INSTRUCTIONS

FOR INSTALLATION AND
MAINTENANCE OF

SELF-WINDING SYNCHRONIZED

CLOCKS

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

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

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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

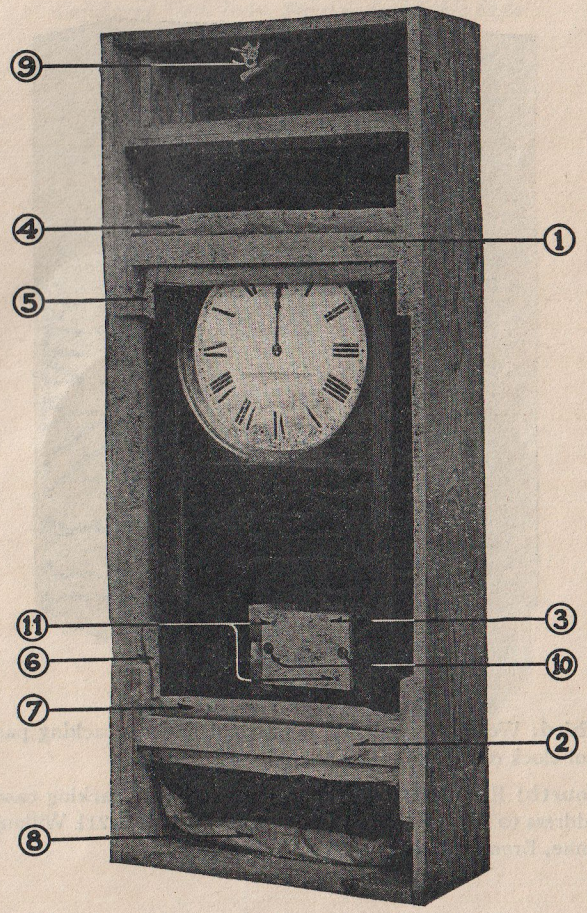


Fig. 1

STYLE No. 29 CLOCK

Method of Packing

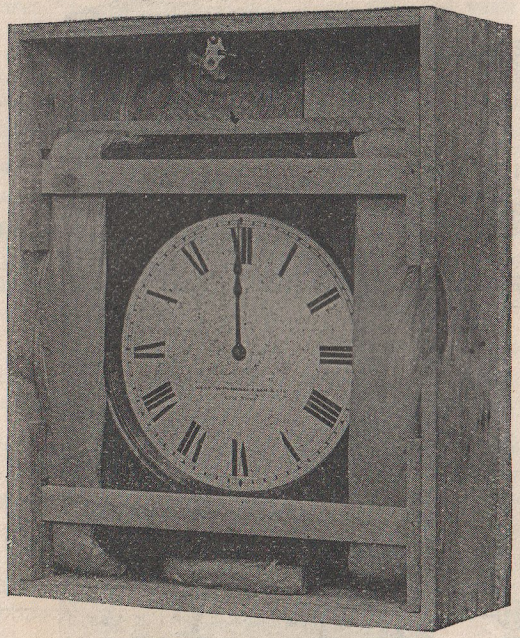


Fig. 2

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

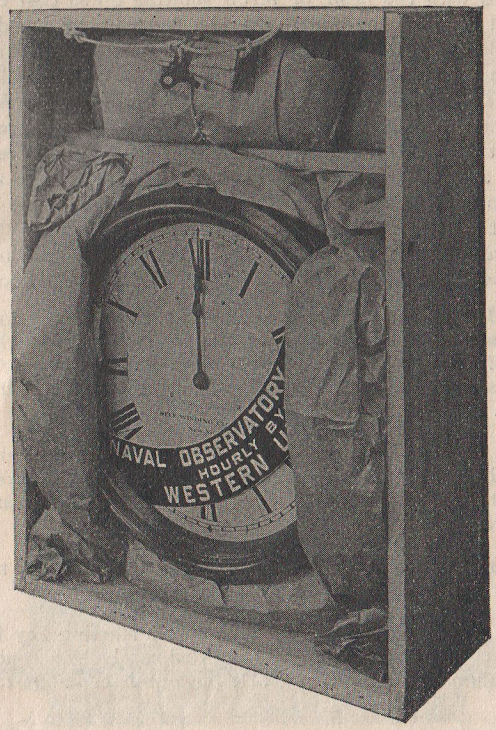


Fig. 3

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

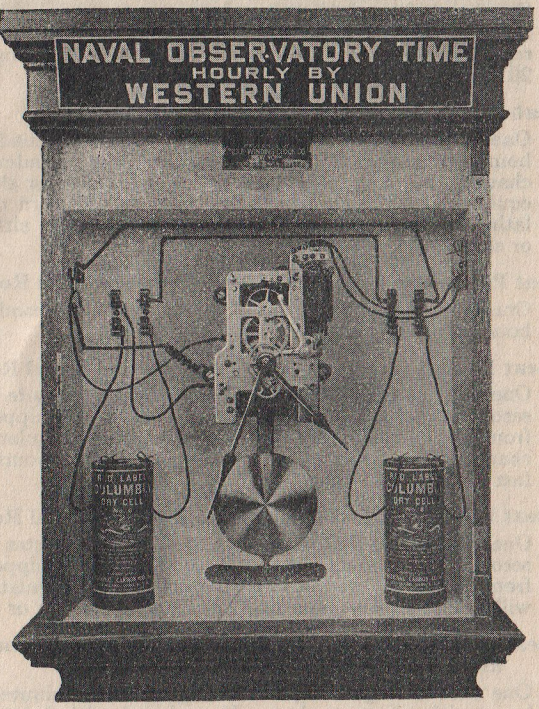


Fig. 4

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.

DIRECTIONS FOR REGULATING CLOCKS HAVING DIFFERENT LENGTHS AND TYPES OF PENDULUMS

60 Beat Pendulum with 10-lb. Brass Bob and Wood Rod

One turn of regulating nut changes rate 40 seconds in 24 hours either fast or slow. If clock is equipped with front regulating bracket, one turn of regulating rod changes rate 20 seconds in 24 hours either fast or slow.

60 Beat—15-lb. Mercurial Compensated Pendulum

One turn of regulating nut changes rate 30 seconds in 24 hours either fast or slow. Two divisions of indexed nut changes rate 1 second in 24 hours either fast or slow. If equipped with front regulating bracket, one turn of regulating rod changes rate 15 seconds in 24 hours either fast or slow.

80 Beat Pendulum with 2-lb. Brass Bob and Wood Rod

One turn of regulating nut changes rate 55 seconds in 24 hours either fast or slow.

120 Beat Pendulum with 2-lb. Brass Bob and Wood Rod

One turn of regulating nut changes rate 1 minute and 50 seconds in 24 hours either fast or slow. If equipped with front or top regulating bracket, one turn of regulating rod changes rate 1 minute and 10 seconds in 24 hours either fast or slow.

140 Beat Pendulum with 2-lb. Brass Bob and Wood Rod

One turn of regulating nut changes rate 2 minutes and 20 seconds in 24 hours either fast or slow. If equipped with front or top regulating bracket, one turn of regulating rod will change rate 2 minutes in 24 hours either fast or slow.

140 Beat Pendulum with Small 10-oz. Nickel Finished Bob and Wood Rod

One turn of regulating nut changes rate 2 minutes in 24 hours either fast or slow. If equipped with front or top regulating bracket, one turn of regulating rod will change rate 2 minutes and 10 seconds in 24 hours either fast or slow.

Fast: If clock *gains time* turn regulating nut to the left.

Slow: If clock *loses time* turn regulating nut to the right.

Any subdivision of a complete turn of the regulating nut will affect the rate in proportion to the above schedule.

STYLE No. 18 CLOCK

Interior Wiring and Connections

12" Dial—80 Beat Movement

Fig. 5

All clocks leaving the factory are regulated to run within a rate of 10 to 15 seconds (either fast or slow) in 24 hours. However, many contributing causes tend to change this regulation. For instance, a clock after being installed may not be fastened rigidly to the wall or it may be hung out of plumb. The regulating nut or the check nut might have loosened during transportation, thereby changing the adjustment. The pendulum suspension spring may have become buckled in transportation. The wall on which the clock is

STYLE No. 29 CLOCK

Interior Wiring and Connections

12" Dial—140 Beat Movement
14" Dial and larger—120 Beat Movement

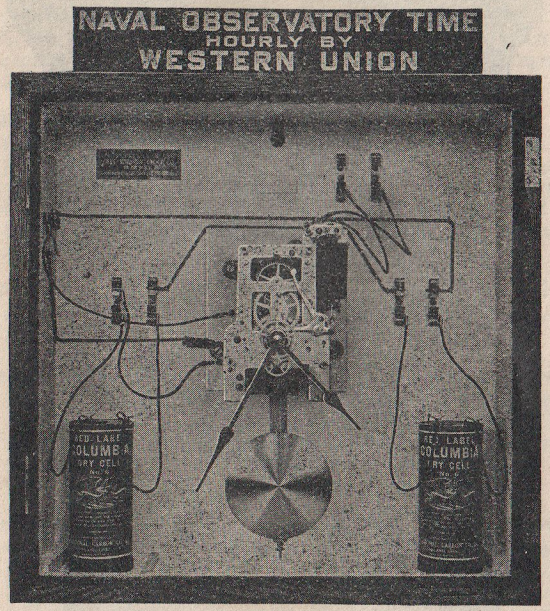


Fig. 6

hung might be subjected to slight continuous vibration or heavy intermittent shocks, the former caused by heavy machinery operating in the building and the latter by elevator or railroad trains or heavy trucking passing the building. Different locations as to latitude would also cause a change in the running rate. As it is practically impossible to guard against the different causes influencing change in rate, all clocks after they are permanently installed should be given a regulating test of several days before connecting to Western Union time service circuits.

STYLE No. 33 CLOCK

Interior Wiring and Connections

14" Dial—140 Beat Movement
18" Dial—120 Beat Movement

Fig. 7

TYPES OF PENDULUMS USED WITH DIFFERENT STYLES OF CLOCKS

No. 9	. . . . .	**60**	beat pendulum
No. 10	. . . . .	**120**	beat pendulum
No. 18	. . . . .	**80**	beat pendulum
No. 29	8", 10", and 12" dial	**140**	beat pendulum
No. 29	14" dial and larger	**120**	beat pendulum
No. 33	14" dial.	**140**	beat pendulum
No. 33	18" dial.	**120**	beat pendulum

DESCRIPTION OF STYLE "F" VIBRATING MOTOR MOVEMENTS

Method of Operation

See Fig. 8

In the hourly revolution of train, the pin (A) which is securely fastened to the center arbor engages a pin on center winding contact sector (B). This sector as it revolves, pushes the plate contact finger (D) upward, bringing it in metallic connection with the center winding contact finger (E) which is fastened to a stud on the insulated binding post (F), thereby closing the winding circuit. The current passes from binding post (F) through the winding battery to binding post (G) to which is connected one terminal of the motor magnet (H). The current passes through this magnet to insulated stud (I). The spiral contact spring (J) is fastened to insulated stud (I) and the current passes from the spring (J) to the plate contact spring (K), thence through the movement frame to plate contact finger (D) and from there through finger (E) and binding post (F) back to the battery.

The spring is wound by a forward and backward motion of the armature (L) which is connected to winding lever (M). As the winding lever is oscillated, the pawl (N) turns ratchet wheel (P) which is checked by back stop pawl (W). The pinion on the ratchet wheel arbor turns the winding wheel until pin (Q) engages the knockaway sector (R) revolving it until it strikes pin (B) on the center winding contact sector (C) and pushes it from under the plate contact finger, thereby breaking the circuit and completing the hourly winding.

The winding motor is of the oscillating type. It has one pair of magnets and two sets of make and break contacts, one set being located on front and the other set on back plate of movement. These contacts are so mounted to the plates that they can be easily removed when necessary to replace them with new parts.

Adjustment of Hourly Winding Circuit Closer

See Fig. 8

The hourly winding circuit closing points are represented by fingers (D and E). When the winding motor is not in action, these springs should be separated about 1/32", as shown on illustration. The closing of these fingers is accomplished by the rise of sector (C) which is carried around by the clock train. When sector (C) comes in metallic connection with plate contact finger (D), the tip of this finger should be even with edge of incline. Contact finger (E) should always clear plate contact finger by 1/32". When the two fingers touch, they should be parallel to each other.

STYLE "F" VIBRATING MOTOR MOVEMENT

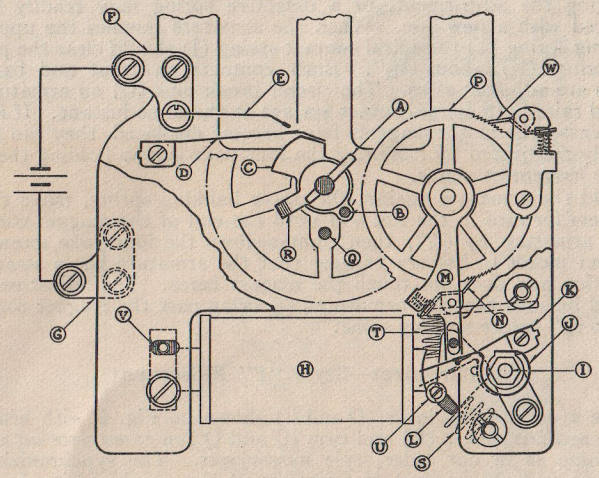


Fig. 8

Adjustment of Armature

See Fig. 8

When the armature (L) rests on banking spring (S), its front edge should be in line with the edge of the magnet core. The upper banking spring (T) must be adjusted so that the front edge of armature will be 1/16" from the corner of the magnet core when it touches the spring.

Adjustment of Motor Contacts

See Fig. 8

When spiral contact spring (J) rests on the contact pin of contact spring (K) it should point to about the center of the magnet core with the pin of contact spring (K) at the middle of the contact piece on spring (J). To adjust the tension of the spiral contact spring (J), take hold of the point with a light pair of tweezers and pull it gently forward, letting it drop under the pin on contact spring (K). It should take the position shown by the dotted line, *i. e.*, the top of spring being about 1/32" below the contact pin. If proper adjustment cannot be made in this manner, loosen the nut (I), remove spring, carefully bend it to its proper shape and replace. The hole

in the spiral contact spring (J) has a flat side and is fitted to a flat on the insulated contact stud. If contact spring is bent to the right position, it may be taken off and put back at any time without changing the adjustment, or a defective spring may readily be replaced with a new one. When the armature touches the upper banking spring (T) the spiral contact spring (J) should clear the pin on spring (K) about 1/16". Both contacts on front and back plates are adjusted alike. The circuit break pins (U) on armature should raise both spiral contact springs at the same instant. If for any reason the motor magnets have become displaced, they can be quickly readjusted by loosening the four yoke screws holding them to the movement plates.

Hold the armature against the upper banking spring, move the magnets forward in the slot (V) until the end of the magnet cores clear armature by 1/64", then tighten down the four yoke screws, connect motor to battery and see that the armature has a steady vibration and does not touch the magnet cores. The adjustment should be such that the armature can swing past the magnet cores 1/8" to 3/16" before striking same.

Synchronizer—Style "F" Movement

The synchronizing lever (D and C) shown on Fig. 9 with heart shape seconds socket (R) and cam (Q and Q') on cannon socket are the same as in our older style movements. The synchronizing magnets and the method of operation of the synchronizing lever are different. The magnet (A) has a flat ended core. The armature (B) is made of flat iron pivoted to stud (P) fastened to synchronizing frame. The armature (B) is connected to the synchronizing lever (D and C) by a connecting rod (E) and two Pitman screws. Synchronizing lever arm (F) has an oblong slot allowing the armature to be lowered or raised 1/16". The synchronizing lever (D and C) is placed on a steel stud (G) fastened to the front plate and held in position by a brass nut. The synchronizing magnets (A) are fastened to yoke (H). The yoke is screwed to the synchronizing frame by four iron screws (I). The holes in synchronizing frame are oblong, allowing the yoke (H) and magnets (A) to be raised or lowered 1/16". The spring (J) on top of armature is used to throw it back quickly and also prevents armature from freezing to magnets. The screw (K) in stud (P) is used to screw up against magnet head, preventing any spring that might take place on armature stud. Binding posts (L and L') are screwed to synchronizing frame and the ends of the magnet coils are fastened thereto with metal clips.

The brown flexible cords have metal clips soldered to them. They connect direct by these clips to binding posts (L and L') thus making a firm connection.

When replacing synchronizing magnets which for any reason have become damaged, remove the old pair at screw (M) and then loosen all four screws (I) in yoke (H), pushing same up against top

SYNCHRONIZER—STYLE "F" MOVEMENT

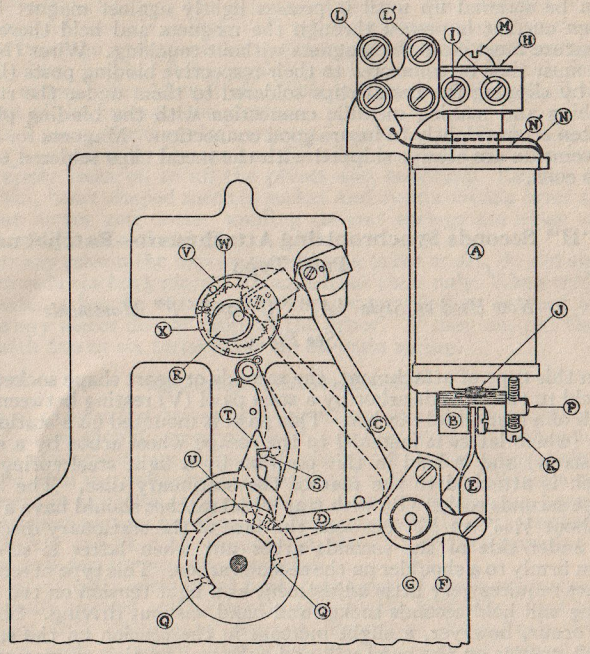


Fig. 9

of oblong holes. Then tighten down lightly and fasten the new pair of magnets with screw (M) to yoke (H) with the inner ends (N and N') of the coils showing front. Press armature (B) upward until synchronizing lever arm (D) locks tightly on cam ears (Q and Q'). With these adjustments made, loosen yoke screws (I) and press magnets down on spring (J) on top of armature.

Then tighten yoke screws (I) firmly and see that the back and front magnets clear armature by 1/100", after which screws in back of yoke (H) can be set down firmly. The adjustment screw (K) may then be screwed up until it presses lightly against magnet head. When current is passed through the magnets and held there, the armature must clear the magnets without touching. Wires (N and N') must then be connected to their respective binding posts (L and L') by slipping the metal clips soldered to them under the rubber bushing and making metallic connection with the binding plates. Fasten screws tightly to insure good connection. Magnets for these movements are always shipped with the metal clips soldered to the wire coils.

"H" Seconds Synchronizing Attachment—Ratchet and Pawl Type

Now Used on Style "A," "C" and "F" Movements

See Fig. 9

In this type of attachment, the seconds or heart shape socket (R) is held to the seconds arbor by a steel pawl (V) resting between two teeth of a star wheel ratchet. This pawl is mounted on a stationary disc (which latter is fastened to the escape wheel arbor by a small set screw) and is held in this position by a light steel spring (X) which is attached to the rear of the stationary disc. The heart shape seconds socket (R) with star wheel ratchet should have a play of about 1/100" to 1/64" between the face of the stationary disc and the under side of the seconds arbor nut when latter is screwed down firmly to a shoulder on the seconds arbor. This type of seconds socket requires very little adjustment as a light tension on the pawl spring will hold seconds socket and hand without driving. Should this occur, however, a slight increase in the tension on the spring which presses on the pawl will add sufficient friction to correct the trouble.

The synchronizing lever arm (F) should be adjusted in such a manner that when pressing down on the double prong cam (Q and Q') on cannon socket, there will remain a very small play between the outer diameter of the seconds roller and the bottom of the heart shape cam. This adjustment is essential as the clock is liable to be stopped by the action of the synchronizing lever should the adjustment be such that the roller completely locks the bottom of the heart shape cam (R) and in doing so binds the escape arbor pivot in its bearing. All heart shape cams are now fitted with square stems and seconds hand sockets with tapered square hole to prevent seconds hands from shifting.

Note: For adjusting movements equipped with friction spring type synchronizer, see **"General Information."**

Cleaning and Oiling Style "F" Movements

Virtually all parts needing periodic cleaning and oiling can be reached without taking the movement apart. Remove dial train, heart shaped seconds socket, and synchronizing lever. Brush out all the bearings and pivot holes thoroughly with Pyrene, using a stiff marking brush. After applying the Pyrene, let it soak for a minute or two, then blow it off. This will force all the old oil and gum out of the holes on the plates.

With a piece of cheesecloth wrapped around a small piece of flat wood, clean the dirty Pyrene and old oil from the plates and arbors. Then apply fresh oil to all the pivots and bearings. Replace the dial train, heart shaped seconds socket and synchronizing lever and see that motor and center winding contact springs are clean and free from Pyrene and old oil.

If for any reason the movement must be taken apart, do not start the screws in the back plate. Remove front plate only. When taking out center arbor be careful that the center winding contact and knockaway pieces do not drop off the arbor. If they do, put them back with five or six turns taken up on main spring.

Exchanging Movements

It is of utmost importance that numbers on metal property tags in clock cases should correspond with numbers of clock movements.

When movements are exchanged, the metal property tag must be removed with the movement and returned with same. When a new movement is installed, there must be a new property tag bearing same number as new movement. Managers and Inspectors should immediately report such changes to their immediate superior so that records can be properly corrected.

Old movements with metal tags, taken out of clock cases should be carefully packed and promptly sent to the Self Winding Clock Company, 205 Willoughby Avenue, Brooklyn, New York, with notice of such shipment specifying serial number of movement, cause for removal and route. When new movement and property tag are installed, the Clock Company should be promptly notified through the Superintendent's Office, with number of movement clearly indicated on such report.

When exchanging movements do not remove old bracket from clock case as this movement will also fit the old style bracket. Fasten style "F" movements to old style brackets with *three* screws only, and omit the brass clamp such as is used on the new style bracket for "F" movements.

When ordering material for these movements, always mention style "F," specify beat of movement, size of dial and order by number as indicated in booklet entitled:

"SCHEDULE OF PARTS STYLE 'F' MINUTE AND STYLE 'F' (H-SECONDS) SYNCHRONIZED MOVEMENTS"

DESCRIPTION OF STYLE "C" ROTARY MOTOR MOVEMENTS

(Style "A" same as Style "C" except that Style "A" has Solid Plates)

Method of Operation

The spring of this movement is wound once every hour by a three magnet rotary motor (see Fig. 10). The motor is connected by gearing to the toothed wheel on spring box. In the operation of winding, this spring box makes one revolution, thus taking up one turn of the main spring. This turn, which is the working turn, is given off in driving the train one hour.

The circuit is closed by arm (A), see Fig. 11, loosely mounted on the center arbor and carried around by a pin (D) in the center wheel until it is upright, when it makes contact with the

ROTARY MOTOR—STYLE "A" AND "C" MOVEMENTS

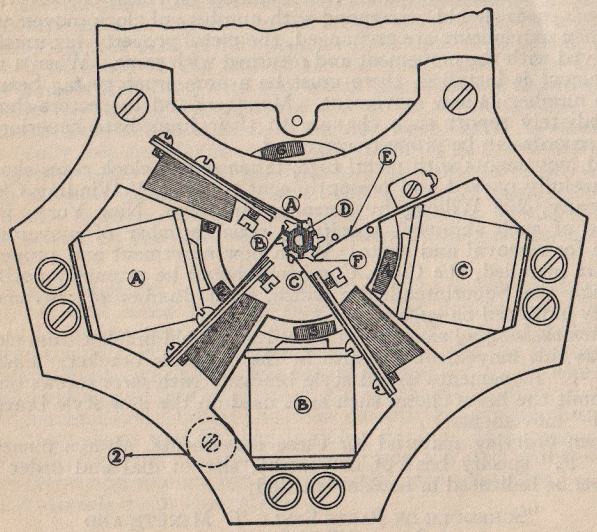


Fig. 10

WINDING CONTACT—STYLE "A" AND "C" MOVEMENTS

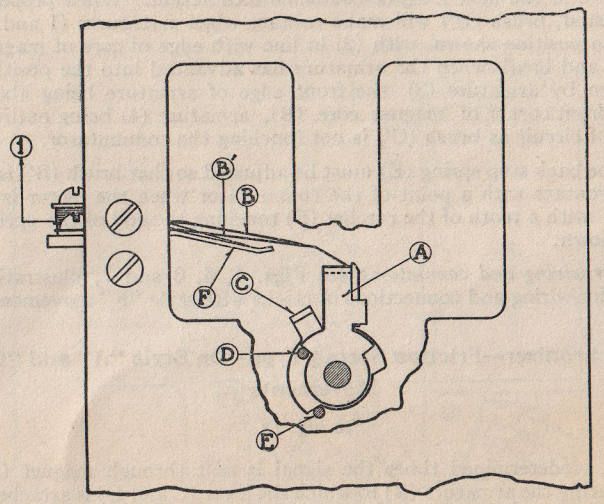


Fig. 11

insulated finger (B) in *old style* contact, or insulated finger (B) and plate finger (B′) in *new style*. The circuit then remains closed until the spring box has turned a full revolution and pin (E) brings up the knockaway piece (C) which moves the arm (A) forward from under the fingers (B and B′) thus breaking the circuit. The fingers (B and B′) must lie firmly on banking pieces (F) and should be so adjusted that when they leave the arm (A) they will drop about 1/32" below contact table. This adjustment insures a firm contact.

The angle at the point of fingers (B and B′) must not be too abrupt, otherwise it will retard the action of the clock while contact is being made.

Description of Motor

See Fig. 10

On the front end of the armature drum arbor is a commutator (D) having six points, corresponding to the six armatures (1, 2, 3, etc.) in the drum. There are three magnets marked (A, B and C). Each magnet has its own brush (A′, B′ and C′). When an armature

approaches a magnet, the brush makes contact with a point of the commutator, and remains in contact until the magnet has done its work and the next magnet has come into action. When properly adjusted, brush (B′) will make contact when armatures (1 and 2) are in position shown, with (2) in line with edge of core of magnet (A), and break when the armature has advanced into the position shown by armature (3), the front edge of armature being about 1/16″ from corner of magnet core (B), armature (4) being entirely out of circuit as brush (C′) is not touching the commutator.

The back stop spring (E) must be adjusted so that brush (B′) is in full contact with a point of the commutator when the motor is at rest, with a tooth of the ratchet (F) touching the end of the spring as shown.

For wiring and connections, see Figs. 4, 5, 6 and 7, illustrating interior wiring and connections of clocks with style "F" movements.

Synchronizer—Friction Spring Type—On Style "A" and "C" Movements

See Fig. 12

At predetermined times the signal is sent through magnet (A) actuating the armature (B) to which the lever (C and D) is attached, moving it down until the points on arm (D) engage the two projections (E and E′) on the minute disc, and arm (C) engages with heart shape cams (F) on the seconds arbor, thus causing both minute and seconds hands to point to the numeral XII.

Fixed on latch (G) is a pin arranged to drop under synchronizing lever hook (H). When locked, this prevents any action of the synchronizing parts. A pin (I) on back of cannon socket disc unlocks the latch at beginning of synchronizing range and locks again at end of range.

The latch (G) prevents all impulses other than the synchronizing impulse actuating the hands of the clock and must be left attached to the movement.

(J) is a light spring attached to the synchronizing frame to help start the armature back after hands are set.

"H" Seconds Synchronizer—Ratchet and Pawl Type

Now Used on Style "A," "C" and "F" Movements

See page 18 for Description

SYNCHRONIZER—STYLE "A" AND "C" MOVEMENTS

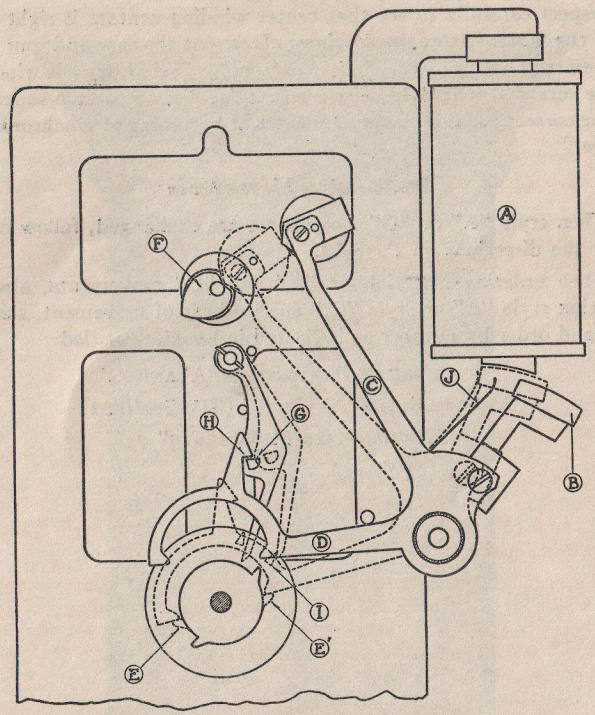


Fig. 12

Cleaning and Oiling Style "A" and "C" Movements

Take movement from case. Take out the pallet arbor button and allow train to run down slowly so as not to break the pins. Never let the clock run down backward as this will cause the arm (A) to be carried back against the brush (B), see Fig. 11, and bend it out of adjustment. Remove the motor. Take off front plate and separate all parts. Wash the plates and all parts in Pyrene and let them dry thoroughly before assembling. The motor must not be taken

apart, but may be washed in Pyrene using a small brush freely about the bearings, commutator and brushes. Put oil in all the pivot holes but not so much that it will run. The motor bearings and the ends of the pallet should also be oiled.

Inspect carefully to see that center winding contact is right and that the motor has no dead points. Dust out the case and put the movement back in place. Before attaching the dial, try the winding to be sure that it is right, also see that the disc on cannon socket is in the correct position to open the latch at beginning of synchronizing range.

Exchanging Movements

When style "A" or "C" movements are exchanged, follow carefully the directions on Page 19.

When ordering material for "A" and "C" movements, always mention style "A" or style "C," specify beat of movement, size of dial and order by number as indicated in booklet entitled:

"Schedule of Parts Style 'A' and 'C'
Minute Style 'A' and 'C' ('H') Seconds
Synchronized Movements"

STYLE No. 9 MASTER CLOCK

Interior Wiring and Connections

60 Beat Wood Rod, Brass Bob Pendulum or Mercurial Compensated Pendulum.

Fig. 13

This clock has a sixty beat movement with Mercurial Compensating pendulum.

At the left and near the center of movement is a device for closing the synchronizing circuit once each hour. This device consists of a stud on which is an insulator having two insulated spring fingers, one above the other, see Fig. 14, except at the points where they are

cut away to lie side by side on an insulated support. On these fingers and near the insulator, are two platinum pieces so adjusted as to be held apart except at the time of synchronizing.

Arm (D) rests on the edge of a disc (E) at the center arbor. At ten seconds before the hour, a notch in this disc allows the retractile spring to draw the support downward, leaving the points of the fingers resting on the raised part of the rubber cam (F) on the escape wheel arbor.

The end of finger (A) is made shorter than finger (B), and at the 59th second finger (A) drops and closes the circuit. At the next beat of the pendulum, the long finger drops and opens the circuit. In this position both fingers (A and B) must clear rubber table (C) by at least 1/64". When seconds arbor has completed one revolution, arm

TILTING CONTACT—STYLE "F" MASTER CLOCK MOVEMENT

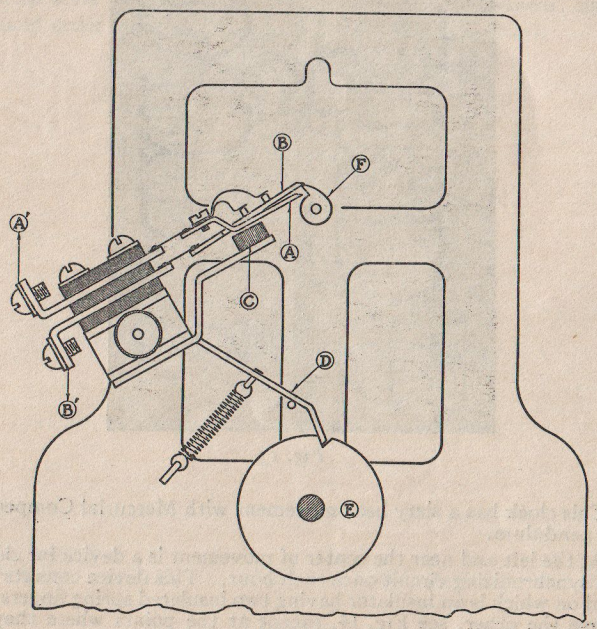


Fig. 14

(D) must have raised on top of disc (E). Both fingers (A and B) must rest firmly on rubber table (C) and clear top of cam (F) at least 1/64".

The winding is the same as in our regular self-winding clocks and they are wired and connected as shown in Fig. 15.

These Master Clocks are manually corrected by comparing their running rate with the time beats as received over the main line relay and local sounder.

Directions for Installing Master Clock

First: Remove the clock from the packing box and hang it on the wall by the hanger at the top of the case.

Second: Take off the dial and hands. Take the movement from the case, and hang the pendulum rod.

Third: If clock is equipped with Mercurial Compensating pendulum, roll the mercury jars gently, and end them up carefully to expel air bubbles; then set them in their places and see that the screws are set well down so as to hold the jars firmly, but not too tightly.

Fourth: If clock is equipped with Wood Rod Brass Bob pendulum, remove regulating nut from rod and slip brass bob in position and replace regulating nut. Brass bob should be screwed up until upper edge of front of bob is in exact line with lead penciled mark on front of rod. Hang pendulum on suspension spring and proceed with installation in the same manner as for clock equipped with Mercurial Compensating pendulum. With pendulum ball in position as described above, clock will show a very close running rate. It will, however, need final regulation, as no clock will run at the same rate in two different locations. In selecting location for Master Clock, always mount on a brick wall if possible, and on side of building which is least subject to vibration.

Fifth: Plumb the case by the pendulum, the lowest point of which must stand in front of the center line of the degree scale, and the rod must be parallel with the back of the case. When plumb, secure the lower end of the case to wall. Use two screws for this purpose. Wood screws may be used to fasten to wood lath and plaster. Toggle bolts should be used in terra cotta or wire lath walls. Lead anchors or expansion bolts should be used in brick or stone walls.

Sixth: Return the movement to the case, being careful not to bend the crutch, and see that the fork is in the rod.

Seventh: Before putting on the dial it is best to see that contacts are working correctly. Wind the clock and start it going. Stop it when the long finger drops. Put on the second hand pointing directly up,

and minute hand on the square, so that the notch in the disc is right for the synchronizing device to drop at the hour. Start the clock going and try it with sounder.

Eighth: When contacts are working correctly, stop the clock again with the hands pointing to twelve. Put on dial and hands, and before connecting to the line, regulate to Observatory time.

Directions for Regulating Master Clock

First: If clock is equipped with a Mercurial Compensating pendulum, regulate at first by the nut at the bottom of the rod until it runs about one second slow in twenty-four hours. Two divisions on the nut will change the rate about one second per day. After the pendulum has been stopped to turn the nut, comparisons must not be made for several hours, giving time enough to be sure it has settled to its normal arc, otherwise an error will appear.

Second: We send with each Mercurial Compensating pendulum clock a set of weights in pairs, the largest weighing one gram each, the next size five decigrams and the smallest two decigrams each. When regulated to one second per day slow, make the fine regulation by placing small weights on the top of the jars.

Third: On the Mercurial Pendulum two weights of one gram each placed on the jars will make the clock gain about one second per day and the smaller weights in proportion. Care must be taken when putting on or taking off weights not to disturb the swing of the pendulum, as any change of the arc changes the rate.

Fourth: To start the clock after it is regulated, stop it, with the second hand at the fiftieth second; move the hands forward to the hour at which the signal comes from the Observatory. then press the minute hand back gently until it is stopped by the extension on the hour contact, and beat the clock up to the hour. This insures the hour contact being in position to send the synchronizing signal.

Fifth: A good way to start it with Observatory time is (with all the hands pointing to the "signal" hour) hold the pendulum to one side and when the signal comes, let it go.

Sixth: For regulation of sixty beat Wood Rod, Brass Bob pendulum, see Page 10. This type of pendulum is fitted with a small brass table fastened about the middle of the rod. We send with each clock a single set of weights, the largest weighing one gram, the next in size five decigrams and the smallest, two decigrams. By placing the one gram weight on this table, the clock will gain one second per day, and the smaller weights in proportion. The same precaution must be taken with this as with the Mercurial Pendulum when putting on or taking off weights, not to disturb the swing of the pendulum, as any change of the arc changes the rate.

MASTER CLOCK CONNECTIONS

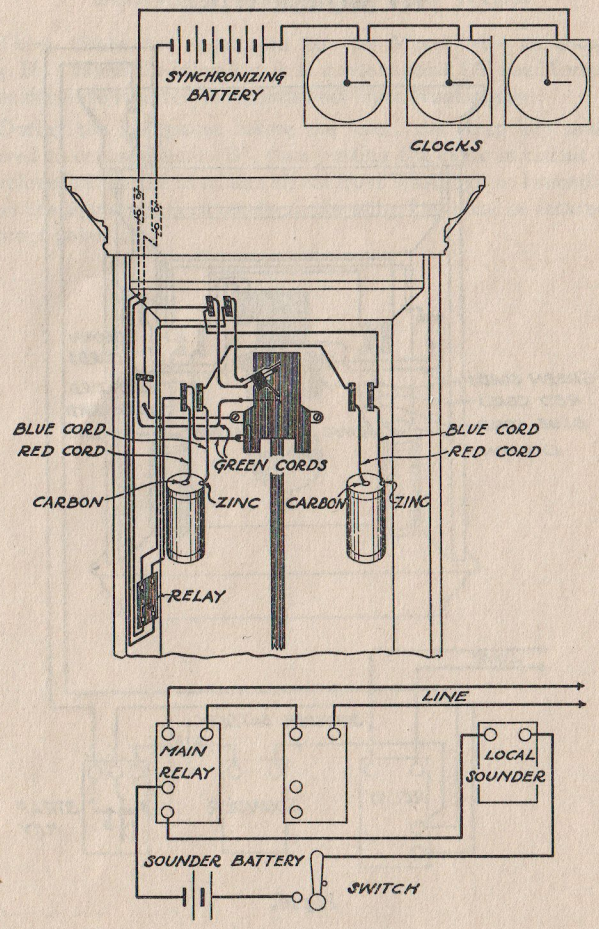


Fig. 15

RAILROAD STATION CLOCK CONNECTED TO MORSE WIRE

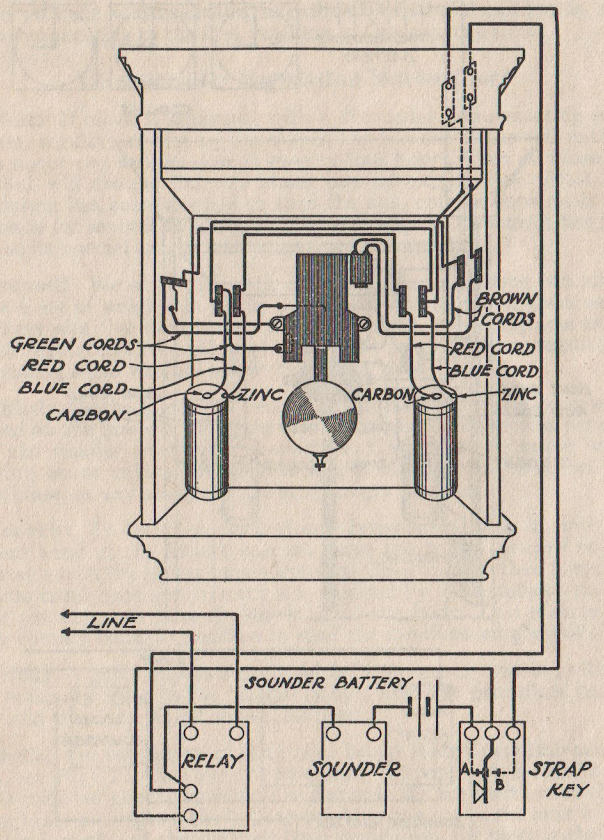


Fig 16.

CLOCKS IN RAILROAD STATIONS RECEIVING SIGNALS FROM MORSE WIRE

These clocks are connected to the Morse wire as shown in Fig. 16. When the strap key is at contact point (A) the Morse wire is in circuit to receive the seconds beat from Washington.

During the last pause before the hour, the strap key must be moved to contact point (B), thus putting the clock in circuit to be synchronized by the Meridian signal from Washington. Immediately after the signal has been received, the strap key must be returned to contact point (A).

GENERAL INFORMATION

Remounting Clock Hands

To determine if the minute hand is on the proper square of the cannon socket, slightly turn minute hand forward until it passes the even hour approximately 1½ to 2 minutes, when a slight sound should be noted, which is an indication that the latch has dropped off the latch pin on the cannon socket disc and locks the synchronizing lever until 2 minutes before the even hour. In this position, the hand is placed correctly. If however, this sound occurs on any other quarter hour, carefully remove center nut by holding on to minute hand, then remove minute hand being sure not to change the position of the cannon socket. Replace the minute hand on the cannon socket. In this position the hand will point to the even hour. Be sure that the minute hand is pressed down slightly below face of the cannon socket and replace center arbor nut. Next see that the hour hand is pushed down slightly below the top of the hour wheel sleeve. When moving hour hand back and forth, there should be at least 1/64" clearance between back of minute hand socket and top of hour wheel sleeve. Test hands to see that neither hour nor minute hand touches the dial and that the hour hand does not touch the back of the minute hand.

Clock Stopped

When clocks are found stopped it is of the utmost importance to locate the cause of the trouble. To do this, test as follows:

First: Set pendulum swinging to see if hands move; if not, see if dial is warped so as to touch hands.

Second: Turn hands to see if they bind in any way.

Third: If hands are free and yet do not move when pendulum swings, wind the clock by contact key.

Fourth: If clock winds slowly in this way, the battery is weak and the clock is run down.

Fifth: If clock winds rapidly, it shows that the trouble is caused by the center winding contact or motor brushes being out of adjustment.

Sixth: Take off hands and dial and examine all the parts closely.

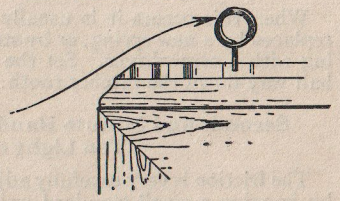
Seventh: Touch contact key in case a number of times to see if the motor starts from every point.

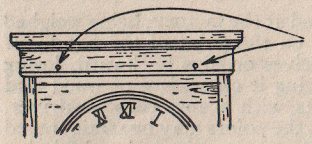
Eighth: Take off front pallet arbor button, hold the escape wheel and raise pallet, then let the clock run down slowly until it makes on the center contact. This will show whether that part is right.

Ninth: If the fault is found and cannot be easily and surely corrected, take the movement out and make a thorough job of it.

INSTRUCTIONS FOR MOUNTING TIME SERVICE SIGNS ON CLOCK CASES

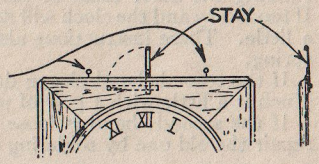
All W. U. Clocks are equipped with rings to hold the Time Service Sign.



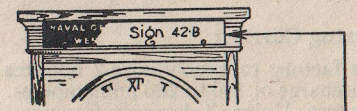


On Nos. 9, 10 and 18 Clocks, these rings are located in the moulding.

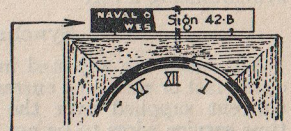
On No. 29 Clocks, the rings are located on top of the case. The stay is located on back at top of case front and is swung down into dotted position shown when clock is shipped



The sign should be mounted between the coils of the ring.



Steel Sign 42-B should be mounted on Clocks Nos. 9, 10 and 18.



Steel Sign 42-B should be mounted on Clocks No. 29.

Clock No. 33 should be equipped with cardboard sign 43-A.

Do not use *Steel Signs* on this Clock.

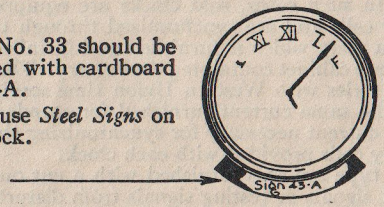


Fig. 17

These Instructions issued by

W. C. TITLEY

General Supt. of Plant, W. U. Tel. Co.

August 13, 1923.

Back Stop Spring Broken or Bent on Rotary Type Motor

Used on Style "A" and "C" Movements Only

When this occurs it is usually from overwinding. It must be replaced by a new spring, or by straightening the old one by burnishing with a screwdriver. Set the spring so that it will catch about half way down the ratchet tooth.

Seconds and Minute Hand Friction Springs Adjusted Too Light or Too Heavy

The friction is very carefully adjusted at the factory, being weighed by hanging a small standard weight on the point of the hand. If it becomes too light and the hand drives or slips backward, losing time, it can be made stronger by laying it on a piece of wood and rubbing the inner faces of the points with a smooth screwdriver. If too heavy and the clock will not set, the points may be straightened a little. These instructions also apply to the minute hand friction spring.

If the seconds hand sleeve does not hold on the seconds socket, pinch it a little with a pair of pliers.

If the seconds hand is loose on the sleeve, put on a new one or repair the old one by soldering it on the under side.

Note: All new types of seconds synchronized clocks are now furnished with a square stem heart shaped seconds socket and a seconds hand with a square hole sleeve to fit the heart shaped socket. This construction prevents the seconds socket or the seconds hand driving or being jarred loose by the action of the synchronizing lever.

Synchronizing Current

All clocks are adjusted in the factory to synchronize 2 minutes either fast or slow on a current discharge of 180 to 200 milliamperes. Current supplied over the Western Union Telegraph Company time service wires to be not less than 230 milliamperes.

Where *sold* clocks are installed, it often becomes necessary to furnish slightly increased synchronizing current for the reason that dial diameters are larger and hands are heavier than those furnished with rental clocks. In such cases, sold clocks are equipped with additional dry cell or cells and are synchronized through the local battery by means of a relay which is furnished and installed in the clock case or in a separate cabinet containing the battery. The relay is connected directly in series with Western Union time service wires and will operate on the same current furnished for standard clock units. The increased current necessary for synchronizing the hands is furnished by the dry cells provided with each clock.

Sold clocks of this type are also furnished with a cut-out which prevents seconds beat signals or testing signals from disturbing the clock hands.