Master WATCHMAKING

SHOP TRAINING JOB GUIDES

LESSON 9

Winding and Setting Mechanisms

—

Sections 220 - 234

CHICAGO SCHOOL OF WATCHMAKING

2330 N. Milwaukee Ave. • Chicago 47, Illinois

MASTER WATCHMAKING

A Modern, Complete, Practical Course

CHICAGO SCHOOL OF WATCHMAKING

Founded 1908 by Thomas B. Sweazey

Lesson 9

Sections 220 to 234

Lesson 9. — Winding and Setting Mechanisms.

Section 220

BEFORE having had a chance to handle the different models of watch movements, you may be somewhat confused when attempting to assemble the setting and winding parts.

It is a good plan to study the action and be sure you understand the office of each piece before taking any mechanism apart. If you come in contact with an unfamiliar type make a rough sketch showing just how the parts match with each other. There are not a great number of different types of winding and setting mechanisms and after you have had an opportunity to study them as they come to you for repairs, you will have little trouble in replacing any of the pieces and with practice can tell, when shown a setting part for an American watch, the factory from which it came and what its function is.

In the key wind watch, the winding and setting was performed on separate squares but in the stem wind and stem set movement both of these actions are accomplished by means of the one stem.

As shown in a previous lesson the sleeve in a pendant set case is liable to wear or become broken and allow the stem to slip from the winding to the setting position. Again one might neglect pressing the stem back after setting his watch, or even in handling it the stem could be brought out of the winding position, any of these preventing the proper performance of the hands in indicating the correct time.

While the convenience of the pendant set watch makes it more popular with the average person, the positive action of the lever set mechanism has been recognized as being better for Railroad Watches, consequently one of the requirements for a watch to pass Standard Railroad Inspection is that it be lever set.

Sec. 221 — An Older Type of Lever Set

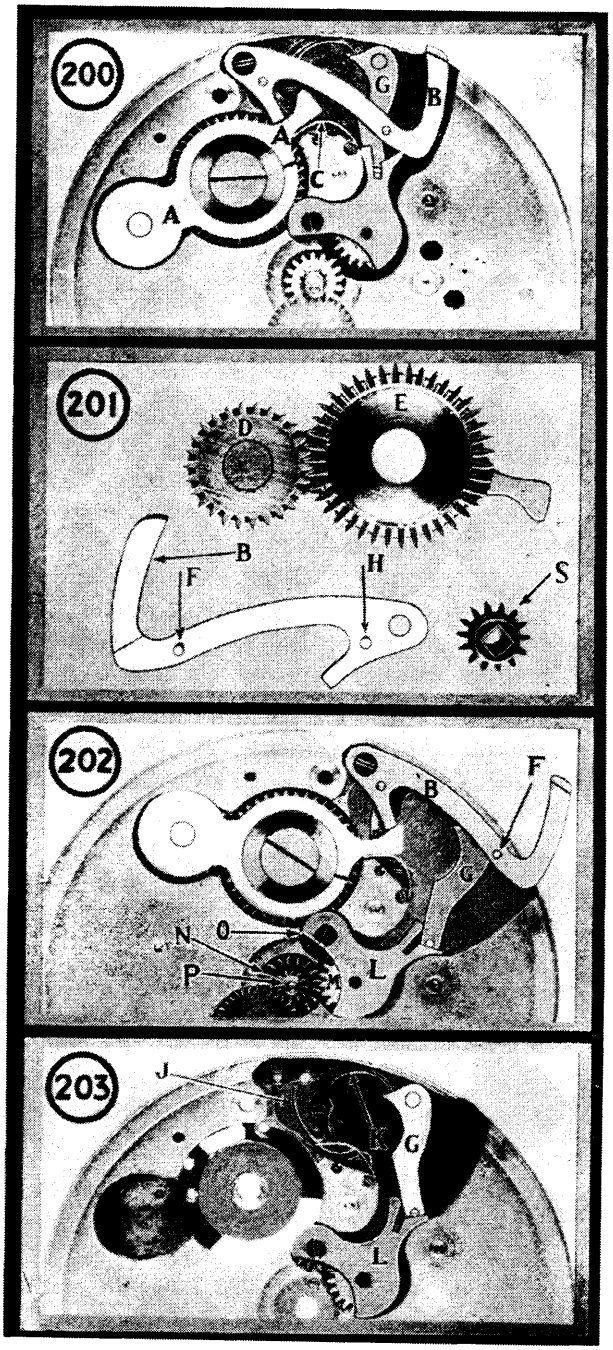
The principles of the winding and setting mechanisms are much the same in all watches, that is the stem turns the winding arbor which is connected with the ratchet wheel by a series of gears when winding, or with the cannon pinion when setting. The older forms of stem winding and setting mechanisms were quite complicated and not always as dependable in their action as the ones of today.

Figure 200 is a view of the dial side of an 18 size American made movement with the dial removed, showing one of the older types of lever setting mechanisms. The shifting of the parts from the winding to the setting position shown in figure 202 is accomplished by a series of levers and springs controlled by the setting lever B.

In figure 200 the mechanism is in the winding position with the lever B pushed in and the vibrating arm spring C pressing the vibrating arm A and this holds the interwind wheel which is underneath, against the ratchet wheel.

In figure 201 is shown the vibrating arm turned over to expose the interwind wheel at D and the crown wheel or main wind wheel at E. B is the setting lever also turned over showing the pins on the lower side, the setting cam G in figure 200 and 202 being controlled by pin F, while the setting lever spring J in figure 203, presses against the pin H, figure 201, and holds the setting lever firmly when in the winding position.

When the lever B is pulled out as shown in figure 202, the pin F slides along the edge of the setting cam G and allows it to shift to the position shown in figures 202 and 203 being forced over by the setting spring K, figure 203. In this position it so presses the setting bar L that the setting wheel M, figure 202, is engaged



with the wheel N which is attached to the cannon pinion P. Thus if the crown wheel is turned while in this position it engages the intermediate set wheel at O and this conveys the power from the setting wheel to the cannon pinion P which carries the minute hand.

In figure 204 is shown the other side of the plate with the winding bridge, ratchet wheel, click and click spring. This winding bridge may be removed by taking out the two screws R and S after which it will appear as in figure 205 with the bevel pinion in position at V. At S, figure 201, the bevel pinion standing on end shows the square hole into which the square of the winding stem fits. When this pinion is turned by means of the stem, the beveled leaves engage the teeth of the crown wheel and turn either the winding or setting, depending upon the position of the vibrating arm.

T in figure 204 shows where the interwind wheel engages the ratchet wheel when in the winding position.

Sec. 222 — A Modern Type of Lever Setting

In the more modern type of watch the change from the setting to the winding is achieved by means of a sliding clutch. In figure 206 are shown the parts of a Hamilton type of lever setting mechanism. A is the clutch lever and spring, B the setting lever or shipper, E the winding pinion, F the clutch and G the winding arbor. The clutch F has a square hole running lengthwise through the center which fits over the square portion H of the winding arbor. The clutch slides freely on this square and is shifted back and forth by the clutch lever and spring A.

One end of the clutch has ratchet teeth at J to match the ratchet teeth in the lower side of the winding pinion at K, while the other end at L matches the teeth of the interset wheel at M in figure 207.

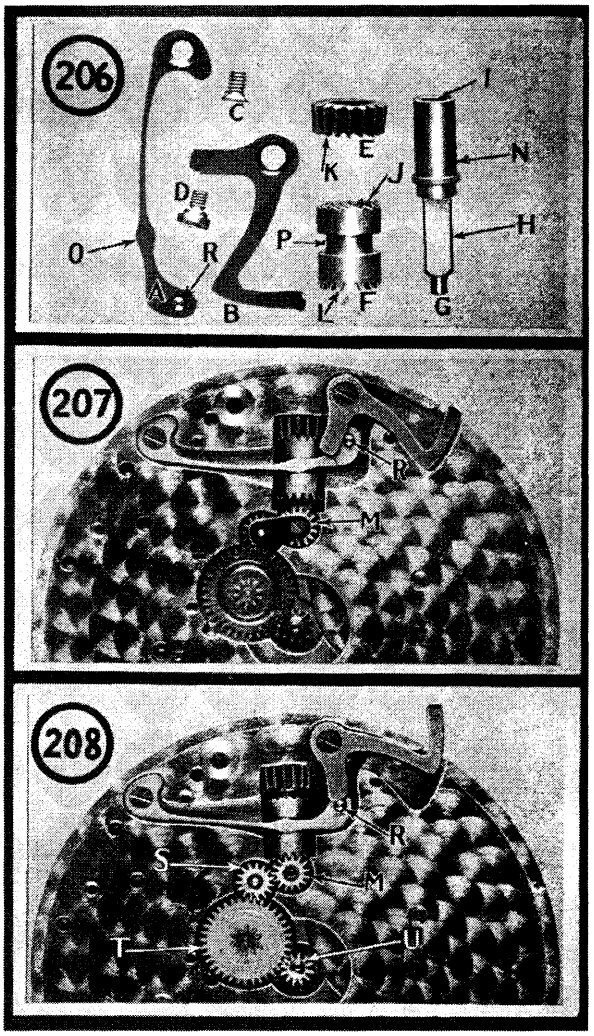
The winding pinion E has a hole through it which is fitted to turn freely on the round portion of the winding arbor at N. The thicker portion of the clutch lever and spring at O fits in the slot P of the clutch and when these parts are assembled and the setting lever is pressed into the winding position shown in figure 207, the tension of the clutch lever and spring holds the ratchet teeth of the clutch in contact with the ratchet teeth of the winding pinion.

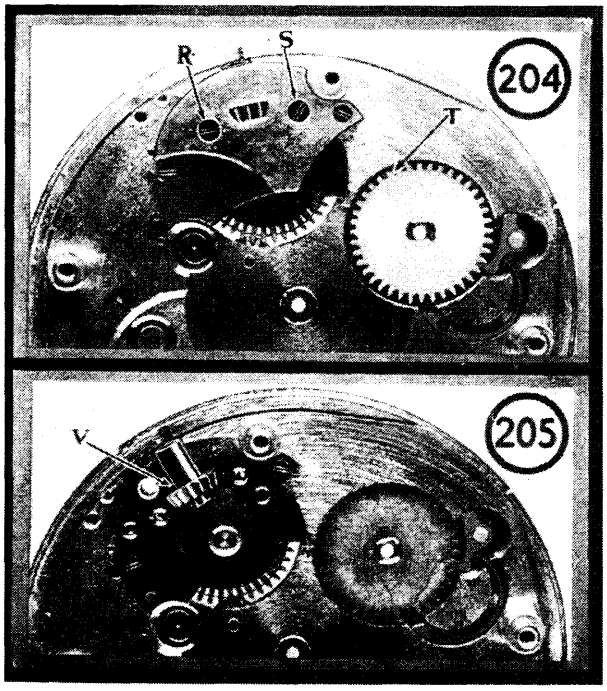
When the setting lever is pulled out to the setting position the end of it is pressed against the pin R of the clutch lever and spring and forces it to the position shown in figure 208. This carries the clutch along the square portion of the winding arbor and the lower end is engaged with the teeth of the interset wheel M and this conveys the power through the setting wheel S and the minute wheel T to the cannon pinion U.

This action may be somewhat confusing at first but if you will remember that the power from the stem is conveyed by the winding arbor directly to the clutch and that the winding pinion does *not* turn except when engaged with the clutch, it may help you to recall how these parts should be placed.

In figure 209 is shown the other side of the plate when these parts are in the winding position and at figure 210 with the setting lever pulled out to the setting position. The clutch and winding pinion in 209 correspond to the position shown in 207, while 210 corresponds to 208. As may be seen in figure 209 the winding pinion is held in place on the winding arbor by the slot in the plate at V which prevents it from creeping away from the clutch and disengaging the teeth. When assembling these parts the clutch and winding pinion are placed on the winding arbor and then set in position on this side of the plate as shown in figure 209 and 210.

In figure 211 is shown the crown or winding wheel W and the ratchet wheel X, when the movement is assembled. At 212 is shown a side view of the crown wheel on which are two sets of teeth at right angles with each other, see Y and Z. When the clutch is engaged with the winding pinion and the winding arbor is turned by the stem — the winding arbor having a square hole shown at I in figure 206 into which the square of the stem fits — the leaves of the winding pinion shown at V in figure 209 are engaged with the lower teeth Z on the crown wheel and the upper teeth at Y are engaged with the ratchet wheel as shown in figure 211.





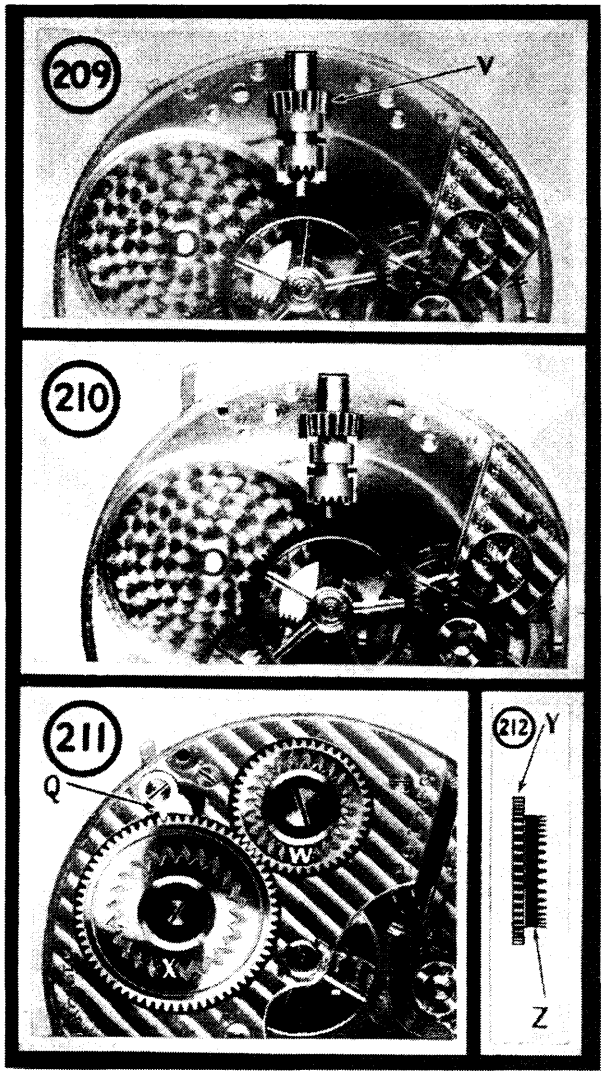
The clutch being held against the winding pinion by the tension of the clutch spring as in figure 207 and the teeth on each of these being ratchet shaped, when the winding arbor is turned backwards the ratchet teeth of the clutch rise and fall in the ratchet teeth of the winding pinion and make the familiar clicking or sound of the *backwind.* When the winding pinion is turned forward the clicking that is heard is caused by the rise and fall of the click at Q, figure 211, in the teeth of the ratchet wheel.

Sec. 223 — A Waltham Lever Set

Figure 214 shows another type of lever setting mechanism used on some models of the Waltham watch, with the setting lever at A and the shipper lever at B.

In figure 213, E is the winding pinion, F the clutch, G the winding arbor, H the setting wheel cap, I the setting wheel and J the winding arbor bearing. The end of the winding arbor at K fits into the hole of the winding arbor bearing at L.

On the shipper lever at C, figure 214, is a pin which projects on the under side and fits the slot in the clutch at O, figure 213. When the setting lever is shifted to the setting position the shipper lever is forced down and carries with it the clutch which engages the interset wheel under the setting cap at D, figure 215.



The winding arbor bearing is put in place from the movement side of the plate as shown at M in figure 216. The setting wheel is placed on its shoulder from the dial side and this assembly is held in place with the setting wheel cap screw N which screws through the setting wheel cap D, figure 215, into the winding arbor bearing M, figure 216.

Sec. 224 — Illinois Type of Lever Set

Figure 217 shows the setting arrangement of a high grade Illinois watch movement, the Bunn Special, in which A is the clutch lever, B the clutch lever spring, C the setting lever, and D the setting lever spring. One looped end of the setting lever spring is held by the screw at E while the other end fits over the pin on the lower side of the setting lever at F.

Figure 218 shows the position of these parts when the setting lever is shifted to the setting position and with the plate over the setting wheel removed.

The setting mechanism of the modern lever set watch is not complex in its action and after you understand the mechanical principles of the clutch and winding pinion in its relation to the crown wheel and setting wheel you should be able to re-assemble any of them.

Sec. 225 — Modern Pendant Setting Mechanisms

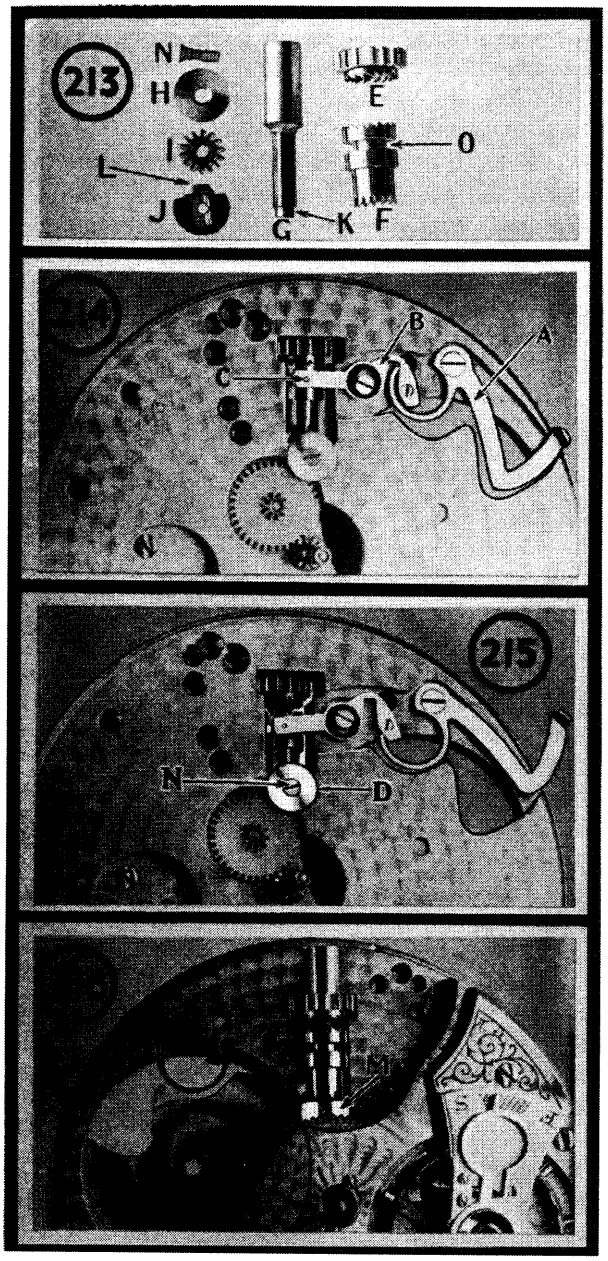
In some of the earlier models of Pendant set watches, before the use of the clutch, vibrating arms or yokes were used. These earlier forms were somewhat complicated but in all modern types you will find the mechanism much simplified and as in the case of the lever set, after you have once mastered the arrangements of the parts you should assemble easily either American or Swiss styles.

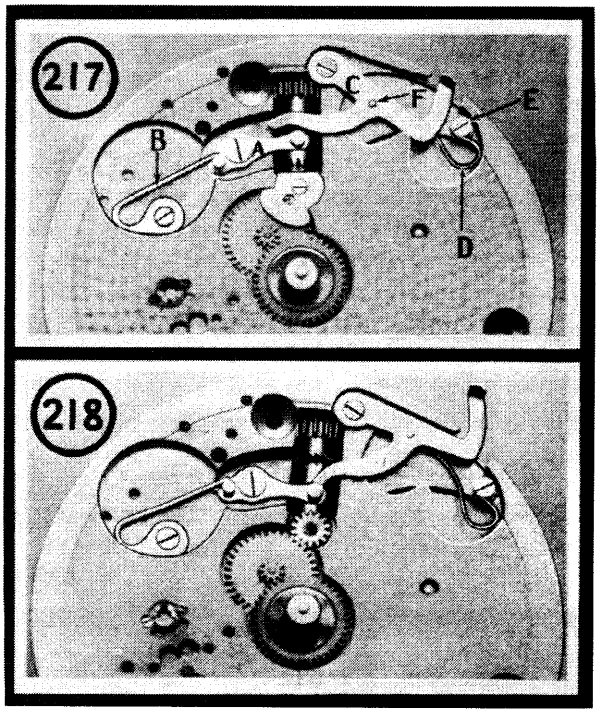
The use of the sliding clutch does away with the yoke and has been adopted by practically all watch manufacturers both in pendant and lever set movements.

Sec. 226 — Waltham Pendant Set

The Waltham pendant set mechanism shown here is used in connection with the stem and sleeve described in lesson 2.

If you will compare the parts in figure 219 you will see that they are much the same as those used in the lever set in figure 213 with the addition of the plunger or push pin at R figure 219. In this photograph I have shown the other side of the winding arbor bearing to enable you to see the shoulder at S on which the setting wheel rests.





In examining the lever set watches we found that most of the mechanisms for changing the position of the clutch was on the dial side of the pillar plate while in this pendant set movement the majority of the parts are between this plate and the barrel bridge.

In figure 220 is shown the mechanism for shifting from the setting to winding in its position on the lower or pillar plate. These parts are held in place by the shipper cap shown at A and this cap is held by the screw B. By removing this screw and lifting off the cap the parts will appear as shown in figure 222. C is the shipper lever, D the shipper, while the triangular shaped spring shown at E is the shipper spring.

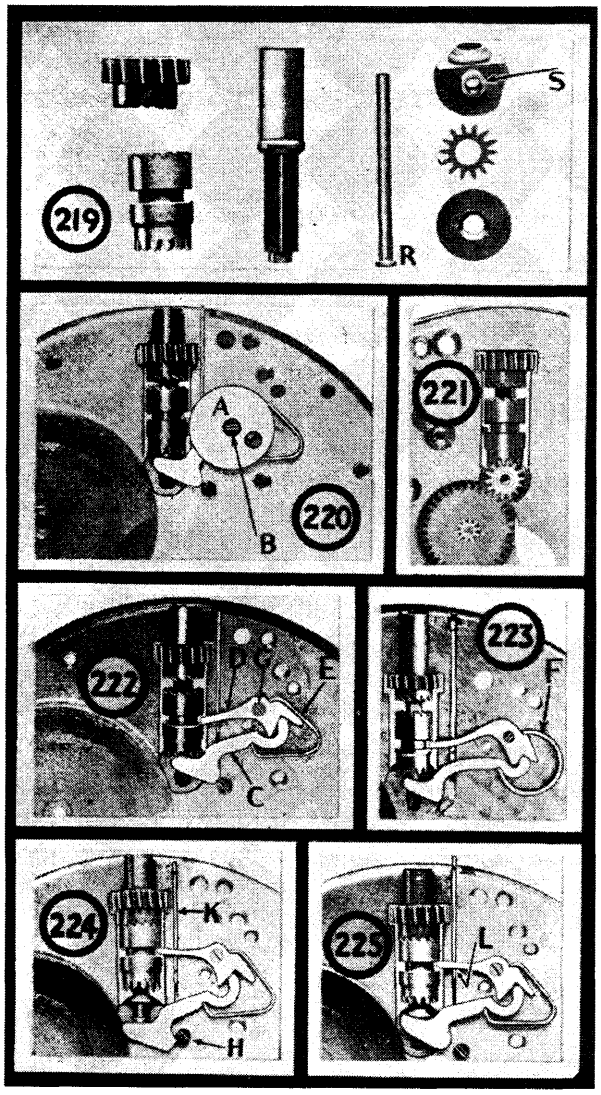
This shipper spring in some models is round as shown at F, figure 223, but its action is the same in either shape. The shipper performs the same office here that the clutch lever did in the lever set model in figure 214, that is it controls the position of the clutch.

Sec. 227 — Setting Position

The position shown in figures 220 and 222, is the one that these parts will assume when the movement is out of the case or when the stem is pulled out to the setting position. The shipper D is pivoted on the screw G. The position of the shipper is controlled by the shipper lever C and the shipper spring E. As shown here the shipper spring presses the lever against the end of the shipper furthest from the clutch and the shipper being pivoted at G, the end which lies in the slot of the clutch is pressed downward carrying the clutch with it, until it engages the setting wheel, see figure 221.

Sec. 228 — Winding Position

When the stem in the pendant set case is pressed into the winding position by means of the crown and is held in that position by the sleeve as explained in Lesson 2, the plunger or push pin which extends through the winding arbor is pushed down to the position shown in 224 and the end of the plunger presses the shipper lever down past the stop screw H and forces the end of the shipper and with it the clutch upward into the winding position, that is with the ratchet teeth of the clutch in the ratchet teeth of the winding pinion. In taking down this mechanism it is not necessary to remove this screw it being left in the plate at all times even when cleaning the watch.



Care should be used to see that the shipper spring E or F does not spring away from you. In assembling it is well to place your shipper and shipper lever in position, then slip one end of the shipper spring in place and holding the two parts down hook the other end in its position. After doing this immediately replace the shipper cap and set the screw to hold it.

This mechanism is hard to assemble without instruction and the beginner usually is confused as to the position of the shipper and the shipper lever but anyone should be able to see the proper location of these parts by consulting these enlarged photographic studies.

Sec. 229 — When Timing Movement Outside the Case

When a lever set movement is out of the case the winding and setting will act as it would when in the case but this is different with a pendant set movement. The only thing that keeps the pendant set mechanism in winding position while in its case is the position of the stem, this in turn being held by the sleeve. When the movement is removed from the case this is released and the shipper spring through the shipper lever forces it to the pendant set position.

When the cannon pinion turns while in the setting position, it turns the minute wheel, setting wheel, clutch and winding arbor. If you will examine figure 221 you will see what I mean. When the cannon pinion is compelled to turn all these parts, its load is increased and unless it fits tighter than is necessary, is liable to slip on the center staff or if the cannon pinion is too tight it will slow down the motion or in some instances stop the watch.

Occasionally movements are allowed to run outside the case and unless there is some means of keeping the parts in the winding position this unnecessary friction will cause the watch

to run at a different rate than when cased. For this reason pendant set watches have some method of throwing the parts into the winding position when outside the case.

In the Waltham movement shown here this is accomplished by means of the shipper bar at K in figure 224. The outer end extends to the edge of the plate where there is a notch in which to insert a screw driver or the tip of the tweezers and pull this shipper bar out which causes the hook on the other end at L to catch the shipper and shift it and the clutch to the winding position as shown in figure 225. As long as these parts are in this position the watch cannot be set from the winding arbor but will perform as it does when in the case with the stem pushed in.

It sometimes happens that you may neglect to press this shipper bar back to its proper position. For this reason it is well to always test the winding and setting with your bench key before recasing any movement.

Sec. 230 — Elgin Pendant Setting

Figure 227 shows part of the pillar plate from a 16 size Elgin movement with the winding and setting parts in place on the dial side. Figure 226 shows the other side of this same plate.

Here is a bevel or winding pinion together with a winding and setting clutch, much on the order of ones you have studied in previous sections, but controlled by a different plan.

The letters indicate the parts as follows:

A—Setting Cam

B—Setting Lever

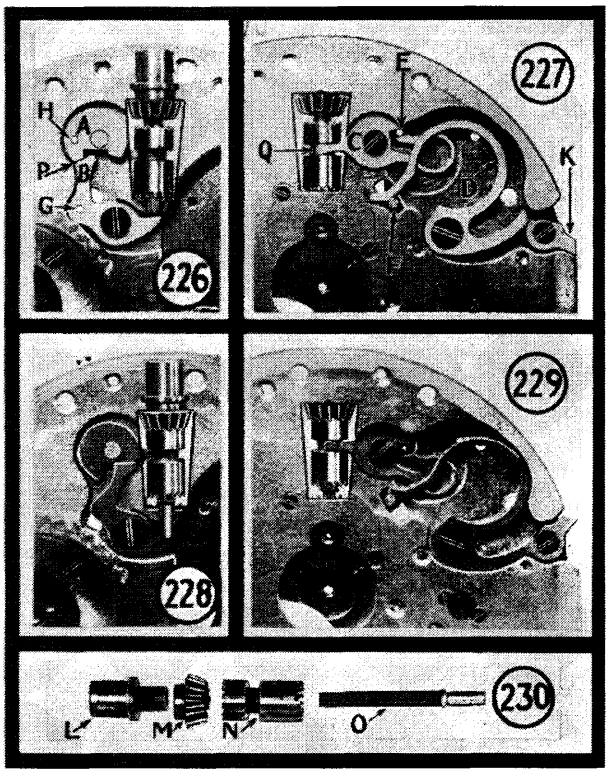
C—Clutch Lever

D—Setting Spring

K—Setting Spring Cam

Figures 226 and 227 show the parts in the setting position. The setting spring D figure 227, presses the pin F down and this pin being attached to the setting lever B figure 226, at the point G, forces the setting lever over until the end at P pushes the setting cam A upward. At H on the setting cam is attached a pin which extends through the plate and may be seen at E figure 227. As the pin is pressed upward it forces the other end of the clutch lever at Q downward and this carries the winding and setting clutch into the setting position, gearing into the minute wheel as shown in figure 227.

When the stem is pressed into the movement, the winding arbor which also acts as a push pin, pressing down on the lower end of the



setting lever forces the setting cam over and this raises the end of the clutch lever and carries the winding and setting clutch into the winding position shown in figures 228 and 229.

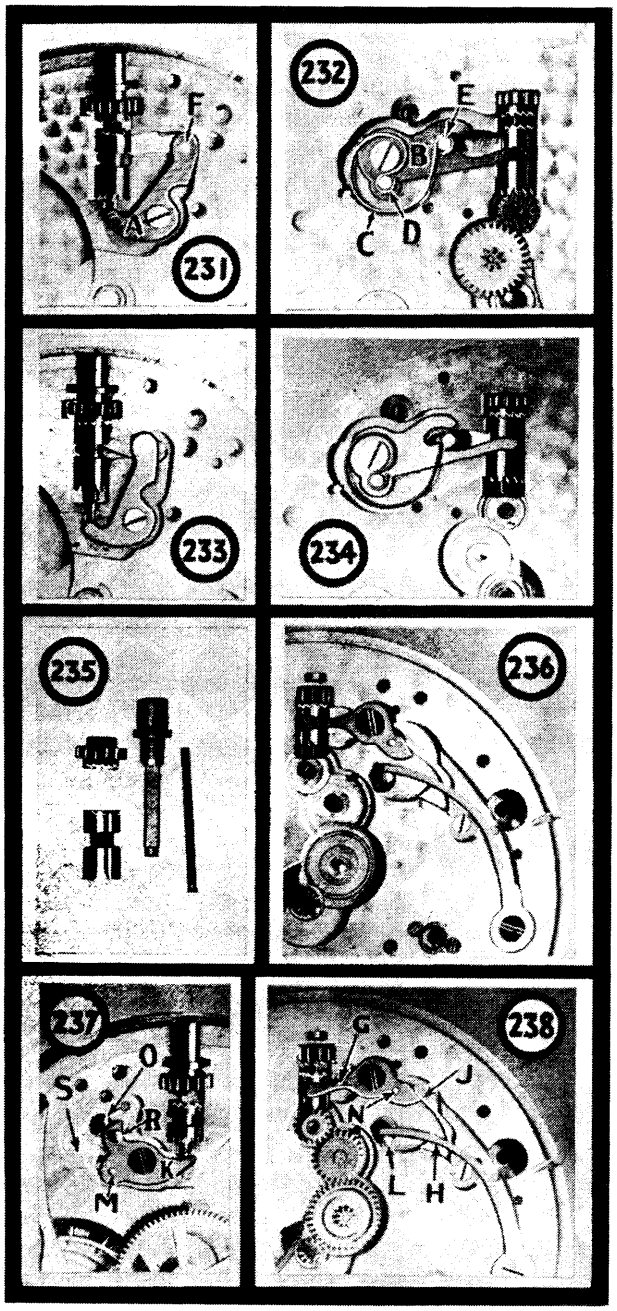
At K figure 227 is the setting spring cam which serves the same purpose as the shipper bar on the movement described in Section 229. When the movement is in its case, the setting spring cam should be in the position shown in figure 227. If you wish to disengage the clutch from the minute wheel, in order to let the movement time outside the case, push the setting spring cam to the position shown in figure 229 and then with your bench key press the winding arbor to the winding position. The pressure of the setting spring on the pin F having been released by moving the setting spring cam, the parts will remain in this winding position. The setting spring cam may be changed from one position to the other without removing the dial. In casing this type of movement be sure to have the setting spring cam in the position shown in figure 227. If left projecting as in figure 229 it might be broken when pressing the movement into the case.

In figure 230 are shown the following:

L—Winding sleeve

M—Bevel Pinion or winding pinion

N—Winding and setting clutch



O—Winding arbor which also serves as a push pin.

In assembling these parts it is only necessary to line them up as shown in this photograph. The bevel pinion sets on the small shoulder of the winding sleeve, the square of the winding arbor goes through the winding and setting clutch extending into the winding sleeve. When assembled this unit will appear as in figures 226 and 228.

Sec. 231 — Illinois Pendant Set

Figures 231 to 235 show the setting parts of a 12 size Illinois movement not at all complicated and easy to understand. A, figure 231, is the locking lever, B figure 232 the clutch lever and C the clutch lever spring. As shown in figure 232 one end of the clutch lever spring is hooked over the pin at D on the clutch lever and the other end over the pin E which is on the upper end of the locking lever at F figure 231. This spring pulls the pin E into the slot of the clutch lever forcing the end which extends into the clutch, downward to the setting position as shown in figure 232.

When the push pin is forced down, it presses the locking lever over to the position shown in figure 233, thus forcing the pin on the other end past the shoulder in the slot of the clutch lever in figure 234, and this permits the clutch lever to spring upward into the winding position shown in figure 234.

In figure 235 are shown the parts with which you should be familiar by this time, the bevel pinion, the winding and setting clutch, the winding arbor and the pendant push pin. These parts are shown in the assembled unit in figures 231 and 233.

Sec. 232 — A Hamilton Pendant Set

Figures 236 to 238 show a type of Hamilton pendant set mechanism, simple and positive in action.

In figure 238:

G is the clutch lever

H the setting lever spring

J the clutch lever spring

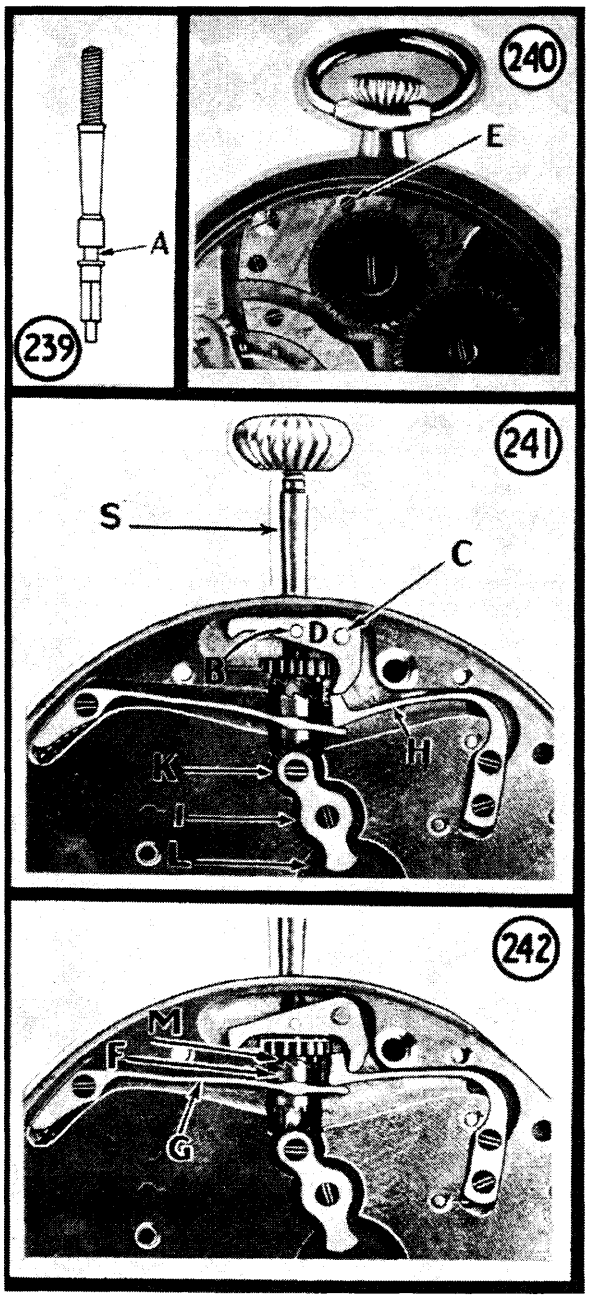
K in figure 237 the pendant set lever.

The pin at L figure 238 is fastened to the set lever at M figure 237 while the pin O figure 237 is fastened to the clutch lever at N figure 238. In the setting position the stronger setting lever spring H figure 238 forces the pin at L downward pressing that end of the set lever K figure 237 downward, the upper end pressing the pin at O upward and this presses the end of the clutch lever, which connects with the clutch, into the setting position shown in figure 238.

When the push pin is pressed down to the winding position by means of the stem, the pendant set lever K figure 237 is forced away from the pin O and this permits the weaker clutch lever spring at J figure 238 to press the

end of the clutch lever and with it the winding and setting clutch into the winding position shown in figure 236.

In this movement will be found a cam fitting in the space at S, one side of which comes in contact with the pin R on the setting lever. This cam (not shown in the photograph) has a pin attached which extends up through the top plate terminating in a screw head and by inserting a screw driver in the slot of this head the cam may be turned to the left causing it to press against the pin R in the setting lever, figure 237 and forcing it into the winding position so the movement may run out of the case with the setting and winding parts in the same position as when in the case with the stem pushed in. The screw head which connects with this cam may be known by its color, it being dark blue while the bridge screws are bright finished. When the movement is replaced in the case be sure that the cam is so turned that the setting works properly.



Sec. 233 — A Different Type of Mechanism

The majority of Swiss pocket watches, some American models and practically all Swiss wrist and bracelet watches have a pendant set mechanism that does not require the use of a sleeve.

Figures 241 and 242 show enlarged views of the setting arrangement of a 12 size South Bend movement with the dial removed. This gives a good idea of the general principles of most pendant set mechanisms which do not depend upon a pendant sleeve.

In this model the setting lever D, figure 241, has a pin projecting from the lower side, the end of which may be seen at B and this pin fits in the slot of the stem at A figure 239. In the photograph in figure 241 the stem is shown at S, where it has been pulled out to the setting position carrying with it the setting lever.

In figure 242 the setting lever is shown in the normal position, that is with the stem pressed in. The winding and setting clutch F slides back and forth on the square of the winding arbor or stem and is controlled as to its position by the clutch spring G. When you pull on the stem it brings the setting lever to the position shown in figure 241 and the end of the setting lever forces the setting lever spring H down to the position shown here and it in turn presses down upon the clutch spring which carries the setting clutch downward until the lower end engages the teeth in the intermediate setting wheel at K, this in turn being connected to the cannon pinion by the larger intermediate setting wheel I and the minute wheel L.

When the crown and stem are pressed in, the setting lever slips off the set lever spring allowing it to resume its normal position as shown in figure 242, freeing the clutch spring which then forces the clutch to engage with the winding or bevel pinion M and this in turn winds the mainspring through the crown wheel

and ratchet wheel on the other side of the movement, see figure 240.

In taking this type of movement from the case the screw at E figure 240 is turned to the left to loosen the setting lever D figure 241 and free the pin B from the slot in the stem. This is similar to the Swiss movement shown in figures 40, 43 and 44 in lesson 2, the screw at E, figure 240, extending down through the two plates and being threaded into the setting lever at C figure 241.

Sec. 234 — Examples of Swiss Setting Parts in Wrist Watches

In figure 243 are shown the setting parts of one type of setting mechanism as employed in a Swiss wrist watch. The part A is the setting lever or detent, B the yoke lever or clutch lever and C the yoke spring or clutch lever spring. This type of setting works on much the same principle as was described in section 233. When the stem is pushed in, the yoke lever holds the clutch in mesh with the winding pinion being held in that position by the spring C. When the stem is pulled out as in figure 244 it presses the end of the setting lever against the yoke lever which carries the clutch down until engaged with the intermediate set wheel and is locked in this position by the point on the yoke lever being held in the notch on the setting lever at E in figure 244.

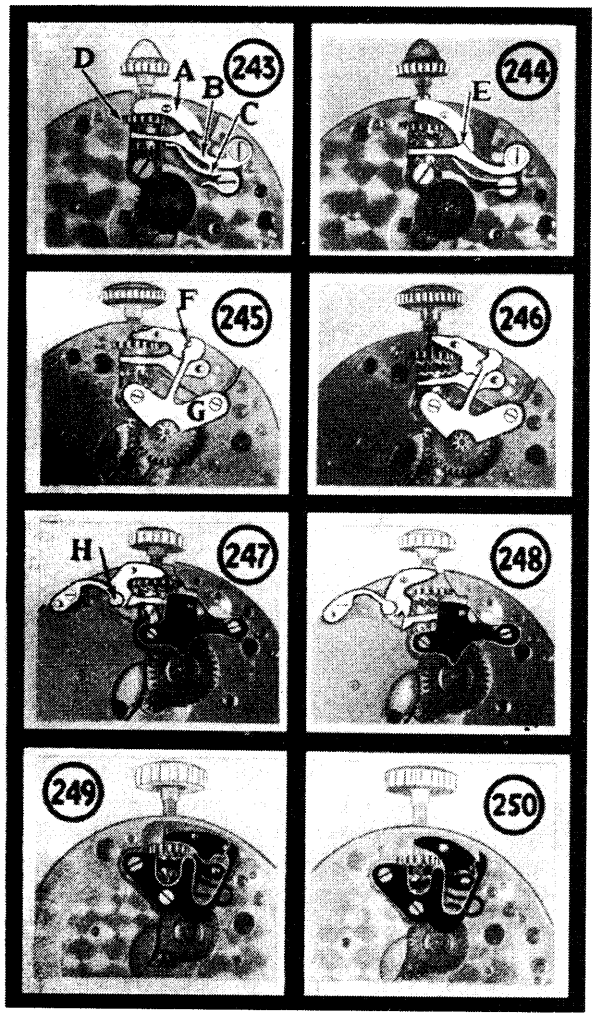


Figure 245 shows a Swiss type of setting and winding with a yoke bridge or setting wheel bridge, at G. Here the parts are locked into the winding position by means of the notch on the arm extending from the yoke bridge to the pin on the setting lever at F. When the stem is pulled out the lever is held in this setting position by the arm pressing against the pin as shown in figure 246.

In figures 247 and 248 is shown a different type of yoke bridge and here the setting lever works on the yoke lever from the left side and is locked in position by the pin on the end of the setting spring at H figure 247.

In figure 249 is another type of yoke bridge with the arm extending from the end to lock the setting lever in position much as the one does in figure 245. Figure 250 shows this same assembly in the setting position.

One of the systems of selecting material for Swiss watches is based largely upon the size of the movement and the shape of the parts I have been describing. Make yourself familiar with these three pieces, which are found in the great majority of Swiss wrist and bracelet watches and from the distinctive shape of which it is possible to identify the factory in which the watch was made.

1.—Setting lever or detent.

2.—Yoke lever or clutch lever.

3.—Setting wheel bridge or yoke bridge.

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JOB SHEETS

UNIT	W III
LESSON	8-9

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET W8-9-J1

DISASSEMBLY: 12/s Or 16/s Elgin Open Face

NOTE: In each watch there are several different sizes of screws. It is important that these screws be put back in their correct position. We suggest that as the odd sizes of screws are removed they be put back in the plate after the part they were holding has been removed. This will eliminate the possibility of misplaced screws. When you become familiar with the various screws and are able to recognize their correct position in the watch, this practice may be discontinued.

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - hand remover - cannon pinion remover - assembly tweezer - Mainspring winder - Jewel pusher

PROCEDURE	REFERENCE
HOW TO DISASSEMBLE 12/s OR 16/s ELGIN OPEN FACE	
1. Remove movement from case and place in movement holder.	Les. 1
2. Let down power.	Les. 5, Sec. 132
3. Loosen stud screw, remove balance cock and balance wheel.	Fig. 169
4. Remove hands, dial, hour wheel and cannon pinion.	Fig. 170-173-175-177
5. Remove minute wheel clamp and minute wheel.	Fig. 175-176
6. Remove clutch lever and setting spring.	Les. 9, Sec. 230
7. Turn movement over and remove pallet bridge and fork.	Fig. 178-179
8. Remove ratchet wheel and crown wheel.	Fig. 180
9. Remove train and barrel bridge.	
10. Remove train wheels and barrel.	
11. Remove barrel cap, arbor and mainspring.	
12. Lift out winding pinion and clutch assembly, separate the four parts of this assembly.	Les. 9, Sec. 230
13. Remove setting cam and setting lever.	Fig. 226
14. Remove balance cap jewels from balance cock and pillar plate.	Les. 10, Sec. 240; Les. 13

NOTE: Observe the difference in size and appearance of these two jewel settings so you will remember when replacing which one belongs in the balance bridge and pillar plate.

ASSEMBLY: 12/s Or 16/s Elgin Open Face

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - assembly tweezer - mainspring winder jewel pusher

PROCEDURE — REFERENCE

HOW TO ASSEMBLE 12/s OR 16/s ELGIN OPEN FACE

1. Place pillar plate on movement rest, dial side up.
2. Replace balance cap jewel.
3. Turn pillar plate over and replace setting lever and cam.
4. Assemble winding sleeve, winding pinion, clutch and winding arbor and put in place.
5. Place all train wheels on plate in the order listed: Fig. 183
   1. Escape wheel and pinion, 2. 3rd wheel and pinion,
   3. 4th wheel and pinion, 4. Center wheel and pinion.
6. Replace train bridge and screws. Fig. 184
7. Assemble mainspring, arbor and cap in barrel.
8. Replace barrel and bridge. Fig. 185
9. Replace crown wheel and screw. (Turn screw counter clockwise to tighten.)
10. Replace ratchet wheel and screw.
11. Turn movement over and replace cannon pinion and minute wheel and clamp.
12. Replace clutch lever and setting spring.
13. Test winding and train - should revolve freely.
14. Turn movement over and replace P. F. & A. and bridge.
15. Replace balance cap jewel and assemble balance and hairspring to balance bridge. Sec. 215
16. Replace balance bridge and wheel in movement.
17. Turn movement over and replace hour wheel, dial and hands. Les. 11

UNIT	W III
LESSON	8-9

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W8-9-J3

DISASSEMBLY: 12/s Or 16/s Elgin Hunting

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - hand remover - cannon pinion remover - assembly tweezer - jewel pusher

PROCEDURE	REFERENCE
HOW TO DISASSEMBLE 12/s OR 16/s ELGIN HUNTING	
1. Place movement in movement holder and let down power.	Les. 5, Sec. 132
2. Loosen stud screw, remove balance cock.	Sec. 209
3. Remove balance wheel.	
4. Remove hands, dial, hour wheel and cannon pinion.	Sec. 210
5. Remove minute wheel clamp and minute wheel.	
6. Remove clutch lever and setting spring.	Sec. 230
7. Turn movement over and remove pallet bridge and fork.	Fig. 178-179
8. Remove ratchet wheel and crown wheel.	Fig. 180
9. Remove train and barrel bridge.	
10. Remove train wheels and barrel.	
11. Remove barrel cap, arbor and mainspring.	
12. Lift out winding pinion and clutch assembly and separate the four parts.	Sec. 230
13. Remove setting cam and setting lever.	
14. Remove cap jewels from pillar plate and balance cock.	Les. 10 & 13

ASSEMBLY: 12/s Or 16/s Elgin Hunting

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - assembly tweezer - hand remover - cannon pinion remover - mainspring winder - jewel pusher

PROCEDURE — REFERENCE

HOW TO ASSEMBLE 12/s OR 16/s ELGIN HUNTING

1. Place pillar plate on movement rest, dial side up.
2. Replace balance cap jewel.
3. Turn plate over and replace setting lever and setting cam.
4. Assemble winding sleeve, winding pinion, clutch and winding arbor and put in place.
5. Place all train wheels on plate in the order listed: — Sec. 212
   1. Escape wheel and pinion. 3. 3rd wheel and pinion.
   2. 4th wheel and pinion. 4. Center wheel and pinion.
6. Replace train bridge and screws. — Fig. 184
7. Assemble mainspring, arbor and cap in barrel.
8. Replace barrel and bridge. — Fig. 185-186
9. Replace crown wheel and screw.
10. Replace ratchet wheel and screw.
11. Turn movement over and replace cannon pinion, minute wheel and clamp.
12. Replace clutch lever and setting spring.
13. Test winding and train - should revolve freely.
14. Turn movement over and replace P. F. & A. and bridge.
15. Replace balance cap jewel and assemble balance and hairspring to balance bridge. — Sec. 215
16. Replace balance bridge and wheel in movement. — Fig. 190
17. Turn movement over and replace hour wheel, dial and hands. — Les. 11

UNIT	W III
LESSON	8-9

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W8-9-J5

DISASSEMBLY: 12/s Or 16/s Waltham

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - hand remover - cannon pinion remover - assembly tweezer - jewel pusher

PROCEDURE — REFERENCE

HOW TO DISASSEMBLE 12/s OR 16/s WALTHAM

1. Place movement in movement holder and let down power.
2. Loosen stud screw and remove balance cock. Sec. 208
3. Turn movement over and remove hands and dial, hour wheel, cannon pinion and minute wheel.
4. Remove intermediate set wheel. NOTE: The bearing on which the intermediate set wheel is setting is also the bearing for push pin.
5. Turn movement over and remove pallet bridge and fork.
6. Remove ratchet wheel.
7. Remove crown wheel screw and crown wheel. (NOTE: Right thread turn counterclockwise to release.)
8. Remove train and barrel bridge.
9. Remove train wheels and barrel.
10. Remove barrel cap, arbor and mainspring.
11. Remove shipper cap, shipper spring, shipper lever and shipper. Les. 9, Sec. 226-227-228-229
12. Remove clutch and winding pinion assembly, separate the 5 parts.
13. Remove balance cap jewels from pillar plate and balance cock. Les. 10-13

ASSEMBLY: 12/s Or 16/s Waltham

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - assembly tweezer - mainspring winder

PROCEDURE — REFERENCE

HOW TO ASSEMBLE 12/s OR 16/s WALTHAM

1. Place pillar plate in movement holder, dial side up and replace balance cap jewel.
2. Place pillar plate on movement rest, dial side down.
3. Assemble and replace the winding pinion and clutch assembly.
4. Replace shipper, shipper lever, shipper spring and cap.
5. Place all train wheels on plate in the order listed:
   1. Escape wheel and pinion. 3. 3rd wheel and pinion.
   2. 4th wheel and pinion. 4. Center wheel and pinion.
6. Replace train bridge and screws.
7. Assemble mainspring, arbor and cap in barrel.
8. Replace barrel and barrel bridge.
9. Replace crown wheel and screw. (Turn screw clockwise to tighten.)
10. Replace ratchet wheel and screw.
11. Test winding and train - should revolve freely.
12. Replace P. F. & A. and bridge.
13. Replace balance wheel in movement. — Fig. 168
14. Replace balance cap jewel and put balance bridge in place.
15. With stud in place at proper height, tighten stud screw. — R Fig. 167, Sec. 208
16. Replace intermediate setting wheel and cap.
17. Replace cannon pinion, minute wheel and hour wheel.
18. Replace dial and hands.

UNIT	W III
LESSON	8-9

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W8-9-J7

DISASSEMBLY: 18/s Elgin

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - hand remover - cannon pinion remover - assembly tweezer - jewel pusher

PROCEDURE	REFERENCE
HOW TO DISASSEMBLE 18/s ELGIN	
1. Place movement in movement holder.	
2. Loosen stud screw.	Lesson 5
3. Remove balance bridge and balance wheel.	Lesson 5
4. Let down power.	Lesson 5
5. Turn movement over and remove hands and dial.	
6. Remove hour wheel and cannon pinion.	
7. Remove minute wheel.	
8. Remove vibrating arm, crown wheel and intermediate winding and setting wheels.	Les. 9, Sec. 221
9. Turn movement over and remove barrel bridge and barrel.	Lesson 5
10. Remove barrel cap, arbor and mainspring.	
11. Remove ratchet wheel.	
12. Remove plate bridge screws.	Sec. 217
13. Turn movement over holding upper bridge in place. Then lift lower plate up.	
14. Remove all train wheels and P. F. & A. from upper plate or train bridge.	
15. Remove balance cap jewels from potance and balance cock.	

UNIT	W III
LESSON	8-9

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W8-9-J8

ASSEMBLY: 18/s O. F. Elgin

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - assembly tweezer - mainspring winder

PROCEDURE — REFERENCE

HOW TO ASSEMBLE 18/s O. F. ELGIN

1. Replace balance cap jewels.
2. Set upper plate or train bridge in a movement holder, upside down. — Sec. 217
3. Insert P. F. & A. in opening of potance. — L Fig. 193
4. Put escape wheel in proper jewel or hole making sure that the escape wheel teeth line up with pallet stones.
5. Put fourth wheel in position with long pinion up.
6. Put center wheel in position with long pinion up.
7. Put third wheel in position.
8. Take pillar plate and lower it over train wheels. NOTE: The center pinion is the longest, so that should first be through, then line the fourth pinion in it's proper jewel. Holding the pillar plate in place line the other three pinions in their proper jewels.
9. Holding pillar plate at edges turn movement over and put in bridge screws.
10. Insert ratchet wheel, be sure click is in position.
11. Assemble mainspring, arbor and cap in barrel.
12. Replace barrel and bridge.
13. Turn movement over and install cannon pinion and minute wheel.
14. Replace crown wheel, intermediate winding and setting wheel and vibrating arm.
15. Replace hour wheel, dial and hands.
16. Replace balance wheel and balance cock.

DISASSEMBLY: Swiss AS 970

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - hand remover - cannon pinion remover - assembly tweezer

PROCEDURE

HOW TO DISASSEMBLE SWISS AS 970

1. Remove hands, dial, hour wheel and cannon pinion.
2. Turn movement over and loosen stud screw. NOTE: Do not push on stud.
3. Remove balance bridge and balance wheel. (Tilt movement holder on bench and jiggle as you lift balance bridge, balance wheel should come free of movement.)
4. Turn bridge and wheel over and lay it flat on bench plate.
5. Holding bridge down firmly, select proper screwdriver and turn hairspring gate half way. NOTE: If there is not a slot for screwdriver, gate may have a hole, use a small pin to open regulator gate.
6. Turn bridge over and push on stud, balance and hairspring should come free of bridge.
7. Let power down.
8. Remove pallet bridge and fork.
9. Remove train bridge.
10. Remove ratchet wheel and crown wheel. (Both screws turn clockwise to loosen.)
11. Remove barrel bridge and barrel.
12. Remove barrel cap, arbor and mainspring.
13. Remove train starting with: a. Center wheel. b. 3rd wheel. c. 4th wheel. d. Escape wheel.
14. Remove two screws holding set bridge and carefully remove clutch lever and spring.
15. Remove minute wheel and intermediate wheel.
16. Remove all cap jewels.
17. Release set lever, pull out stem, remove clutch and winding pinion.

ASSEMBLY: Swiss AS 970

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - assembly tweezer - mainspring winder

PROCEDURE

HOW TO ASSEMBLE SWISS AS 970

1. Place pillar plate on movement holder.
2. Replace all cap jewels.
3. Place all train wheels on plate in order listed below:
   A. Escape wheel
   B. 4th wheel
   C. 3rd wheel
   D. Center wheel.
4. Replace train and escape wheel bridges.
5. Assemble mainspring, arbor and cap in barrel.
6. Replace barrel and bridge.
7. Replace crown and ratchet wheel.
8. Replace cannon pinion.
9. Replace clutch winding pinion, stem, intermediate set wheel, minute wheel and set bridge.
10. Replace P. F. & A. and bridge.
11. Assemble balance wheel and hairspring to cock.
12. Holding bridge take screw driver and turn gate closed, making sure that outer coil is in regulator pins.
13. Replace balance assembly in movement.
14. Replace hour wheel, dial and hands.

DISASSEMBLY: AS 1194 Direct Drive Sweep Second

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - hand remover - cannon pinion remover - assembly tweezer

PROCEDURE

HOW TO DISASSEMBLE AS 1194 DIRECT DRIVE SWEEP SECOND

1. Remove movement from case.
2. Remove hands and dial.
3. Remove hour wheel and cannon pinion.
4. Turn movement over and loosen stud screw. (NOTE: Do not push on stud.)
5. Remove balance bridge and balance wheel.
6. Turn bridge and wheel over and lay flat on bench plate.
7. Holding bridge down firmly, select proper screwdriver and turn hairspring gate quarter turn in either direction.
8. Turn bridge over and push on stud, balance should come free of bridge.
9. Let power down.
10. Remove pallet bridge and fork.
11. Remove train bridge.
12. Remove escape wheel, 4th (sweep) wheel and 3rd wheel.
13. Remove ratchet and crown wheel.
14. Remove barrel bridge and barrel.
15. Remove barrel cap, arbor and mainspring.
16. Remove center wheel bridge and center wheel.
17. Remove set bridge.
18. Remove minute wheel and intermediate set wheel.

19. Carefully remove clutch lever and spring.

20. Remove stem, clutch and winding pinion.

21. Remove all cap jewels.

ASSEMBLY: AS 1194 Direct Drive Sweep Second

TOOLS, EQUIPMENT AND SUPPLIES:

Movement holder - screwdriver - assembly tweezer - mainspring winder

PROCEDURE

HOW TO ASSEMBLE AS 1194 DIRECT DRIVE SWEEP SECOND

1. Replace all cap jewels.
2. Replace center wheel and bridge.
3. Assemble mainspring, arbor and cap in barrel.
4. Replace barrel and bridge.
5. Replace crown and ratchet wheel.
6. Replace escape wheel, 3rd wheel and 4th (sweep) wheel.
7. Replace train bridge and screws. (Check for train recoil.)
8. Replace cannon pinion.
9. Replace clutch, winding pinion and stem.
10. Replace clutch lever and spring, intermediate set wheel minute and set bridge.
11. Replace P. F. & A. and bridge.
12. Assemble balance wheel and hairspring to cock.
13. Holding bridge, use screwdriver to close regulator gate. (Be sure outer coil of hairspring is in between regulator pins.)
14. Replace balance assembly in movement.
15. Replace hour wheel, dial and hands.