, a reliable well made instrument that could be sent anywhere, put up by anybody of ordinary intelligence, requiring no battery, could not be tampered with, and in addition meet the stringent requirements of all insurance companies under all conditions, furnish proof every morning that the watchman had either been attentive to duty or not, the previous night, and if he patrolled the building, how long he spent on each round, how long between each station, and how long he rested between each round.

By avoiding the mistakes made by others and the exercise of an ordinary amount of common sense, we have succeeded in producing the best devices ever introduced for checking Watchmen.

Our claim in this is constantly endorsed by the thousands of satisfied users of our Clocks, in their reports to us, to our representatives, and to prospective buyers.

Our service does not compel any service of the Watchman but it does give an absolutely infallible record of his registration, while on his rounds through the plant. And the record should be an indisputable proof.

First-class material and workmanship is assured, in the electrical mechanism and also in the cabinet work, as we use nothing but the best of material, and employ only competent workmen. Standard cabinets are furnished as shown in cuts, in antique or golden quartered Oak, and on reasonable notice can be furnished in Mahogany, Walnut, Cherry, Birch, etc., of special design and to match surrounding woodwork.

Drawings and Instructions will be furnished to those who wish to arrange for installing the system themselves, thereby enabling any intelligent mechanic to set up the equipment so as to give satisfactory results.

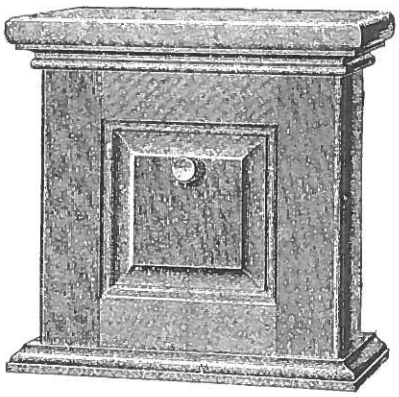
The "Eco" Alarm

Is a device attached to the clock movement by which the Foreman, Superintendent or Overseer, is automatically notified of Watchman's negligence, or summons help in case of need. Simple in construction; entirely independent of Watchman's Recording Apparatus and can be readily attached and detached. Furnished when desired at slight additional cost.

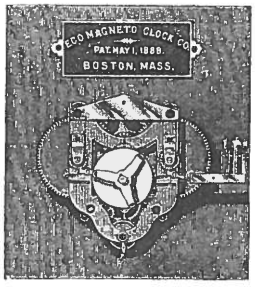
Single Station Mechanical Clock

For Inside or Outside of Buildings

No Wiring Necessary



21 inches square



Mechanism Exposed

Showing Punching Device
Tell-tale, etc.

Pressure on Knob shown on door, records the time of Watchman's visit.

To be continued.

"A Guide to Electrical Horology" by Martin Swetsky, FNAWCC. Includes Chapters on History, Electrical Principles, Repair Methods, Tips, plus Repair References. Price $42.00 Post Paid. Mitchell Swetsky, 10 Chelsea Way, Fairport, NY 11450. E-mail MSwetsky@Rochester.rr,com.

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THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXX #3, SEPTEMBER 2004

Fellow Horologists:

This issue of the Journal of the Electrical Horology Society completes the series concerning the Sangamo Electric Clocks. Sangamo clocks are very well made and are quite interesting. If you are unfamiliar with these clocks, I hope that you take a very hard look at them and keep your eyes open for Sangamo clocks at your local Marts. This issue of the Journal continues the series of articles on the Silent Electric Clock Company and on the ECO Magneto Clock Company.

The following brief report concerns the Oklahoma City, OK NAWCC National Convention. Mr. Len Brenner presented a very interesting history of the Tiffany Never-Wind Clocks to a joint meeting of Chapter 78 and Chapter 168. Mr. Brenner described the characteristics of the various models produced by Tiffany and outlined the legal problems that the Clock Company had with the Tiffany Jewelry Company. These problems resulted in the several name changes to the Clock Company such as "Never-Wind" and "Cloister." Mr. Brenner also showed a photograph of the building in Buffalo, NY where Tiffany was located. This building is now in a rather rough neighborhood so we all appreciated his willingness to explore and to take risks in the interests of electric clock collecting.

At the National Convention, it was announced that Mr. Dale Sowell was unable to make his planned presentation on electric clocks so Mr. Rodney King expanded his talk to include electric clocks in general. Mr. King also described some of this experiences in locating and collecting electric clocks. This was a very enjoyable presentation and there was a lively discussion of electric clock collecting following Mr. King's presentation.

As a part of the National Convention, there was a spectacular exhibit of electro-mechanical clocks. This exhibit encompassed examples of the more common and available electric clocks and several examples of the rare, uncommon electric clocks. The clocks were well displayed and you could get a very good look at the various examples of electric clocks. Mr. King spent a great deal of time in the exhibit answering questions about the displays and this greatly enhanced an already spectacular exhibit. Thank you to all who put together such a great display.

Enjoy this issue of the Journal.

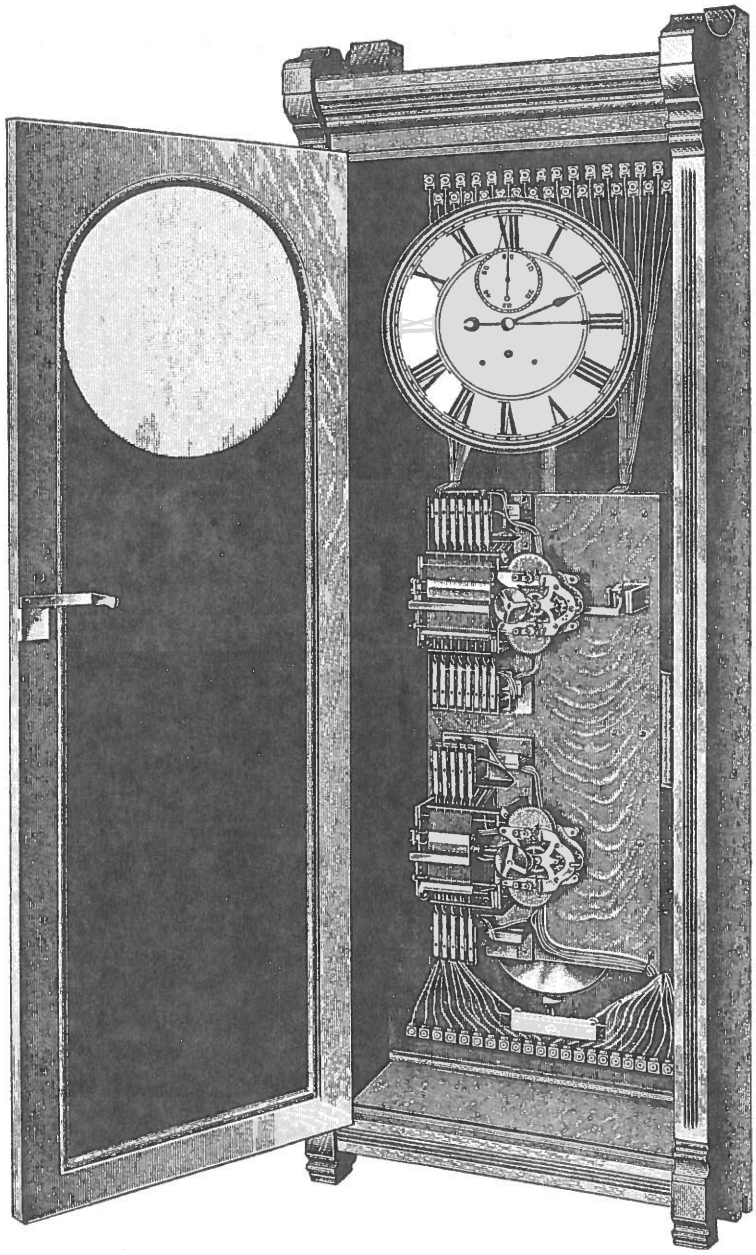
Bill Ellison.....President
Harvey Schmidt, FNAWCC,.....Secretary-Treasurer) Co-Editors
Dr. George Feinstein, FNAWCC..Chapter Historian)

Continued from June, 2004 issue.

Office Regulator Combined with Eco Recorder

For any size from 35 to 60 Stations

Larger equipments combined with Regulators are arranged along similar lines.

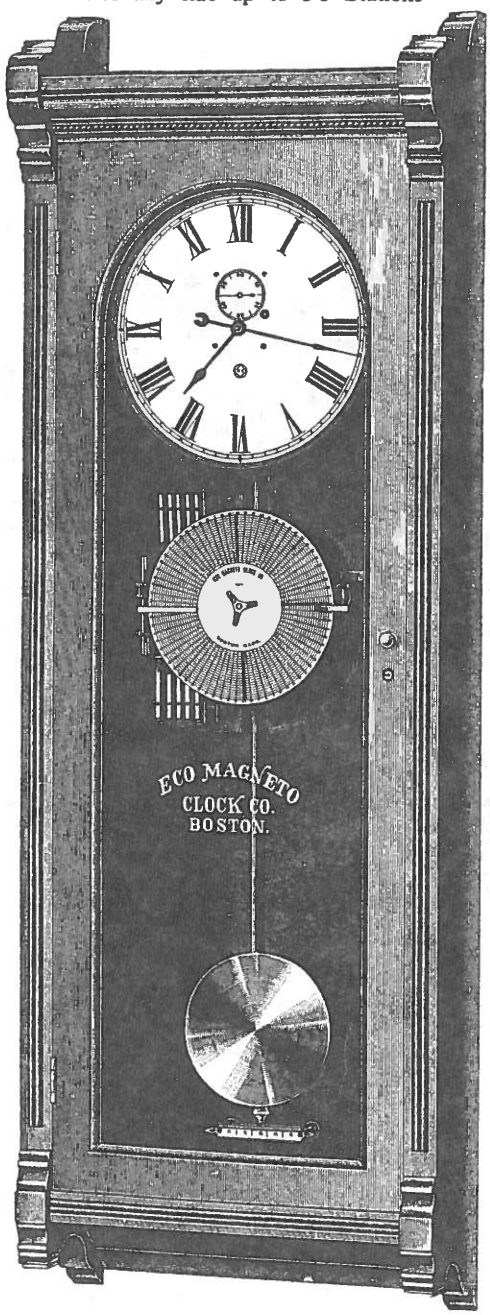


Dimensions—68 inches high 23 inches wide 10 inches deep

Regulator as described on page eleven, Style No. 1

Office Regulator Combined with Eco Recorder

For any size up to 30 Stations

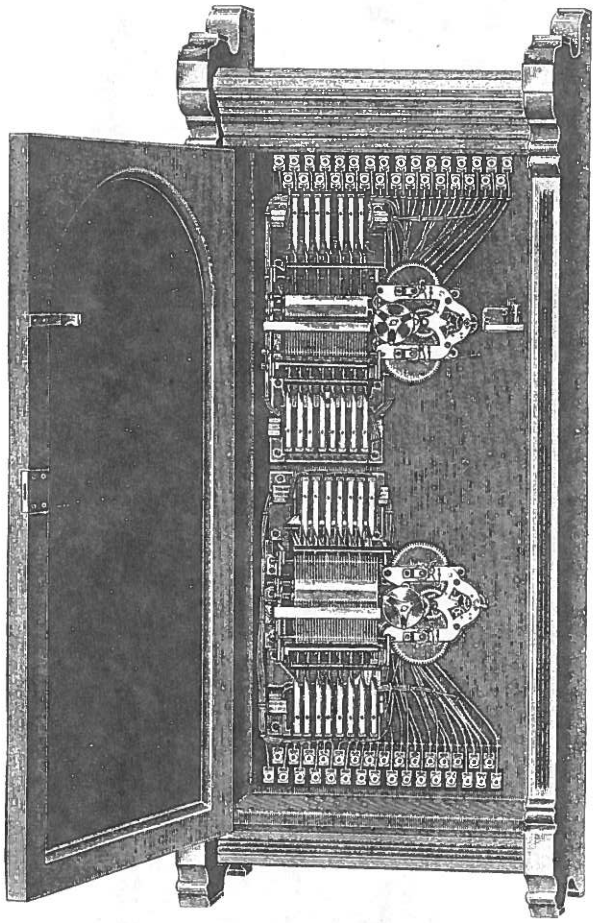


Dimensions — No. 1 style, 68 inches high, 23 inches wide, 8 inches deep. Seth Thomas movement, 60 Beat, 14-inch dial.

Dimensions — No. 2 style, 48 inches high, 20 inches wide, 8 inches deep. Seth Thomas movement, 80 Beat, 12-inch dial.

Standard Eco Recorder — Arrangement of Mechanisms

35 to 60 Stations

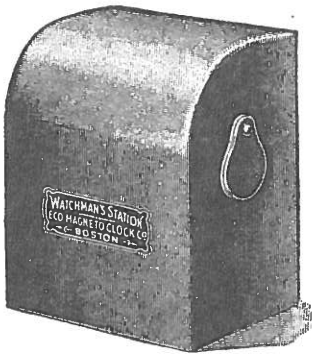


Larger equipments are constructed along similar lines by the use of thirty-station mechanisms fitted with the required number of recording stations.

Dimensions—35 to 60 stations, 48 inches high, 20 inches wide 8 inches deep.

Dimensions—65 to 90 stations, 68 inches high, 23 inches wide, 8 inches deep.

Watchman's Stations—Magneto Type



Steel Cover

Dimensions

5⅞-in. High 4¾-in. Wide 3⅞-in. Deep

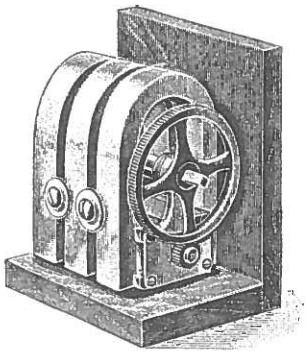
Wood Cover

Dimensions

6⅛-in. High 5⅜-in. Wide 4⅛-in. Deep

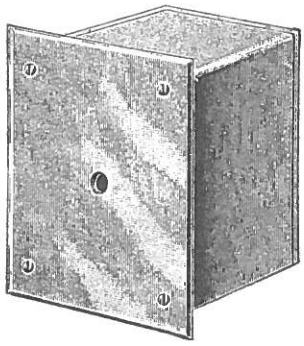
Watchman's Crank for Operating Magneto

These generators can be furnished in fibre covers where preferred, or in heavy cast iron covers for outdoor use.



Mechanism of Magneto Generator

Exposed



Iron Outlet Box with Flush Brass Plate

Dimensions

7-in. High 4¾-in. Wide 5-in. Deep

METHOD OF OPERATION

OF THE

Eco or Boston Magneto Watchman's Clocks

The Recorder, or Combination Recorder and Regulator, is placed in the office or other suitable location, and stations located at desired points, throughout the premises to be covered during the rounds of the Watchman.

Each station is connected with Recorder by a separate wire, and has its record shown in a separate space on the paper dial. Any number of watchmen can record at the same time, on the same dial, and yet each man's record be independent of the other.

Number 1 station is connected to the magnet which operates number 1 needle, and the record will be a puncture through the paper, in space numbered 1, at the time the record is made. Station number 2 will record in space numbered 2, station number 3 in space numbered 3, and so on for whatever number of stations are in operation.

A small magneto is placed at each station to be visited by the watchman. One full turn of the crank which he carries with him, generates sufficient current to perforate the paper dial, in the space corresponding to the number of the station operated, and at the exact time the record was made.

With this System, a Chemical Battery is dispensed with, and there is no current except at the actual moment of making the record, consequently no record can be made by short circuiting or crossing of wires at some convenient point near the recorder, as can be, and is, done where battery clocks are used.

To Architects, Engineers and Contractors

who are specifying Watchman's Clock systems for new buildings where stations on the surface of walls are objectionable, we call attention to our outlet box, designed for the purpose of installing in walls during the construction of buildings, in which the magneto can be placed, covered with a neat plate (similar to a flush switch), as shown on previous page. Ample space is provided for making connections under the magneto itself, which rests on wooden base.

GUARANTEE

¶ We guarantee the mechanical construction and perfect working of our electrical apparatus for five years, subject to the following conditions:

¶ First. That generators shall be oiled regularly,—the usual requirement being every six months.

¶ Second. That no dials shall be used except those made by us. These are printed on specially prepared paper and our Recorders are carefully adjusted so as to give the best results on this paper.

¶ When other dials are used we are absolved from this warranty.

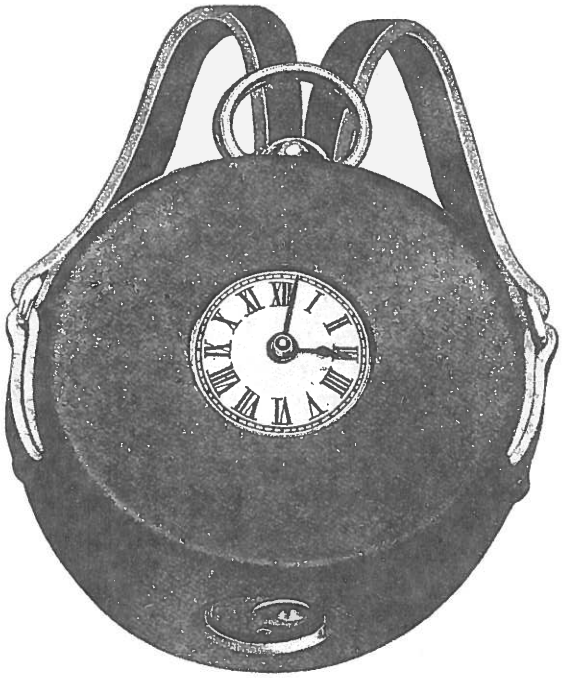
UNDERWRITERS APPROVAL

¶ Our Clocks and Stations are officially approved by the National Board of Fire Underwriters and all Insurance Companies and are regularly inspected and labeled under the supervision of Underwriters Laboratories (Inc.)

WE ALSO MANUFACTURE

THE

ECO PORTABLE WATCHMAN'S CLOCK



AND WILL SEND PAMPHLET ON THIS TYPE OF CLOCK, ON REQUEST

To be continued.

Continued from June, 2004 issue.

MASTER CLOCKS.

ONLY *one* "Master" clock is required to control an installation. The pendulum mechanism, as already described on pages 13 and 14, is made in two standards, (*a*) the "short" pendulum, swinging half seconds, and (*b*) the "long" pendulum, swinging full seconds. As our "Master" clocks are *quiet in action*, they are a pleasing adjunct to a private office in the factory, or in a living room at home. Consequently we have always made a speciality of *high-class case work*, worthy of containing the substantial and accurately built "Master" clock mechanism.

Standard Half-Seconds Pendulums.

The neatest and most compact electric "Master" clock ever manufactured. The outside dimensions of the cases are 2 ft. 6 in. in length, by 12 in. wide, and 6 in deep. The dial fitted is about 5 in. diameter, and the general appearance is as shown by Fig. 22. This style "Master" can be thoroughly recommended as an excellent time keeper, and has been used in large numbers by H.M. Post Office for controlling large and important installations in Postal Buildings. Easily set up and simple in action, this pattern is specially recommended for export use.

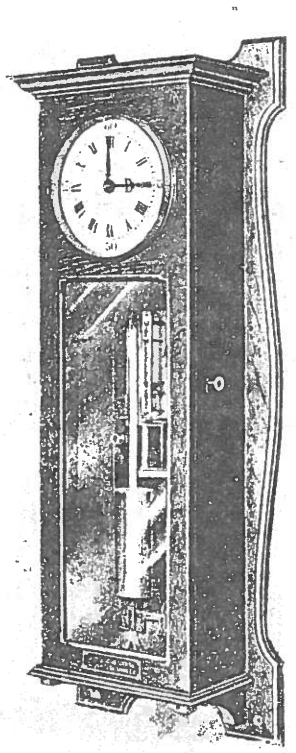


Fig. 22.

Master Clocks (*continued*).

CODE H.2. Standard Half-seconds "Master," in oak case, with 4½ in. dial, solid bezel.

H.3. Ditto, in mahogany case, with 6 in. dial, plate glass, hinged bezel.

H.4. Ditto, in oak case, but fitted with ornamental Old English design ("The Gale") dial.

H.5. Ditto, in mahogany case.

The above styles are similar to Fig. 22, though we can fit our standard "Half-seconds 'Master' Mechanism" into any pattern casework to suit architectural surroundings, and will always be pleased to submit special designs and estimates for same. Special pendulum rods of steel of negligible coefficient of expansion can be fitted if desired.

[Code "NC" added to any of above Code Numbers.]

Standard Full-Seconds Pendulums.

Our Full-seconds "Master" clocks are perfectly finished, and handsome additions to the furnishing of either the Board Room of a business house or the Hall of a country mansion. The dimensions of the "standard" pattern case are 5 ft. high by 1 ft. 4 in. wide by 9 in. deep. The pendulum mechanism is beautifully finished, mounted on heavy cast-iron base. Special pendulum rods of steel of negligible coefficient of expansion can be fitted if desired.

[Code "NC" added to any Code Numbers.]

CODE F.1. Standard Full-seconds "Master" clock, with enamelled dial, in oak case.

F.2. Ditto, in mahogany case.

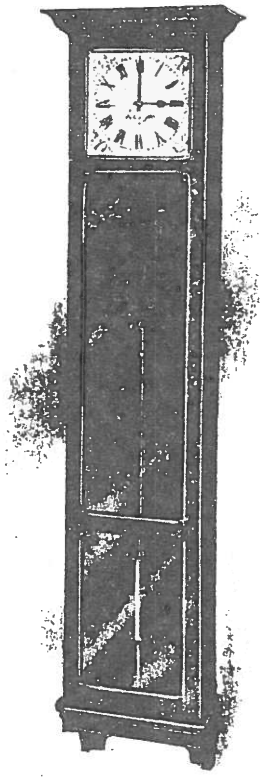


Fig. 23.
The "Standard" Full seconds "Master" case.

Master Clocks (*continued*).

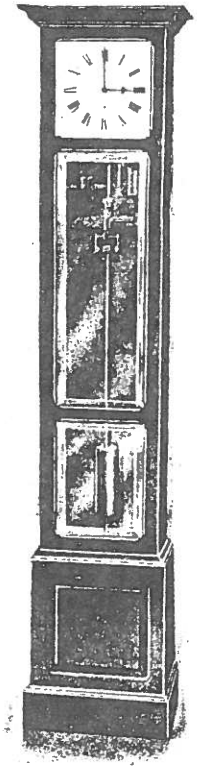


Fig. 24.
The "Standard Pedestal" case in either oak or mahogany.

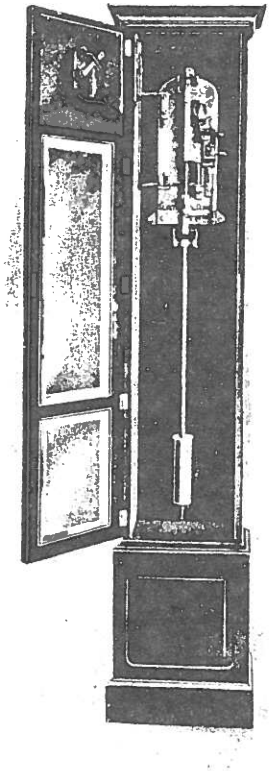


Fig. 25.

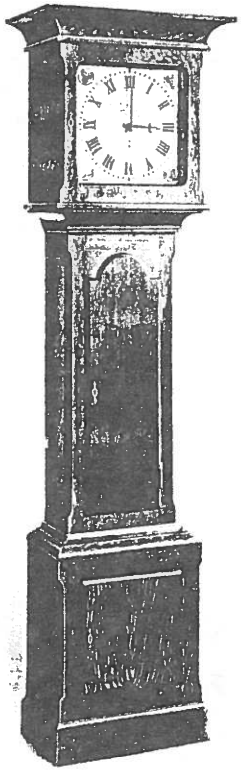


Fig. 26.
A "Standard Grandfather" case in oak.

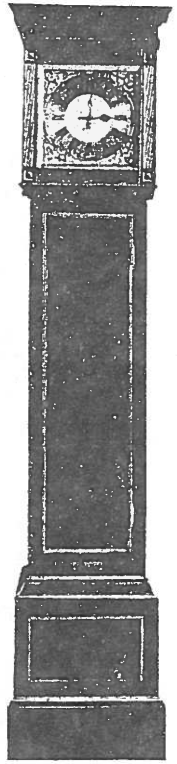


Fig. 27.
Special design
Mahogany Grandfather

Master Clocks (*continued*).

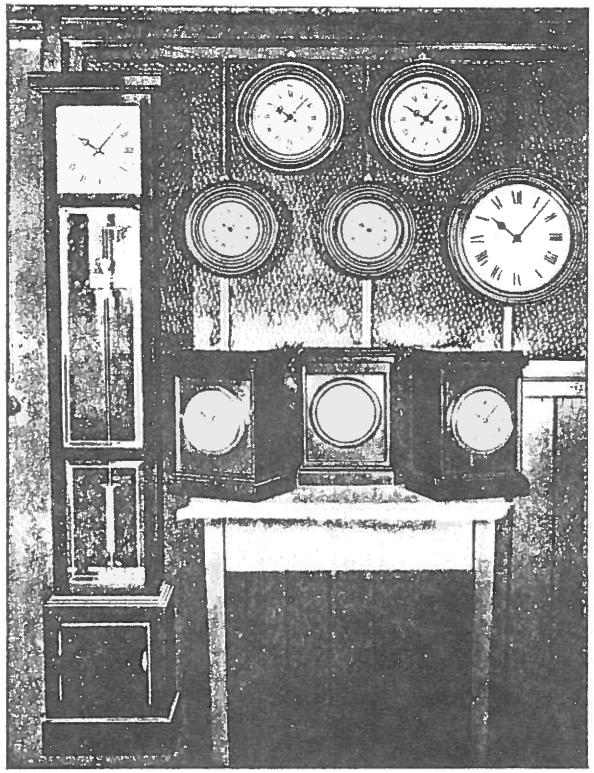


Fig. 28.

"Pedestal" Mahogany Full-seconds "Master," with special dials made for the Hong-Kong and Shanghai Bank.

CODE F.3. Standard Full-seconds "Master" clock, in oak case, but with silvered engraved dial.

F.4. Ditto, in mahogany case.

The preceding four standard cases are as Fig. 23.

F.5. "Pedestal" Full-seconds "Master" clock, in oak case, and with silvered engraved dial.

F.6. Ditto, but in mahogany case.

Figs. 24 and 25 illustrate the above "Pedestal" pattern.

CODE F.G.7. "Standard Grandfather," case in oak, with enamelled dial.

F.G.8. Ditto, but with Old English style brass dial.

Fig. 26 illustrates the above "Standard Grandfather,"

F.G.9. Special Design "Grandfather," case in mahogany, with Old English brass dial, as illustrated by Fig. 27.

As well as above standard pattern cases, we can supply special designs to any requirements.

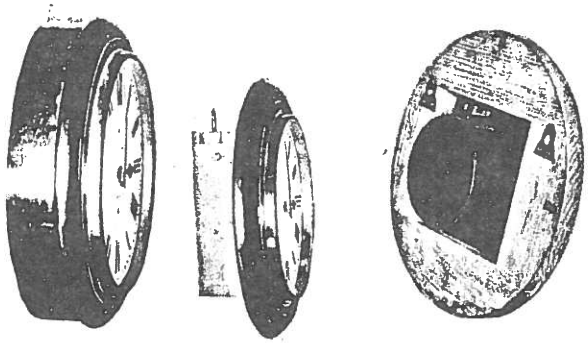
RECEIVING CLOCKS.

ANY NUMBER of "Receiving" clocks can be actuated by ONE "Master" clock, and we manufacture a series of "receiving" mechanisms on the "Rotary Armature" patent, for use according to the size of the subordinate clock, whether the latter be a 6 in. mantelpiece clock or a 6 ft. outdoor tower clock.

The dials (or faces) of our clocks comprise an exceptional selection of artistic designs, while the standard Roman figure style as used in our plain clocks is clear and easily read. The "standard" plain dials are enamelled by special process, accurate in every particular, of perfect finish, and will stand any climatic conditions.

Where sizes are given, the figures represent the *dial* exact diameter *without* the surrounding casework. If the average case be included the sizes are approximately :—

Diameter of Dial,	8 in.	10 in.	12 in.	18 in.	24 in.
Outside Diameter of Case,	11 in.	13 in.	15 in.	23 in.	31 in.



"A" "B" "C"

Fig. 29.

Fig. 29 shows three methods of plain casework. "A" is our "Drum" pattern clock, "B" is the "Standard Backbox" pattern, and "C" is a method of construction with metal backbox, where the clock mechanism is to be let into the wall and the case to lie flat.

Pattern "B" is the simplest and most generally used, and with pattern "A" is always in stock in standard sizes.

"Standard" Back-box Pattern Clocks

in round cases, either oak or mahogany, fitted bezel and glass and back-boxes, as illustrated by Fig. 30.

CODE

D.S.1.	Standard	6 in.	clock	in oak
D.S.1a.	,,	6 in.	do.	in mahogany
D.S.2.	,,	8 in.	do.	in oak
D.S.2a.	,,	8 in.	do.	in mahogany
D.S.3.	,,	10 in.	do.	in oak
D.S.3a.	,,	10 in.	do.	in mahogany
D.S.4.	,,	12 in.	do.	in oak
D.S.4a.	,,	12 in.	do.	in mahogany
D.S.5.	,,	18 in.	do.	in oak
D.S.5a.	,,	18 in.	do.	in mahogany
D.S 6.	,,	24 in.	do.	in oak
D.S.6a.	,,	24 in.	do.	in mahogany
D.S.7.	,,	30 in.	do.	in oak
D.S.7a.	,,	30 in.	do.	in mahogany

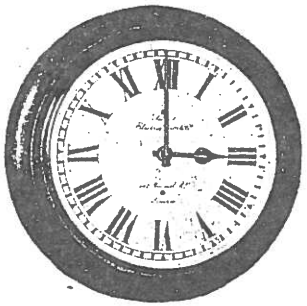


Fig. 30.

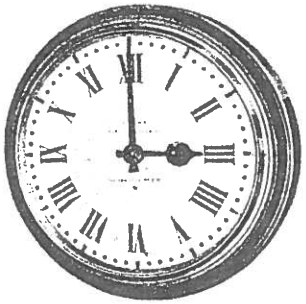


Fig. 31.

Drum Pattern Clocks

in solid built up drum cases in either oak or mahogany, fitted with bezel and glass and with dial either in minute divisions same as the Standard clock or, if preferred, with dots as shown by illustration (Fig. 31).

CODE.

D.D.12.	8 in.	Drum	in	oak
D.D.12a.	8 in.	,,	,,	mahogany
D.D.13.	10 in.	,,	,,	oak
D.D.13a	10 in.	,,	,,	mahogany
D.D.14.	12 in.	,,	,,	oak
D.D.14a.	12 in.	,,	,,	mahogany
D.D.15.	18 in.	,,	,,	oak
D.D.15a.	18 in.	,,	,,	mahogany

Plain Factory Clock

in metal case, fitted with metal removable back-box covering mechanism.

D.F. 24. Fitted with 12 in. dial.

SPECIAL DESIGNS.

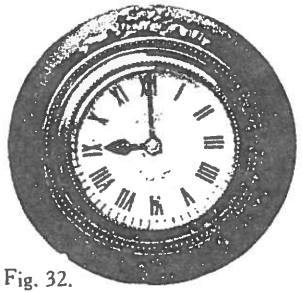


Fig. 32.

CODE D.31. The "Piccadilly" Dial; a neat little 5 in. dial, with a screwed-on solid brass bezel; similar design to that in use throughout the Piccadilly Hotel, London, where some three hundred dials are installed. "Roman" figures usually preferred.

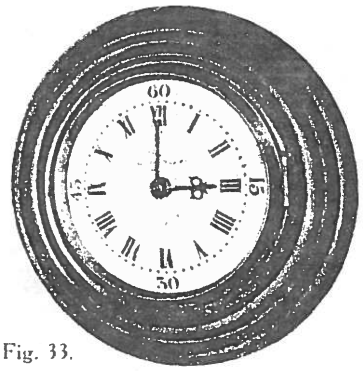


Fig. 33.

CODE D.32. The "Gale" Dial; a 6 in. convex cream tinted Old English style dial in handsome oak case; the design of the dial taken from an XVIIIth Century watch.

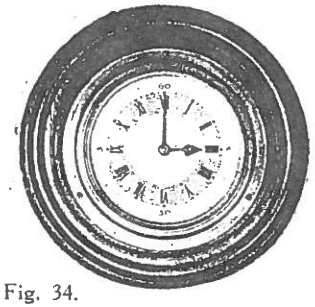


Fig. 34.

CODE D.33. "The Bank" dial; silvered 6 in. dial with screw-on bezel and in substantial oak case. Bezel, heavy oxydised bronze effect.

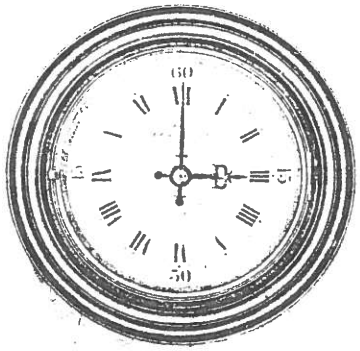


Fig. 35.

CODE D.34. Special Design; 10 in. dial, "Gale" pattern, Old English style, convex dial and glass. As supplied for use by H.M. Post Office.

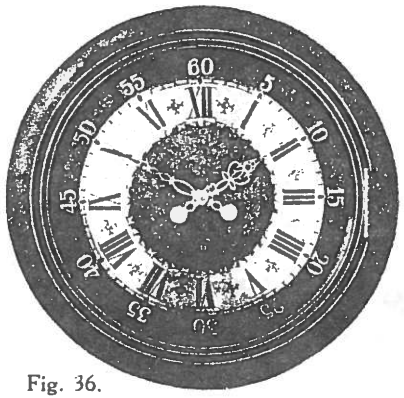


Fig. 36.

CODE D.35. Special French design, silvered engraved centre upon gilt background and raised minute figures with 12 in. face.

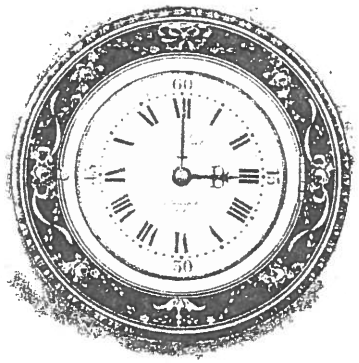


Fig. 37.

CODE D.36. Special Design; 6 in. "Gale" dial with satinwood case, hand-painted floral decorations, convex cream-tinted dial and convex glass.

Receiving Clocks. Special Designs (*continued*).

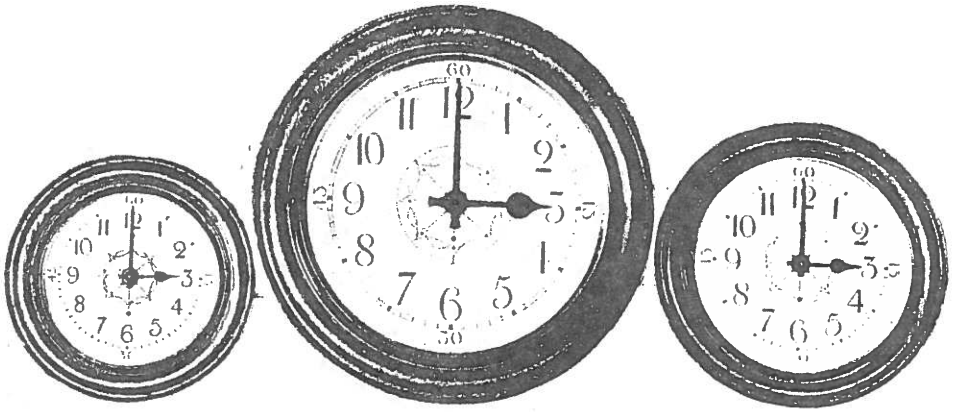


Fig. 38

CODE D.37. Special silvered engraved arabic figure 8 in. dial in oak case
D.38. Ditto, with 10 in. dial. D.39. Ditto, with 14 in. dial.

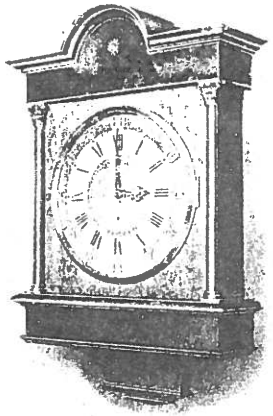


Fig. 39.

CODE D.40. Design similar to D.35, 12 in. dial mounted in handsome pedestal mahogany case.

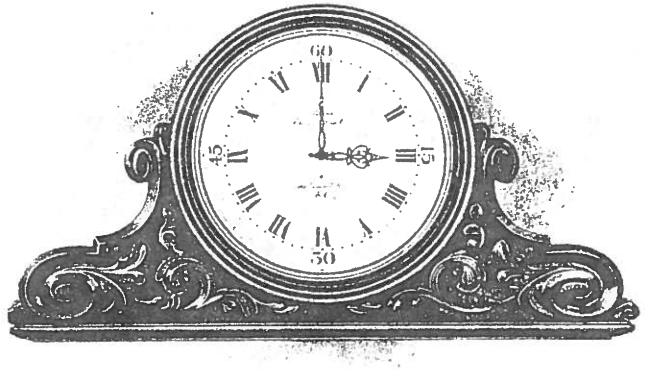


Fig. 40.

CODE D.41. Special design large overmantel clock with 18 in. dial and with solid mahogany pedestal.

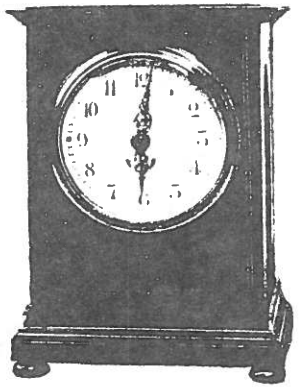


Fig. 41.

CODE D.42. Special small Sheraton mantel clock with 4 in. dial, arabic figures, in oak (D.42) or mahogany (D.42a) inlaid design.

To be continued.

Continued from June, 2004 issue.

Manufacture of meters resumed —1944.

The gigantic expansion of manufacturing facilities, the construction of military camps and immense defense housing projects, added to all the other unusual demands imposed by war, brought tremendous increases in consumption of electric power. This power must be measured and conserved; and near the end of 1943 the War Production Board authorized production of 150,000 singlephase, watthour meters during the next six months. Sangamo's allotment, as one of four manufacturers, was 40,000. As a result of this authorization the company resumed the manufacture of meters, although it did so without interference with its war work.

Sangamo designs new submarine detecting apparatus—1944–1945.

AS American scientists and technicians sought to develop ever more effective instruments of war, one of the National Research Laboratories devised a new system of submarine detection; and the Navy chose Sangamo to perfect the practical application of the idea. This was the first submarine detecting apparatus designed and manufactured entirely by Sangamo. In the spring of 1945 the first unit was installed in a destroyer for deep-sea tests off the Atlantic coast. Other destroyers were standing by, and in the course of the tests one of them picked up a radio message reporting that a freighter had just been torpedoed by a submarine not very far off. The whole flotilla steamed away in pursuit, and as the ships approached the designated spot the destroyer carrying Sangamo's new equipment picked up the U-boat. The raider was sunk. And inasmuch as the incident occurred on the Saturday night before V-E Day, the marauder may well have been the last U-boat to be destroyed.

An amusing incident occurred in connection with another test of submarine detecting equipment in which Charles H. Lanphier participated as a representative of the company. A destroyer and a submarine were to work together in the tests, and as the commanders of the respective vessels discussed procedures before leaving base, the sub commander asked the destroyer captain how deep he should submerge. The captain suggested 150 feet. But the Army-Navy football game was being played that afternoon and the submarine's radio antenna, attached to the periscope, submerged at 55 feet. The skipper was reluctant to go below that level, since to do so would cut off the football broadcast, so the tests were run off at 55 feet until, late in the afternoon when Army had piled up a commanding lead, the disconsolate submarine commander signalled that he would go down to 200 feet, or even to the bottom, if the captain gave the word.

Training military technicians.

AS Sangamo developed more intricate apparatus for the armed services, especially for the Navy, company engineers were sent to various military training centers to supervise tests or to instruct the service personnel in the use of the new equipment. The Navy also established a training school at the plant, where the men who were to service and repair the various instruments not only attended classes but

also studied every manufacturing process as the apparatus passed along the assembly lines. From twelve to eighteen of these trainees, under the command of a petty officer, were in the plant most of the time, and as the equipment was completed and shipped, these technicians—radio men, mechanics, electricians—were sent to Iceland, North Africa, England, Australia, the Pacific islands, as the case might be, right along with the equipment they were to maintain. The company not only provided plant men to conduct these training courses, but in some cases even found lodgings for the trainees. The Navy required the men to drill for at least an hour a day, so the petty officer would take them across the street from the plant and put them through exercises and maneuvers, matters on which he confessed he must do some brushing up himself.

Burdens imposed by government contracts.

ARMY and Navy inspectors in varying numbers were in the plant throughout the war to check on the quality of the product at every stage of manufacture. Bookkeeping methods must be brought into accord with government accounting practice; and since the company was held strictly responsible for every item of allocated material, it had to work out systems to keep track of them at every stage. Altogether, there was a prodigious increase in paper work.

Comparison of profits in peace and war.

NOTWITHSTANDING the tremendous increase in volume of business resulting from the war, Sangamo's profits actually declined due to renegotiation and excess profits taxes. During the war years—1942 through 1945—sales after renegotiation averaged $11,053,085 per year as against $4,837,861 in the four preceding years of peace. Yet profits for the war years averaged only $558,887 as against an average of $595,748 in the four preceding years. Thus the percentage of dollar volume retained by the company as profit not only declined from an average of 12.31 percent to 5.06 percent, but profits also showed an actual dollar decrease averaging $36,861 per year.

The Retirement Income Plan—January 1, 194

AT the beginning of 1944, Sangamo was obliged to modify its Pension Plan, with its 50-50 contributions from employer and employee, in order to conform with certain Treasury Department rulings. Under the plan as revised, Sangamo assumed the payment of all costs instead of requiring a contribution from employees as heretofore. To provide a more adequate retirement income, the company instituted the Retirement Income Plan, which provided for a supplemental retirement wage. Thus, at retirement, an employee of fifteen years service now receives an annual income equivalent to 35 percent of his last annual wage, his income increasing to 40 percent for thirty or more years of service.

A labor election —December, 1944.

SINCE 1937, eligible employees had bargained with the Sangamo management through the Selco Employees Association, an independent union. In December, 1944, as a result of an election conducted by the National Labor Relations Board, employees selected the Selco Employees Association to represent the production and maintenance workers, the International Association of Machinists to represent the tool and die makers, and the American Federation of Labor to represent the steam plant employees. These unions have continued to represent their respective units, and relations between management and employees have remained harmonious.

Discontinuance of the Weston subcontracting agreement. Production in 1945.

ON December 31, 1944, Sangamo closed out its subcontracting agreement with the Weston Electrical Instrument Corporation under which the Springfield company had manufactured a variety of instruments of Weston design. That company, together with other regular instrument manufacturers, could now handle the whole volume of government business and Sangamo, having helped meet the emergency, was left free to produce and develop other military apparatus. During the following year the War Production Board substantially increased the number of standard watthour meters to be manufactured to meet the requirements of the public utility companies, and by the end of the year Sangamo was making about half as many meters as would have constituted its normal pre-war output. These meters were not classed as civilian goods, but were

channelled through the Office of War Utilities. Added to Sangamo's other war work, they taxed the company's productive facilities and manpower to the limit. Again sales established a new record, $13,500,000 after renegotiation.

Cessation of hostilities.

IN the summer of 1945, Sangamo was tooling for the manufacture of additional war products. On August 14, however, came V-J Day, and hostilities ceased. At that time Sangamo was manufacturing military apparatus at its maximum rate.

Citations for excellence.— Employees' service record— 1942–1945.

AS early as December 5, 1942, Sangamo had been awarded the Army-Navy "E" in recognition of its contribution to the war effort. The following June it was awarded its first star, which was followed by three similar awards at six months' intervals. Thus Sangamo was one of a few companies to receive five citations for excellence; and in addition it was cited for excellence in plant security, and by the Navy's Bureau of Ships and Bureau of Ordnance for extraordinary engineering and manufacturing contributions. Sangamo Weston received the British Empire Medal for its war service, the award being made by King George VI in person. At the conclusion of hostilities the armed services had claimed 490 of Sangamo's employees, 60 of them women. Twelve gold stars were conspicuous on the company's service flag, and the names of those who died were inscribed on a memorial erected on the company grounds in 1948.

Problems of reconversion—1945.

NOW, with the war ended, came immediate cancellation of military orders and the problems of reconversion to a peacetime basis of operations. The company was fortunate in having been permitted to resume production of meters during the last two years, for this business could now be continued and expanded while other production facilities were changing over for manufacture of normal lines. There was a heavy backlog of meter business and demand for capacitors far exceeded what it had been before the war. Time switches and tachographs were also in demand and some Navy contracts were continued. Major problems confronting the company were the procurement of raw materials, many of which were in short supply by reason of nation-wide strikes, and price ceilings, which were too often maintained rigidly despite increased costs due to wage and raw material price increases.

Adjustment to peacetime production—1946.

BECAUSE of these and other reconversion difficulties the company was obliged, soon after V-J Day, to lay off about 500 of its 2,664 employees. Many of these, however, were women who had been working only as a war measure; and before long employment was again on the increase. Some price relief was granted on capacitors almost immediately, and further adjustments came throughout the year. Even so, Sangamo, like industry in general, was in almost constant negotiation with the Office of Price Administration as government tried to combat inflation and industry sought relief from controls under which it was difficult if not impossible to operate.

Changes in executive personnel—1946.

AS the employment situation eased, Sangamo reinstituted compulsory retirement at age 65. Under this rule, J. H. Hodde resigned as secretary after more than forty years of loyal service. Mr. Hodde continued as a director of the company for two more years when he was succeeded on the board by Russell C. Bennett. Two other executive vacancies were occasioned in 1946 by the death of Charles R. Horrell, vice-president and sales manager, who had been with the company for 27 years, and the retirement of Charles Goin Lanphier, another vice-president with a long and active record. These losses necessitated reorganization of the company's executive personnel, and Charles H. Lanphier was elected a vice-president, while Cecil L. Clark became secretary-treasurer.

Plant addition at Springfield 1946.

AS the company entered upon its first full year of peacetime operations the chief problem was production rather than sales, and it soon became apparent that additional manufacturing space would be needed to meet the pent-up demand for commercial products that had been in short supply for four years. Demand for singlephase watthour meters, for example, mounted steadily, with sales eventually reaching two and one-half times the highest pre-war figure. Polyphase meters, demand meters and thermal meters could be sold as fast as they could be

made, and demand for capacitors had been tremendously increased by wartime developments.

To meet the need for additional space, it was decided to connect the Sangamo buildings with the Watch Factory structures in such a manner as to link the whole layout together as an efficient manufacturing unit. To do this, two new buildings were constructed, one designed to house the painting and plating department, and the other for the shipping department. Altogether, 30,000 square feet of manufacturing space were added with concomitant promotion of efficiency. A new Quonset warehouse provided an additional 10,000 square feet of storage space.

An increase in outstanding common stock—1946.

THE cost of the new buildings together with rehabilitation of the boiler room and necessary repairs to the Watch Factory buildings was in excess of $250,000, and was financed in large part by the sale of 8,000 shares of unissued common stock, thus making 286,000 shares of common stock outstanding.

The capacitor division moves to Marion—December, 1946.

EVEN with this increased capacity the company was pressed for space, and there were also forebodings of an impending labor shortage in Springfield. After a temporary dip, employment had now risen to 2,400. All returned veterans—some 300 to date—had been placed, and the company was experiencing increasing difficulty in filling its employment needs. Accordingly, the company officials made investigations of buildings immediately available in

other cities and finally decided to lease space at the former Illinois Ordnance Plant from the War Assets Administration. Located in southern Illinois about equi-distant from Marion, Herrin and Carbondale, the proposed new plant was in an area well adapted to manufacturing enterprises and affording an ample labor supply. A five-year lease was signed, buildings were reconditioned and equipped, and by late December, 1946, the company's entire capacitor operations had been moved to the new location.

Expansion at Marion—1947.

IN January, 1947, the company decided to expand its activities in the capacitor field still further by producing electrolytic capacitors. Engineers were employed to design the equipment and product and 50,000 additional square feet were rented from the government, bringing the total capacity of the Marion plant to 110,000 square feet.

Sales turn upward.—New plant facilities in Canada—1947.

THE year 1947 was the best in Sangamo's history up to that time, with sales, which had dropped to a postwar low of $9,904,000, now climbing back to a new record of $16,573,000. In Canada, Sangamo Limited, which was now operating in a modern, one-story factory in the northeast part of Toronto that had been completed during the war, was progressing so well that a new unit was purchased in the town of Newmarket, thirty miles north of Toronto, for the manufacture of mica and paper capacitors, radiosondes and certain other products which supplemented the output of the main factory.

Postwar position of Sangamo Weston.

SANGAMO WESTON, which, besides experiencing labor and raw material problems, was confronted with the threat of nationalization of the British utility industry, had overcome the difficulties of reconversion and would soon be turning out meters, time switches and other instruments in excess of its pre-war rate. The British government, in accordance with its program of encouraging exports in order to supply itself with foreign exchange, was allocating materials to the company for volume production of meters for export to South Africa and South America.

Introduction of type H motor and S time switch, 1947–1948.

SANGAMO made substantial outlays for machinery, equipment and plant rearrangement in order to modernize thoroughly its Springfield plant. New commercial products were at a minimum in this period due to the complete preoccupation of the engineering staff through the war years with military designs. The type H low speed hysteresis motor was introduced, and incorporated into the complete time switch line, singlephase and polyphase demand attachments, and the combination time switch watthour meter. Additionally, the new low-price small-size type S time switch was introduced to the market and a new type of instrument transformer with improved impulse insulation was announced.

Sales soar to all-time high—1948.

WHILE introducing these new items in the commercial field, the company also received new contracts from the Navy for both development and

manufacture of equipment which had been under experimental development by the company during the war. In 1948, sales from the Springfield plant soared to a new all-time record of $21,139,000, and the number of employees increased to 2,732 of whom 440 were members of the Fifteen Year Club. Capacitor sales, which had amounted to $123,968 in the last year before the war, were now $1,255,000.

Thus Sangamo enters upon its fiftieth year of corporate existence, housed in modern quarters equipped with up-to-date machinery. Its finances are sound. Its workers are well paid and well provided for under a liberal retirement plan. Proud of its history, grateful for the loyalty and efficiency of its technological staff and working personnel, ready to assume its full measure of responsibility in peace or war, Sangamo faces the challenge of the future.

Sangamo and **Hamilton Sangamo** movements, motors, platforms, and other parts. Send SASE for list. Harvey Schmidt, 75-80 179th Street, Flushing, NY 11366 or wwlathlot @AOL.com.

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

MUSEUM WANDERINGS

Science Museum

Bain Electric Clock (ALEXR. BAIN'S PATENT ELECTRIC CLOCK No. 115)

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The circular pendulum bob is magnetised, and at each end of a swing it enters one or other of two coils mounted on the clock case.

An electric contact is made every double swing by means of a metal slider which runs in two grooves in discs one of which is partly of metal and partly of insulator. When the contact is made a magnetic impulse is given to the pendulum, making good the losses of energy due to friction.

The clock hands are moved forward by a simple ratchet wheel and pawl mechanism, the pawl being attached to the pendulum near its top.

Inv. 1962–131

--- MART ---

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THE JOURNAL OF THE ELECTRICAL HOROLOGY SOCIETY

CHAPTER #78
NATIONAL ASSOCIATION OF WATCH & CLOCK COLLECTORS

VOLUME XXX #4, DECEMBER 2004

Fellow Horologists:

Good News! Dues are due and still only **$10!** It`s Mart "clean-out" time with the March issue of the Journal. Update or change your ad. Those of you who have utilized this free Chapter #78 membership benefit, please notify our chapter Secretary, Harvey Schmidt that you wish to continue your listing. Of course, you can always add a listing to the Journal Mart at any time.

This issue of the Journal of the Electrical Horology Society continue the series on the Silent Electric Clock Company and the ECO Magneto Clock Company. Thanks to Steve Sadowski this issue starts the reproduction of the 1923 Self-Winding Clock Company Manual entitled "Instructions for Installation and Maintenance of Self-Winding Synchronized Clocks."

By way of upcoming plans for the Journal, we plan to publish a new index of Journal articles next year. Please let us know if you feel that it is worth making the Index available on the Internet in addition to a hard copy version in the Journal. Many other chapters have done this - should Chapter #78?

Plans are under way to hold a NAWCC Time Symposium (used to be identified as the NAWCC Seminar) concerning electrical horology. The Symposium is tentatively planned to be held in Springfield, Illinois (Home of the Sangamo Clock) and is scheduled for the end of October, 2006. Mark your calendars now. Please let me know if you are interested in attending and/or presenting a paper at this conference.

Best Holiday wishes and a prosperous and healthy New Year to you and yours.

Enjoy this issue of the Journal.

Bill Ellison.....President
Harvey Schmidt, FNAWCC,.....Secretary-Treasurer) Co-Editors
Dr. George Feinstein, FNAWCC..Chapter Historian)

HARVEY SCHMIDT, FNAWCC, Secretary-Treasurer, 75-80 179th ST. FLUSHING NY 11366

INSTRUCTIONS

FOR INSTALLATION AND
MAINTENANCE OF

SELF-WINDING SYNCHRONIZED

CLOCKS

SELF WINDING CLOCK COMPANY
205-211 WILLOUGHBY AVENUE
BROOKLYN, N. Y.

2

DIRECTIONS

For Installation, Regulation and Care of

SELF-WINDING SYNCHRONIZED

CLOCKS

Also Instructions for Unpacking and Repacking

Used in The Western Union Telegraph Company Service and Receiving Naval Observatory Time Signals

Manufactured by

SELF WINDING CLOCK COMPANY
205-211 WILLOUGHBY AVENUE
BROOKLYN, N. Y.

Form 84—5M—12-23

INSTRUCTIONS

FOR INSTALLATION AND

MAINTENANCE OF

SELF-WINDING SYNCHRONIZED

CLOCKS

SELF WINDING CLOCK COMPANY

205-211 WILLOUGHBY AVENUE

BROOKLYN, N. Y.

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UNPACKING

The Following Instructions Apply to All Styles Except No. 9 and No. 33, 14″ Dial, which are Shipped with Pendulums Detached: (See Note)

First: Carefully remove cover from packing box—using a nail puller. If this is not available, the cover should be pried sufficiently to raise the nails—then use a claw hammer for drawing the nails.

Second: Remove the clock key (9), Fig. 1, and the small package containing the screws for hanging and fastening clock to the wall.

Third: Remove the cleats that hold strips (1 and 2). Remove all packing pads (4, 5, 6, 7 and 8). Carefully examine interior of packing case and remove any nails or other material to prevent damage to clock case.

Fourth: All wood cleats, packing pads and the wood bob blocks (3) to be placed in packing case after clock has been removed. Re-nail cover of packing case and store same for future reshipment.

Note: With style No. 9 clock, the pendulum ball is packed in a separate bundle, placed in compartment at top of packing case. The pendulum rod is wrapped separate and packed at side of clock case.

Style No. 33, 14″ dial clock, Fig. 3, is packed without wood strips and can be removed from packing case by taking out the packing pads. The pendulum for style No. 33, 14″ dial, is packed in a separate bundle, placed in compartment at top of packing case.

PACKING CLOCKS FOR RETURN SHIPMENT

First: Be sure that pendulums are carefully blocked down to the back of the clock case, using the two wood bob blocks (3), Fig. 1, bolts and nuts (10), and wood screws (11). For method of bolting see (3), Fig. 1. Pendulums for No. 9 and No. 33, 14″ dial, to be detached and packed separately as described in above note.

Second: Place clock in packing case, using the packing pads and strips as shown in Figs. 1, 2 and 3. If any loose or broken parts are to be returned, they should be wrapped in a separate package and placed in compartment at top of packing case, or in the space at side of clock case.

STYLE No. 18 CLOCK

Method of Packing

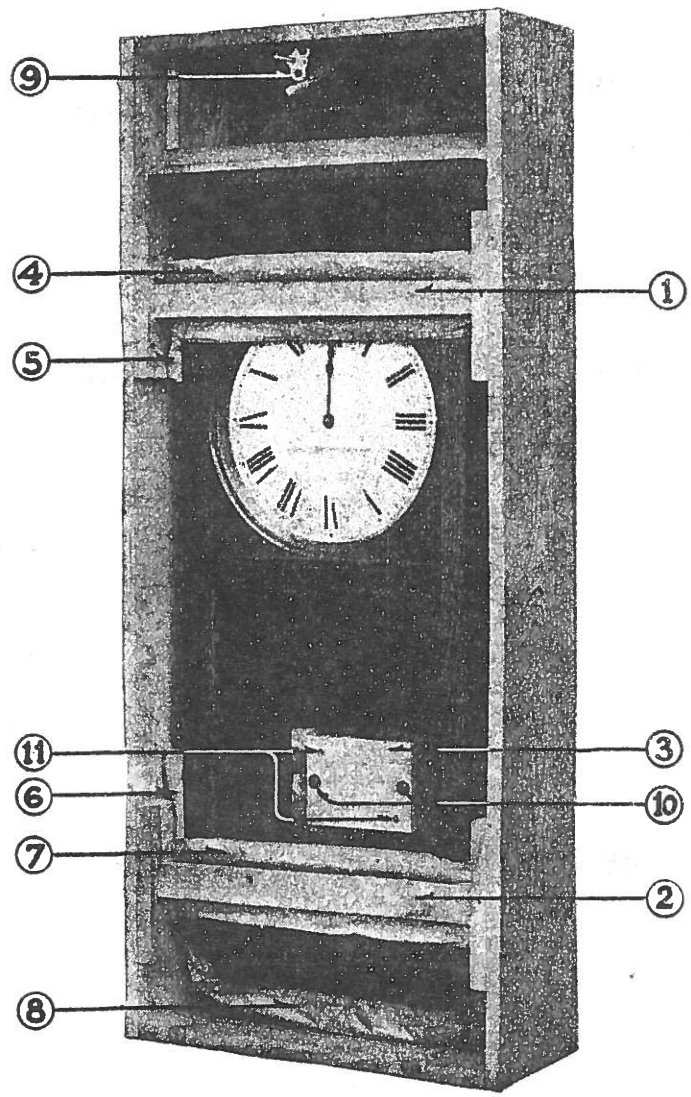


Fig. 1

STYLE No. 29 CLOCK

Method of Packing

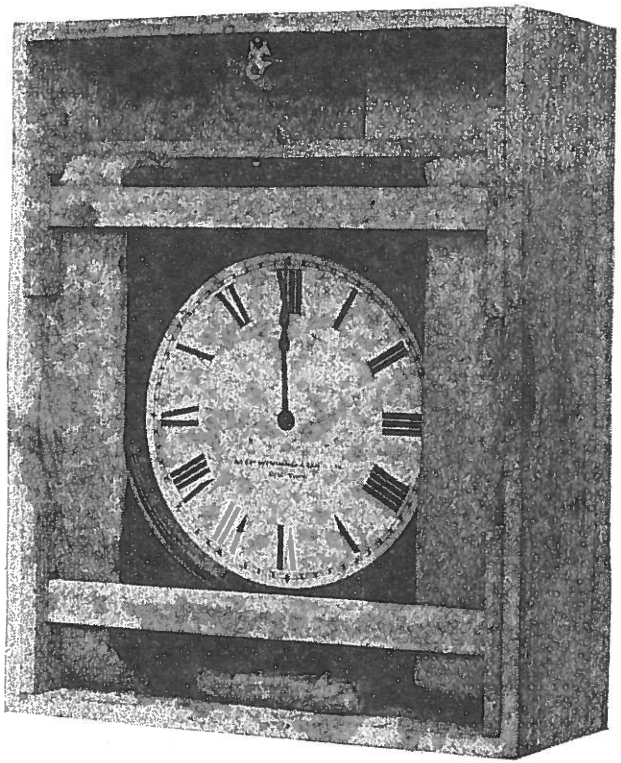


Fig. 2

Third: Wood strips should press tight against packing pads at top of clock case before they are nailed.

Fourth: Remove old markings on exterior of packing case and re-address to SELF WINDING CLOCK COMPANY, 205-211 Willoughby Avenue, Brooklyn, N. Y.

STYLE No. 33 CLOCK

Method of Packing

Cardboard Signs Only, Furnished with this Style

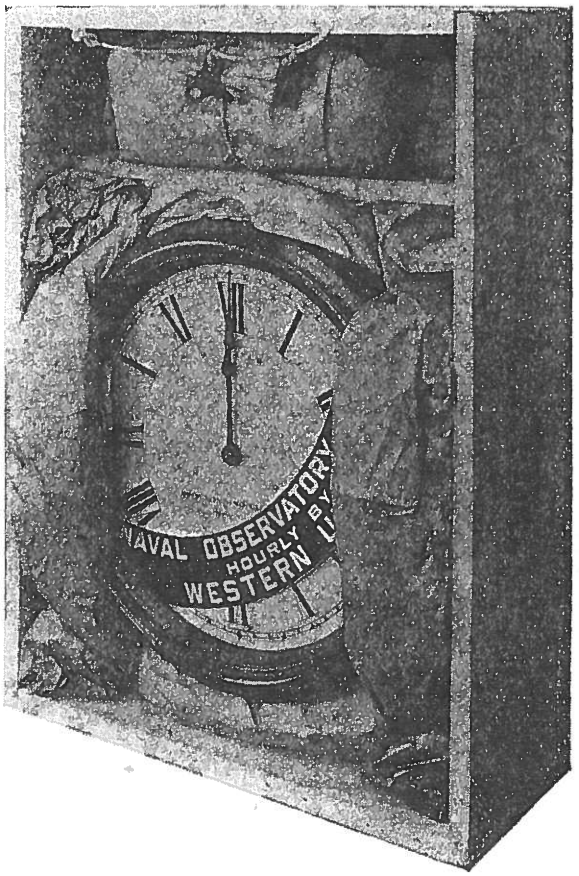


Fig. 3

DIRECTIONS FOR INSTALLING CLOCKS

First: Hang clock on wall where it is to be located by the hanger at top rear of case. The hanger screw should be put into wall firmly and with the head of screw slanting up so that clock will settle flat against the wall. Do not remove the wood clamps which hold the pendulum ball until the clock is on the wall. If pendulum is loose while clock is being hung up, and allowed to swing to one side, it will put the clock out of beat. When the wood clamps are fastened with bolts, and the nuts are on the back of the case, take off the nuts and let the bolts remain. If the nuts are inside the case take them off and change the bolts around to the front, then, when the clock is hung up, carefully take out the bolts and let the clamps drop. When opening the case, and before the lower part of case is fastened to the wall, be careful that it does not swing to one side by the weight of the door.

Second: *The case must be plumb.* Plumb it by the pendulum, the lower point of which must register with the center line of the degree scale, and the rod must be parallel with the back of case. When plumb fasten the lower end of case firmly to the wall with screws provided.

Third: Connect two cells of No. 6 Columbia dry battery to the flexible wires furnished with each clock. The *blue* wires are battery connections to *zinc* terminals. The *red* wires are battery connections to the *carbon* terminals.

Fourth: Connect synchronizing line to binding post terminals in upper right hand corner of clock case.

Fifth: When battery is connected, press starting key in upper left hand corner of clock case for approximately 15 seconds. Start the pendulum by giving it a gentle push and set hands to correct time.

Sixth: All clocks can be hung without removing the dial and hands, *except* style No. 29, 8", 10" and 12" dial, and style No. 33, 14" and 18" dial. With these styles the dial and hands must be removed to give access to the pendulum bob blocks for the purpose of removing same. When replacing the dial and hands be sure that minute hand is pushed down the full distance on the square of the minute socket. The hour hand must be pushed down on the hour wheel sleeve sufficient to allow a slight play between the back of the minute hand and the top of the hour wheel socket.

STYLE No. 10 CLOCK

Interior Wiring and Connections

14" Dial Only—120 Beat Movement

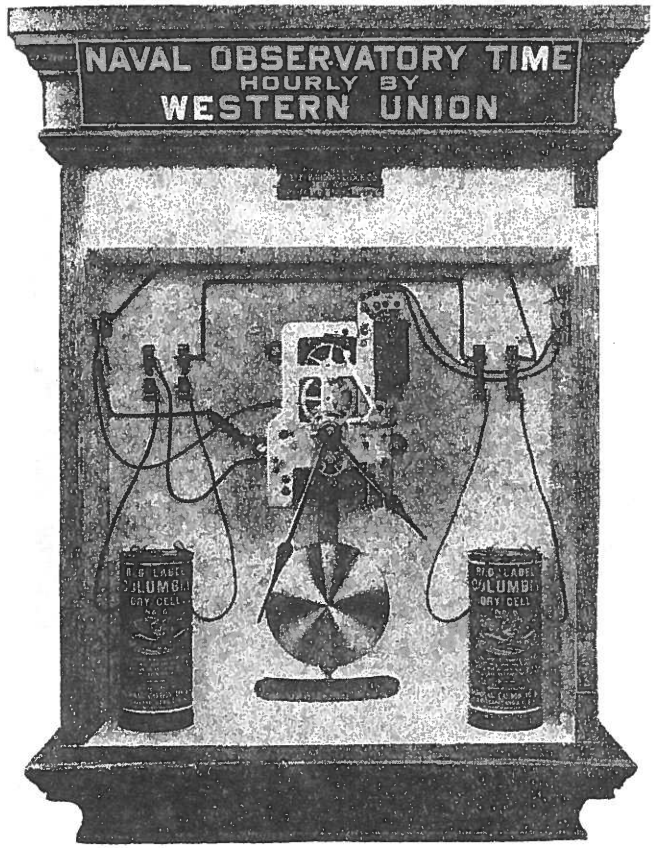


Fig. 4

Seventh: Self-winding clocks can be easily regulated within 2 or 3 seconds per day by raising and lowering the pendulum ball. If conditions permit it is recommended that a little time be allowed for manual regulation after the clock has been installed and before it is connected to the synchronizing line.

To be continued.

Receiving Clocks, Special Designs (*continued*).

In addition to the preceding special patterns—examples of which are generally in stock—we can submit designs of dials and casework to any requirements. We have specialised in dials of various periods and the following are a few examples of dials designed by us.

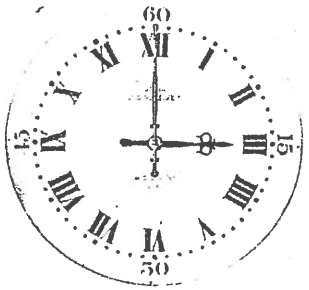


Fig. 42.
CODE D.43. As designed for an Old English Dining Hall and should be mounted in dark bronzed bezel.

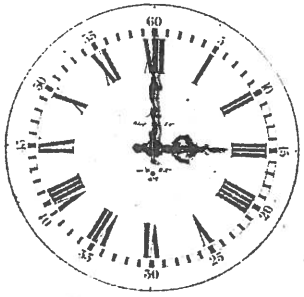


Fig. 43.
CODE D.44. Special Louis XVI style, and should be surrounded by gilt bezel.

Fig. 44.
CODE D.45. Jacobean dial in antique brass style.

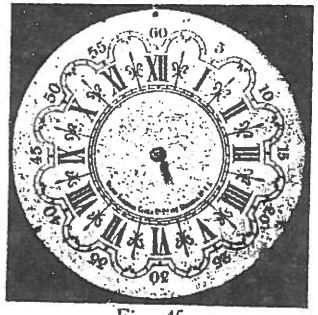


Fig. 45.
CODE D.46. Georgian dial in gilt finish.

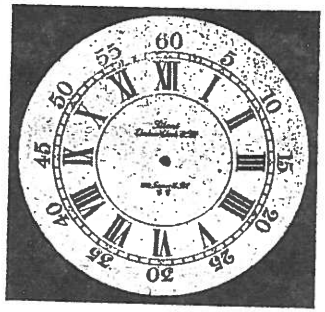


Fig. 46.
CODE D.47. Queen Anne dial, cream enamelled face

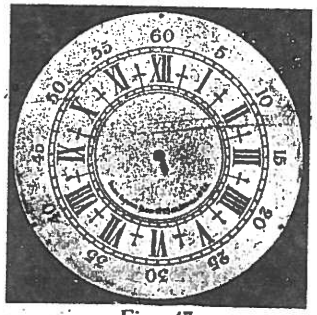


Fig. 47.
CODE D.48. William and Mary dial, metal with silver finish.

We have a variety of additional special Louis XVI and Old English designs.

Continued from September, 2004 issue.

ADAPTATION OF EXISTING VALUABLE CLOCK CASES.

OLD and valuable clock cases, with their own old dials and hands, can be fitted with our "Receiving" mechanisms, and thus without in any way impairing their value as works of art they become perfect timekeepers, showing the same time as throughout the rest of the house installation.

A point worthy of special attention is that our "Receiving" mechanisms are actuated *solely by electric impulses*, and do NOT contain any fictitious aids (such as back-stops, the action of which depends upon the upright position of the clock)—and consequently a clock fitted with our "SILECTOCK" mechanism will continue to record its time perfectly even if laid on its side, or even upside down. For mantel clocks this is an important feature.

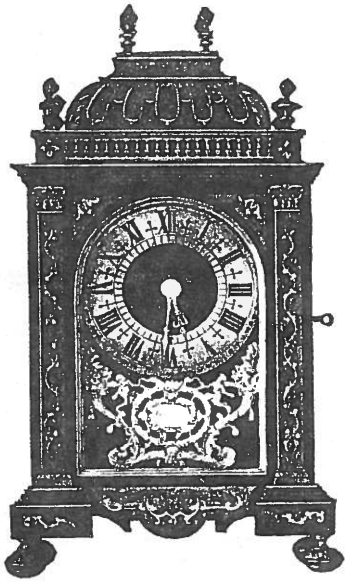


Fig. 48.
Example of fine old inlaid tortoiseshell French Mantel Clock fitted with our "Receiving" mechanism.

An old grandfather clock, for instance, can be converted into a combined clock and cigar cabinet—by attaching one of our "Receiving" mechanisms to the dial, and utilising the remainder of the case as a cupboard.

Unless, however, a clock is intrinsically valuable, or possesses personal recollections, it is no economy to utilise its case and dial, since our standard plain pattern clocks are available at moderate cost.

TURRET AND OUTDOOR BRACKET CLOCKS.

IT is unnecessary to dilate upon the advantages offered by a large OUTDOOR TOWER CLOCK but its usefulness, whether in a busy Factory, or School, or in the grounds of a country house, is more than doubled when it indicates the SAME TIME as the other clocks installed throughout the premises.

PUNCTUALITY can only be reasonably enforced when the clocks on the premises give UNIFORM TIME.

For ordinary sized outdoor clocks we manufacture three standard patterns of mechanisms.

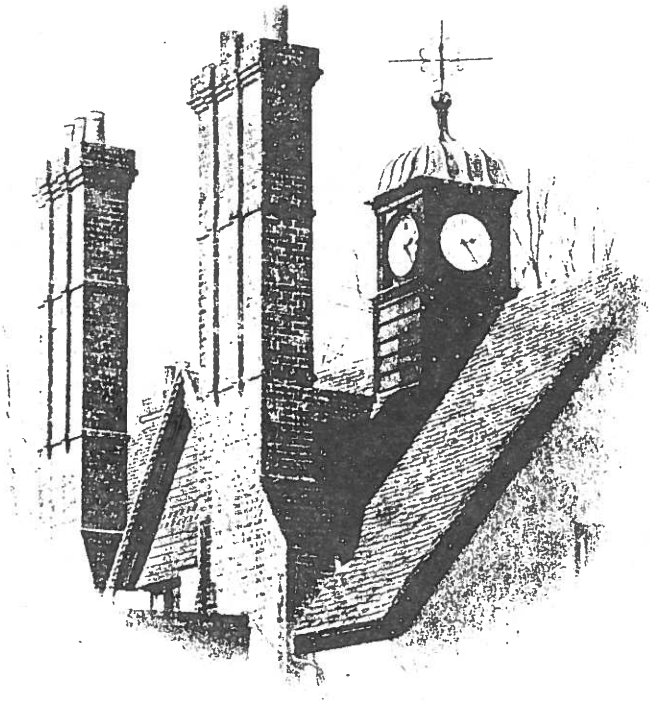


Fig. 49.
An example of a four-faced STABLE CLOCK with light mechanisms and glass protection over the hands.

Our No. 3 is designed for use in clocks with light hands and glass protection over face.

For more substantial clocks, we make two standard sizes of worm-driven heavy Turret mechanisms (similar to illustration on page 16), which are used to drive heavy hands. Glass protection against dirt (or abroad, against sand storms, etc.) may of course be added, but it is not necessary in most instances.

Fig. 50 is an example of a commercial advertising outdoor two-faced bracket clock, glass protection and constructed to a simple bracket design.

Receiving Clocks, Turret and Outdoor Bracket Clocks (*continued*).

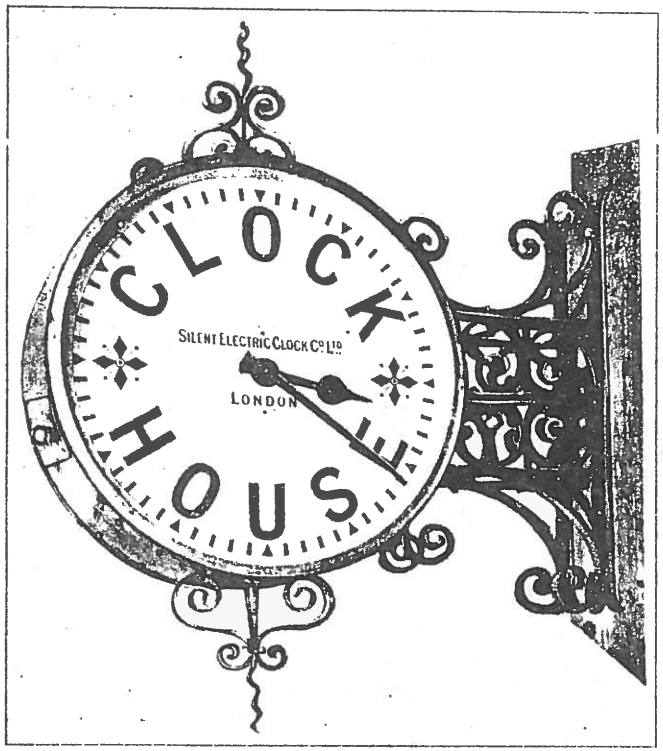


Fig. 50.
Two-faced Clock, 2ft. 6 in. diameter, Standard Bracket Design.
CODE T.D.13.

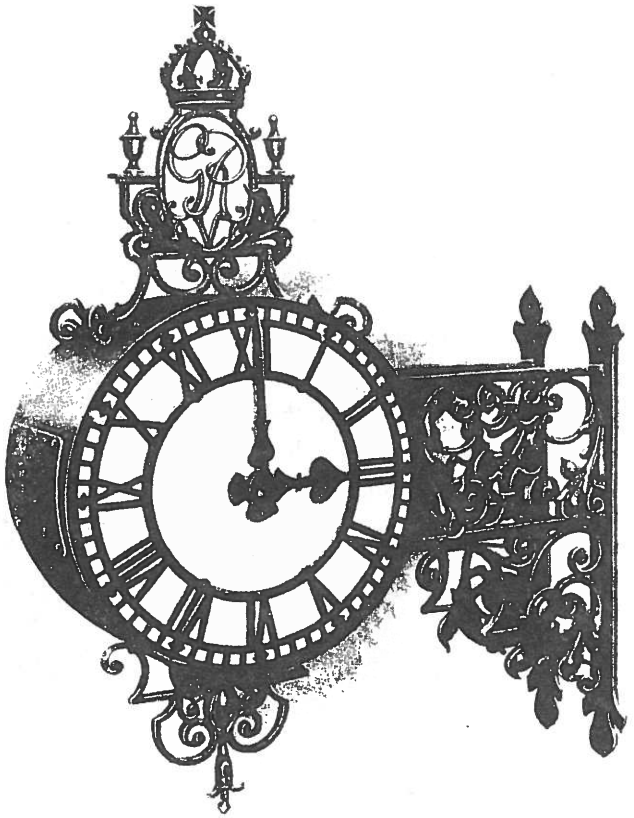


Fig. 51.
Two-faced Clock, 3 ft diameter, Special Bracket Design.
CODE T.D.14.

Receiving Clocks, Turret and Outdoor Bracket Clocks (*continued*).

Fig. 51 is a two-faced bracket clock of more elaborate design, as supplied by us to Government Buildings both in Canada and New Zealand. In this instance, no glass protection was used and heavy exposed hands were used. While it is not possible to illustrate all the varieties of large outside clocks that can be made, these photos give a reasonable idea of the various designs.

A separate leaflet is in preparation to give more detailed information as to sizes and designs of large clocks, as far as these can conveniently be standardised. As, however, in practically every instance, the Tower Clock of a building forms part of the special architectural design, and requires individual attention according to its position and arrangement, the fullest information will be given, and estimate of cost provided, according to the special requirements of each clock.

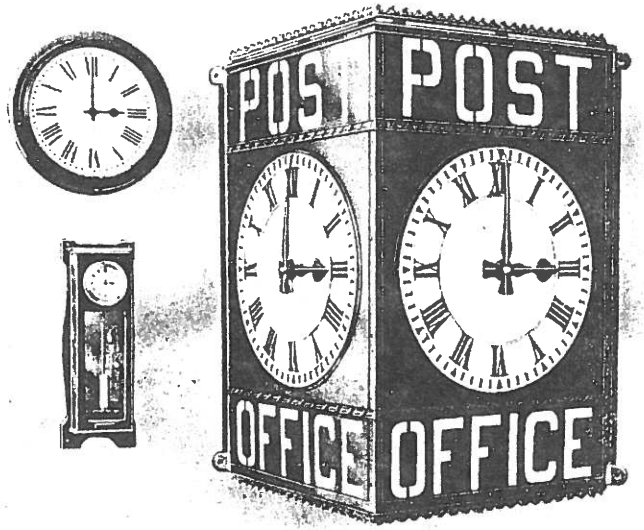


Fig. 52.
Angle two-faced Bracket illuminated Clock, 3 ft. dials, showing actual size of half-seconds "Master" clock and 24 in. indoor dial, as made for the Indian Post Office Department.

When designing Tower Clocks it is essential to provide convenient access to the clock mechanisms. While the "SILECTOCK" "receiving" mechanisms in a Tower Clock possess immense points of advantage over ordinary mechanical weight-driven clocks, for instance, as regards maintenance and cleaning, it is, nevertheless, necessary to provide for the occasional "brush up" without which no substantial mech-

anism can be expected to do its work honestly.

In an Angle-clock, such as is illustrated by Fig. 52 (or as is shown in the Frontispiece, outside our Head Office), it is easy to provide ample access behind the clock.

Fig. 53 illustrates the largest electric clock in London, which, with its four 10 ft. dials, was built by us in 1912, to the special design of Mr. G. B. Bowell.

The dial "Receiving" mechanisms in this big clock are specially designed to automatically synchronise themselves at each hour, while the actual time-keeping is kept by a "Master" clock several floors below, in a private office.

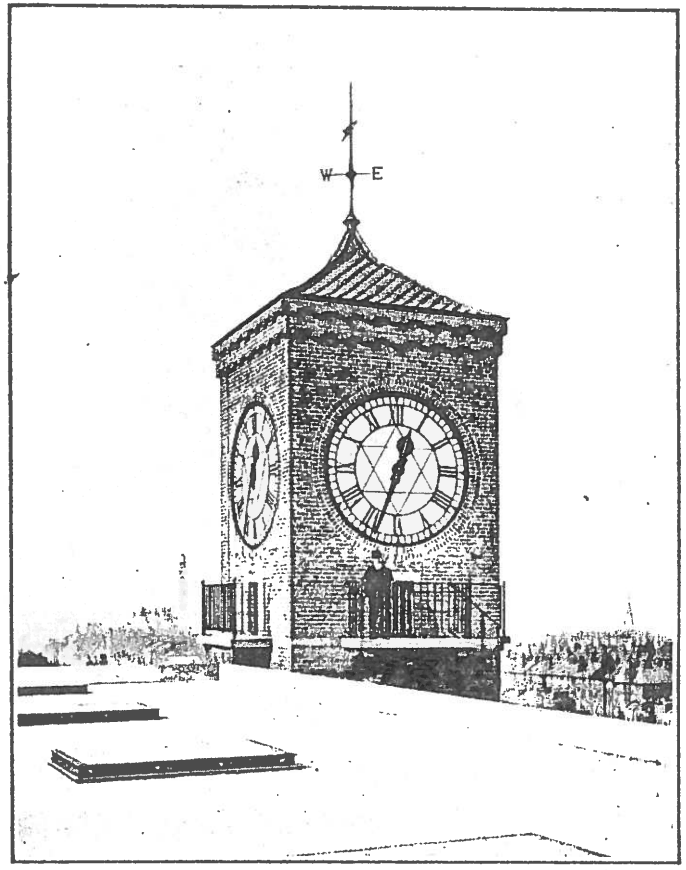


Fig. 53.

In every case, our Turret clock mechanisms are so designed that they can be actuated by any of our standard "Master" clocks and in conjunction with any number of smaller indoor clocks. In this manner the big outside clock is no more trouble than the smallest indoor clock. Similarly the Time Recording Clocks in a factory, the Programme Ringer of a school, the striking gear of a public clock, may all be added and can be controlled by the

ONE "MASTER" CLOCK.

SHIPS' MASTER CLOCKS.

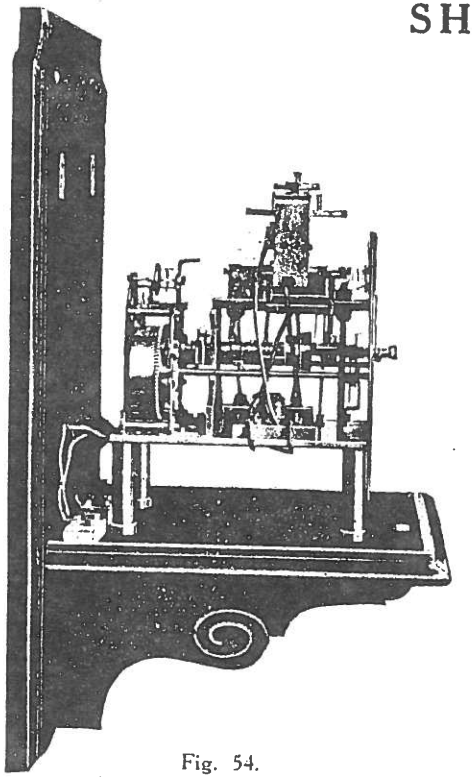


Fig. 54.
Mechanism of Ships' "Master."

FOR Marine use, we manufacture a special type of "Master" clock, the principal feature of which is an automatic attachment whereby the time of every clock controlled in the ship can be set either forward or backward by altering the time shown by the hands of the ships' "Master" clock. A special sheet of instructions and information upon this pattern patent speciality may be obtained upon application.

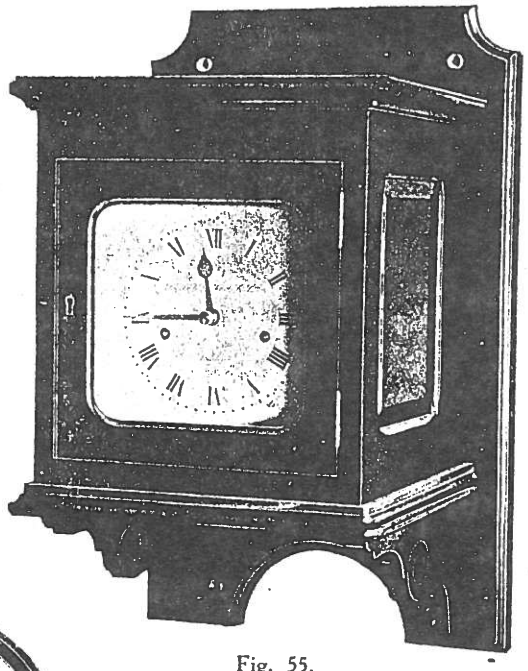
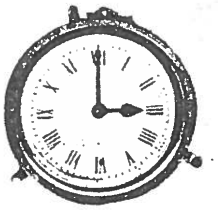


Fig. 55.
Ships' "Master" in case.

As has been already pointed out, our "standard receiving" mechanism is ideally suited for marine use, because the movement of the vessel has no effect upon its action. Hence, any of our "Receiving" clocks can be used on board ship, but we also make a special brass-cased ships "Receiving" clock in various sizes, of the usual ships' pattern, for attachment to bulkheads.



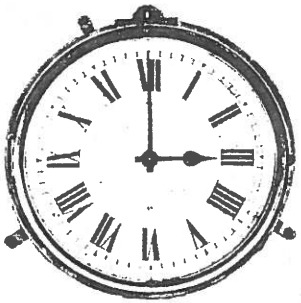


Fig. 56

WORKMEN'S TIME RECORDERS.

In all factories where Time Recorders are in use, it is of the highest importance that the various Time Recorders should indicate the same time, otherwise there is a loss of minutes a day per head of the employees' time as recorded.

Any of the well-known patterns of Time Recorders CAN BE FITTED WITH OUR ELECTRICAL RELEASE so that the time indicated will be controlled on the same circuit as the ordinary electric clocks. Each Time Recorder would remain an ordinary mechanical hand-wound apparatus, but its time would be strictly electrically synchronised to agree with that kept by the Electric " Master " clock, thus ensuring a PERFECT UNIFORMITY OF TIME on all cards stamped by any Recorder thus synchronised on the "SILECTOCK" system.

PROGRAMME RINGING MECHANISMS.

To meet the requirements of Schools we manufacture a Programme Ringing Apparatus, which is placed in the circuit and connected up in the same manner as any ordinary receiving clock, and actuated at each half-minute by the " Master " clock. [Code P.R.1.]

The Programme Ringing Apparatus controls a separate circuit of bells which can be set to ring at pre-determined fixed times throughout the day, and can be altered to suit the differing requirements of different Terms.

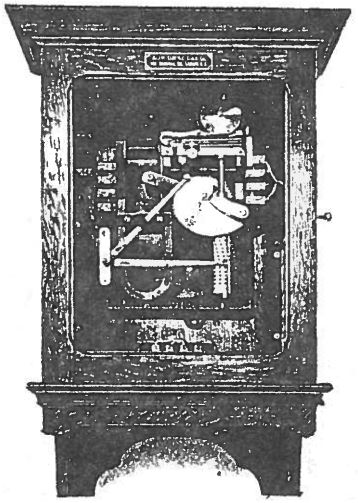


Fig. 57.

Fig. 57 is an example of a *special apparatus* of this description which was specially designed for an important building abroad.

For Factory use, where the signals (to START and CEASE work) are fewer in number and do not vary, we manufacture a simpler design in which the pre-determined fixed times for the signals remain constant daily—with, as an addition, a cut out for week-ends and holidays.

[Code P.R.2.]

To be continued.

Continued from September, 2004 issue.

List of employees now working for E C O C L O C K C O. September 15, 1917.

Names	Date of engagement		Last Raise	Amount	Present Wages
W. Kerins	Previous to April	1910	July 6, 1917	$ 1.50	$ 23.50
W. Hines	October 1915		July 6, 1917	1.00	16.00
A. Richards	November 1915		June 7, 1917	2.00	20.00
D. LaCroix	July 1917				22.00
V. Dugmore	October 1916				18.00
E. Briand	August 1917				7.00
C. Allen	March 1917		July 6, 1917	1.00	12.00
E. Carter	May 1916		July 6, 1917	1.00	12.00
W. Squire	Previous to April	1910	Mar. 8, 1917	2.00	20.00
S. Cogswell	March 1915		Aug.23, 1917	1.00	17.00
W. Belyea	April 1917		Sep.13, 1917	1.00	14.00
C. Donovan	August 1917				14.00
C. McNeill	September 1917				8.00
J. Dalton	June 1917				14.00
D. Kelley	September 1917				8.00
M. Downs	July 1917		Aug.16, 1917	1.00	9.00
A. LaFrance	July 1917		Aug.16, 1917	1.00	13.00
J. Mathis	July 1917				12.00
E. Deslaurier	July 1917		Aug.16, 1917	1.00	6.00
A. Ford	May 1916		Aug. 9, 1917	2.00	16.00
T. Malo	Previous to April And June 1917	1910			32.50
L. Stewart	June 1916		July 6, 1917	2.00	20.00
F. Ferris	October 1916		May 25, 1917	1.00	14.00
M. Rodway	May 1916		July 6, 1917	1.00	11.00
E. Haley	May 1915		Dec.28, 1916	2.00	14.00
B. Pennie	July 1916		May 31, 1917	2.00	20.00
M. Visall	September 1916		July 6, 1917	1.00	10.00
M. Hayes	August 1917				8.00

ECO CLOCK CO.

Manufacturers of Electric and Portable Watchman's Clocks

MAIN OFFICE AND FACTORY
197 Congress Street
BOSTON, MASS.

BRANCH OFFICES
NEW YORK, N. Y., 26 Cortlandt Street
ATLANTA, GA., Walton Building

Products

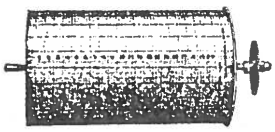
"Boston" and "Eco" Electrical Watchman's Clock Systems, with and without timepiece dials.

Description

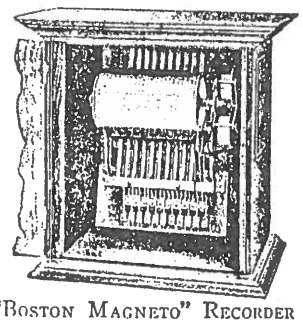
"Boston Magneto" Tri-record Recorder (Rectangular Paper Dial)—Provides for registrations covering Saturday, Sunday and Sunday night without change of dial. Dial drum automatically shifts every 12 hours. Each day's or night's record in separate column. Made in 3 sizes, 20, 40 and 60 stations, respectively.

Every part of mechanism is visible, accessible, interchangeable and easily removed without disarrangement of mechanism. The absence of springs to restore needles after recording is a valuable feature.

"Boston Sixty-hour" Recorder—Similar to "Boston Magneto Tri-record," but provides for holidays following Sunday, without change of dial. Made in 2 sizes, 20 and 35 stations, respectively.



"Boston" Dial and Drum

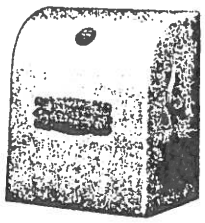


"Boston Magneto" Recorder
Standard case

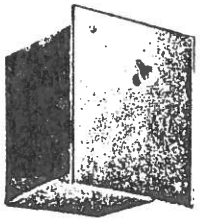
"Eco Magneto" (Circular Dial)—Perforating needle is separate from armature and will not stick. The needle arm and armature are both restored to original positions by gravity.

Operation

"Eco" System—Recorder is usually placed in office. Stations may be located at any place desired. Each station is connected with recorder by separate wire. Any number of watchmen can record on the same dial, with independent record for each.



Steel or Fiber Covers for General Use

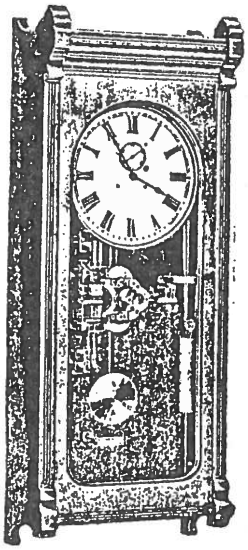


Inset with Plain or Fancy Face Plates

Standard Type Generators

Motive Force—4-volt hand generator. Storage battery or 12-volt motor generator; single or in combination.

Usual Equipment—Small hand generator at each station, surface or flush type. One full turn of the crank handle (which the watchman carries with him) generates sufficient current to perforate paper dial in space corresponding to number of station operated, and at exact time record is made.



Regulator Combined with Recorder
When desired, either "Boston" or "Eco" recorders combined with office regulator timepieces will be furnished

Advantages

Can be installed by any careful electrician. Can not be tampered with without detection. Meets stringent requirements of all insurance companies. First cost is low. No current except at the actual moment of making record. No record can be made by short circuiting. Record dials are reduced to smallest size consistent with accurate and easy reading.

Finish

Recorder cases and face plates furnished to match woodwork and hardware finish.

Insurance

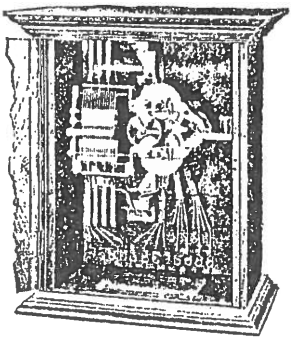
Approved by the National Fire Protection Association for use under the rules and requirements of the National Board of Fire Underwriters and by all Mutuals.

Co-operation

The Eco Clock Co. solicits difficult propositions which relate to a proper control of day or night watchmen.

Catalogue

This company would be pleased to mail illustrated catalogue to any interested party, on request.



"Eco" Magneto Recorder, Open
Standard case; 12- or 24-hour circular dial

Underwriters' Laboratories, Inc.
For Service - Not for Profit
SPONSORED BY
National Board of Fire Underwriters
207 EAST OHIO STREET, CHICAGO 11

Signal 56
Application No. 49C1579
August 9, 1949

REPORT

on

WATCHMAN'S TIME-RECORDING APPARATUS

Detex Watchclock Corporation
Chicago, Illinois

- -

D E S C R I P T I O N

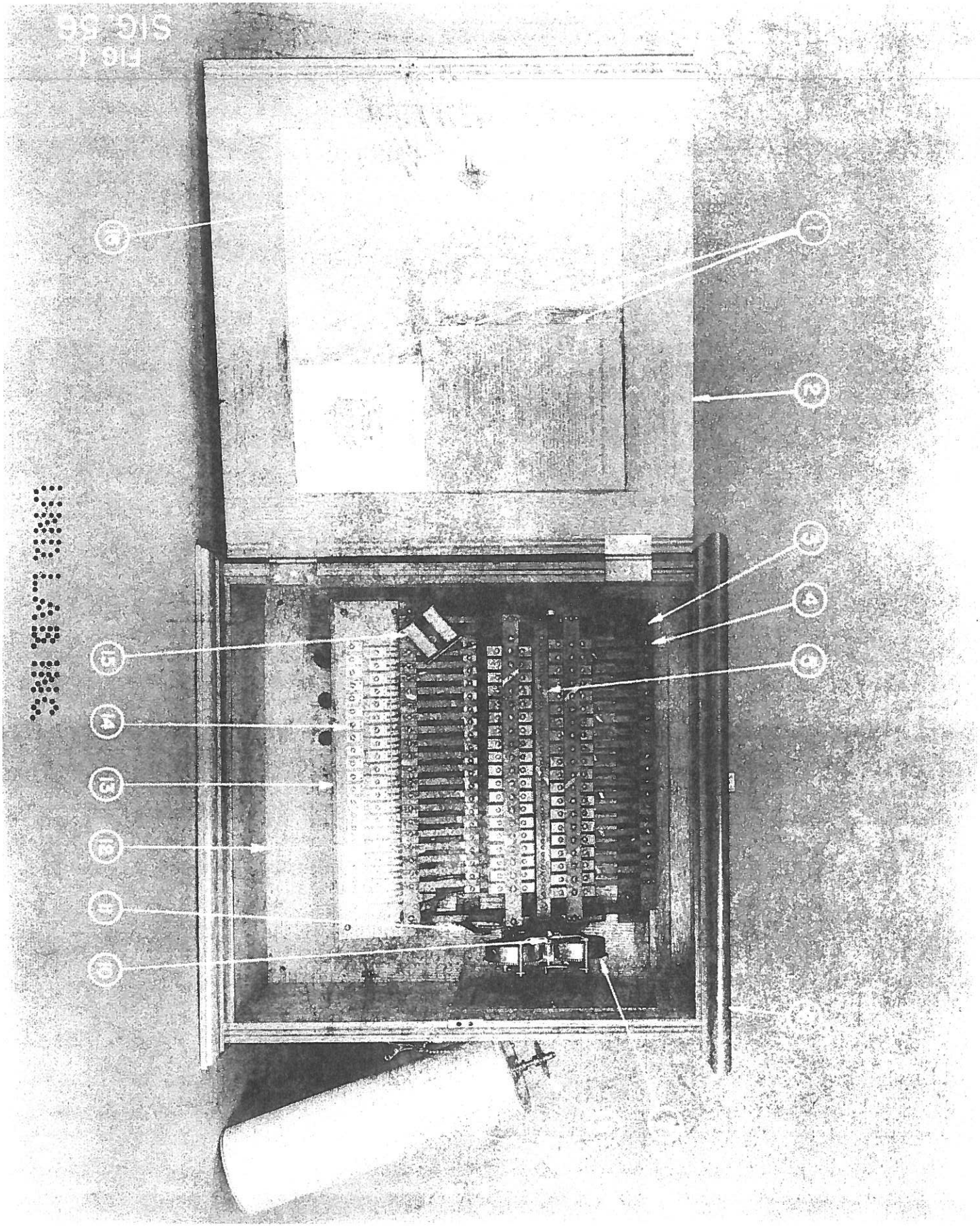
EQUIPMENT COVERED BY THIS REPORT:

"Eco Magneto Watchclock System."

GENERAL CHARACTER AND USE:

The system covered by this report consists of 12-, 24-, 48-, or 72-hour stationary recorders wired to magneto stations for recording inspections of property by watchman at periodic intervals. This system has been subject to Label Service for many years and this report records construction for File Signal 56.

See accompanying photographic descriptions for watchclocks and magneto stations.


SIC 5B
TB1
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CONSTRUCTION DETAILS:

48-HOUR RECORDER -- FIG. 1
(Represents 72-hour recorders.)

General -- Cases are constructed with grooves, molding or rabbets in doors for dust resistance. Recording mechanisms are provided to keep accurate record on suitable graphs of each opening and closing of the access doors. Recording cylinders are not visible when doors are closed.

1. Instruction Sheets -- For loading (see Fig. 1A) and for clock maintenance.

2. Door -- Oak frame, 20-7/8 by 19-7/8 in., grooved and rabbetted to exclude dust, oak or painted glass panel. Hinge screws accessible only from inside, provided with Yale and Towne, Sargent, or Corbin lock.

3. Frame -- Cast iron Steel, end supports 5/16 in. thick; magnet supporting bars approximately 3/16 in. thick; armature, lead clamp, and punch bars approximately 3/32 in. thick; all assembled by machine screws.

4. Armature Assemblies -- Armatures attached to brass rods, 6-1/4 in. long by 5/16 in. wide by 3/64 in. thick, prevented from turning by two bosses. Assemblies held back by 5/16- by 6-1/4 in. flat brass springs, approximately 0.045 in. thick, with inner end loosely slotted over guide pin.

5. Spindle -- Rides on armature, Item 4, fits loosely in guide bar, punches paper record. Point rounded to prevent sticking in record sheets.

6. Cabinet -- Solid oak, inside dimensions, 20 by 19 by 9½ in. Access door on side for winding clock rabbetted and secured from inside by substantial hook and eye.

7. Clock Mechanism -- (Seth Thomas or Telechron), double spring, two main spring gears act on single heavy pinion. A gear on the pinion shaft meshes with gear at end of record cylinder. Additional gear on same shaft leads through a train of three pinions and three gears to escapement wheel, balance wheel with hair spring, pallet, etc. Parts not small or delicate used in the clock mechanism or movement, all parts readily accessible for cleaning and repairs. (Item 7 continued on page 3.)

7. (Contd.) The clock will run at least eight days on one winding, substantial keys for winding are furnished. Frame of clock held together by four studs from front to back plate and is mounted by four screws to side of metal frame.

8. Record Drive Shaft -- Drive gear in place, spring slips shaft toward gear end acting against latch wheel trip device on opposite end. Circular brass stop on latch wheel allows spring to shift record one space 0.075 in. for each 12-hour revolution for four revolutions. Twelve-hour records therefore appear in four columns. For 72-hour record, latch wheel makes six 12-hour shifts instead of four. Shaft 1/4 in. diameter, steel, gear wheel 1-7/8 in. diameter.

9. Record Cylinder -- Hard-rubber matrix grooved to clear spindles, Item 5, supported by aluminum plates, 4 in. in diameter, lengths as follows:

   (a) 48-station recorder, 12-15/16 in.

   (b) 72-station recorder, 18-15/16 in.

   Cylinder arranged to not normally slip on shaft, nor can record sheet slip, tear, or become detached.

10. Cylinder Release Lever.

11. Tell-Tale Arm -- Punches record in proper column when actuated by door bracket, Item 16.

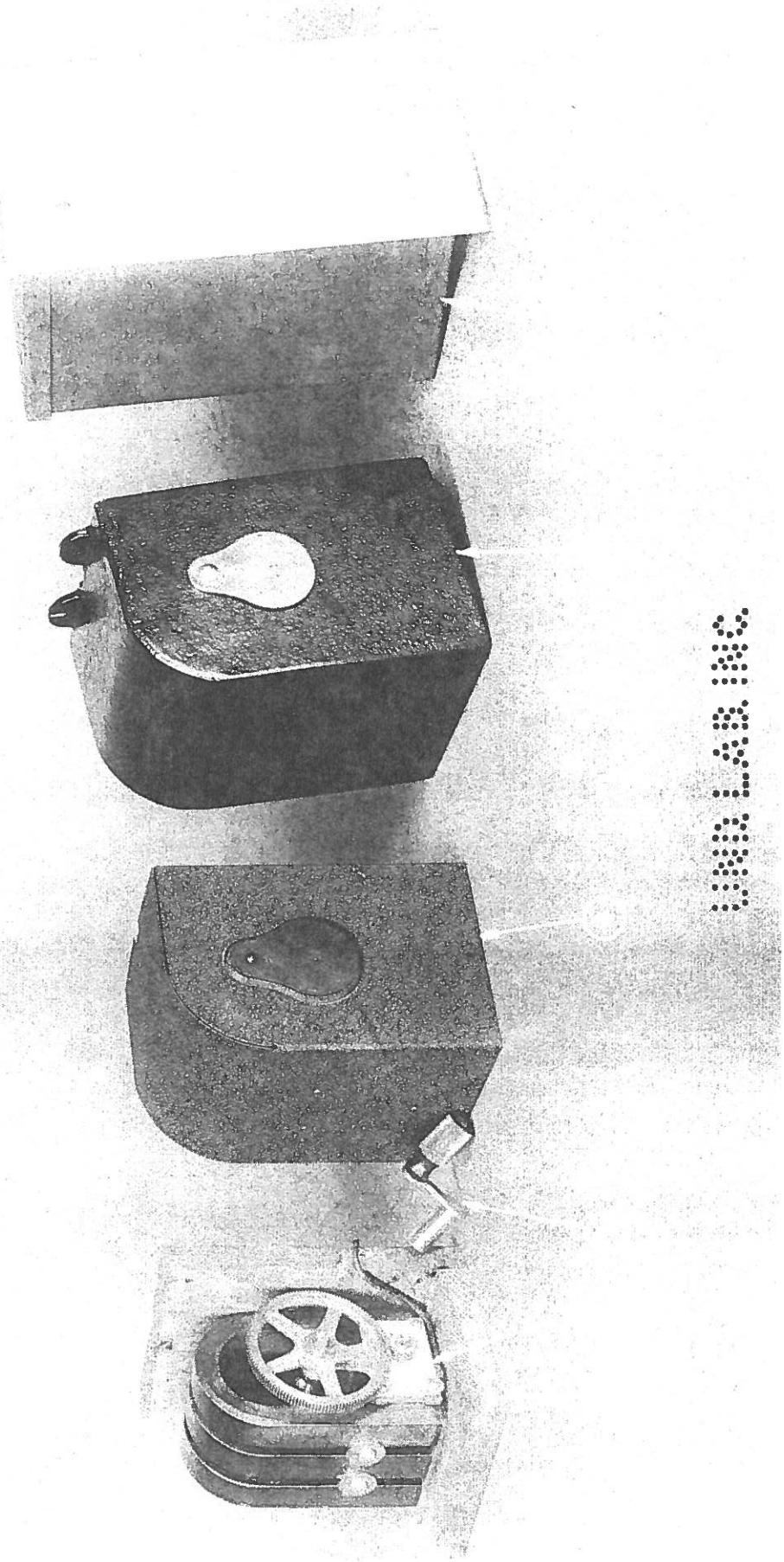
12. Back Cover -- Mounts mechanism, screwed and hooked in place from inside.

13. Terminal Board -- Solid oak, supported from back by end braces.

14. Terminals -- One pair for wiring each magneto station.

15. Magnets -- Double-pole, horseshoe type, wound on rectangular cores, mounted edgewise in two tiers as shown, approximately 5/16 in. apart for 48-hour and 1/2 in. apart for 72-hour clocks. Windings silk-covered No. 30 copper wire on fiber spools. Lead wires carried directly in rubber tubing and soldered to terminal plates, Item 12.

16. Bracket -- Operates tell-tale, Item 11, when door is closed.



MAGNETO ASSEMBLIES -- FIG. 2

1. Wood Frame -- 5/8 in. thick, screwed construction, for case, Item 5.

2. Magneto -- Substantial construction completely encased and insulated, all connections soldered and protected.

3. Magneto Crank -- Brass, substantial construction.

4. Indoor Surface-Mounting Case -- Steel, approximately 1/32 in. thick, crackle enamel finish, approximately 6 by 4-13/16 by 4-1/16 in. over all, secured to base, Item 1.

5. Outdoor Case -- Cast iron, approximately 3/16 in thick, approx 6-1/2 by 5-1/4 by 7-7/16 in. over all, wood base, 1 in. thick, screwed in place.

6. Indoor Flush-Mounting Case -- Steel, 1/16 in. thick, welded construction, channels for 7/16-in. thick wood magneto base.

7. Face Plate -- Stainless steel, 1/16 in. thick, provided with screw clamps for attachment to Item 6.

8. Crank Port and Cover -- Provided on all models, riveted; marked -- "Detex Watchclock Corporation."

To be continued.

ELECTRICAL CLOCK BOOKS - from the library of **MARTIN SWETSKY.** Send SASE for list to: Harvey Schmidt, 75-80 179th Street, Flushing, NY 11366 or wwlathlot@aol.com

"A Guide to Electrical Horology" by Martin Swetsky, FNAWCC. Includes Chapters on History, Electrical Principles, Repair Methods, Tips, plus Repair References. Price $42.00 Post Paid. Mitchell Swetsky, 10 Chelsea Way, Fairport, NY 11450. E-mail MSwetsky@ Rochester.rr.com.

BANGOR Electric Clock Parts, New Factory original parts too many to list separately. Call or e-mail with your needs. Elmer Crum, (727)868-0181, electrichorology@juno.com

New publication: 60-page booklet with facsimiles of instructions and drawings re: **FAVAG** clocks with Hipp-toggle, period 1930-1960 (all in French). $25 including postage. Rare French book on CD-Rom, easily printable (in .tif format: "Horlogerie electrique-1ere partie-Horloges-meres et installation horaires" by **Ch. Poncet**, Cluses, 1905, 227 pages. 25 USD or 25 EUR. Order email, viredazepal @bluewin.ch, or address Michel Viredaz, Chemin du Raidillon 48, CH-1066 Epalinges, Switzerland.
Send money in banknotes, no checks please.

50 - **1908 SELF-WINDING CLOCK CO. CATALOGUES** reprinted in 1979 by Dr. Bengt E. Honning. New old stock. $35.00 ea. Including shipping. Roy Crowe, 9257Appleby St., Downey, CA, 90240, (562) 861-8788, email dcrowe2259@ AOL.com

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

MUSEUM WANDERINGS

Liverpool Museum

Precision Observatory Clock
invented by William Hamilton Shortt and made by the Synchronome Company in 1937.

This type of clock was the standard timekeeper for many countries from the early 1920s until atomic clocks became widely available in the 1970s. The clock is numbered 99 but this number appears to have been allocated after the last example was built in 1956. They were usually installed in observatories where the timekeeping was checked by observing the stars. These clocks proved so accurate that it was possible to measure variations in the rotating speed of the earth.

This clock was used during the second World War to calibrate Asdic Systems and was kept by the Synchronome Company until being presented to the Museum in 1993 by the Tunstall Group Plc.

The clock has two pendulums. One, called the master, is in the copper cylinder and one, called the slave, is in the adjacent wooden case. The two are connected electrically and work together to keep very precise time.

(1993.76)

--- 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.

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PORTESCAP Secticon 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

D.E.H.O. slave; please send size, condition and price.
Kenneth Erlenbusch, 124 North Avena Ave., Lodi, CA 95240, email kene_lodi @gotnet.net

SWCC, IBM, Standard Electric, & E. Howard parts or complete movements. Any condition, will buy or tradefor other master clock items. Clocks can bee seen at www.telechron,com
Mitchell Janoff, 3 Stratford Ave., White Plains NY. email mjanoff@optoline,com, (914) 997-5670

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

HARD TO FIND PARTS AVAILABILITY:

BULLE suspension assemblies, fabric type, just like the originals. **TIFFANY** Single Contact suspension springs (0.004") The Horolovar Co., Box 264, St. Clair Shores, MI 48080 (313)882-9380

TIFFANY Double Contact Suspension Springs: Use a **Hamilton** Ladies Watch Mainspring, Specification: **HAMILTON** 6/0 #2521, 1.40 mm x 0.12 mm x 11¼". Available from:
Bill Schroeder @ $3.00 each + postage. 6033 N. Sheridan Rd., #31H, Chicago, IL 60660,
(773)275-2563. Also available from most Watch Parts Suppliers.

FOR SALE: Replacement Field Coils for **SESSIONS** and **HAMMOND** synchronous clock movements.
Wining's Clock Service, 2910 Farmdale Rd., Akron, OH 44312 (330) 628-9655

"Synchronome Brisbane 1903-1991" The story of the Jackson family of electrical clock makers. An Historical Project by Chapter 104. A 32 page booklet about the operation of the Synchronome Elec. Co. of Australasia. $5.00 Norman Heckenberg, 60 Orchard Tce., St. Lucia, 4067, Australia

Glass Domes for the **Tiffany Never Wind** and other early electrical & battery clocks. If I don't have it in stock I'll try to get it. E-mail www.glassdomes.com
Ben Bowen, Rt. 3 Box 134C, Monticello FL 32344, (850) 997-3797 phone & fax.

CD containing animations of 40 different electric clock systems (such as **ATO, Brillie, Bulle, Campiche, Eureka, Garnier, Gent Hipp, Lowne, Poole, Shortt, Synchronome, Tiffany, Wagner**) and 20 slave movements. Included are some biographies and portraits of inventors and a large reference list to relevant literature. Price $20, includes shipping. J. E. Bosschieter, contact me at BoscoClocks @Zonnet.nl

Electronic "master clock" for old slave dials: $50. "Governor" makes Eureka clocks keep quartz-accurate time with no change to the clock: $95. Voltage regulators: $35 to $55.
Bryan Mumford, 3933 Antone Road, Santa Barbara, CA 93110; (805) 687-5116; www.bmumford.com