



Master WATCHMAKING

SHOP TRAINING JOB GUIDES

LESSON 10

Cleaning Watches

—
Sections 235 - 259

CHICAGO SCHOOL OF WATCHMAKING

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MASTER WATCHMAKING

A Modern, Complete, Practical Course

CHICAGO SCHOOL OF WATCHMAKING

Founded 1908 by Thomas B. Sweazey

Lesson 10

**Sections
235 to 259**

CLEANING WATCHES

SEC. 235 — Necessity for Cleaning

One of the most common services which the watchmaker is called upon to perform is the cleaning of watches. The general repair of a watch is not complete until it has been cleaned thoroughly, oiled properly and brought to time. In a general overhaul the replacement of parts and the repairs necessary to put the watch in first class order must be done before the watch is cleaned. The actual cleaning does not require a great amount of skill provided you are able to take apart and reassemble a watch in a workmanlike manner. Every part must be absolutely clean and then kept that way until the movement is back in the case. Of course, this cannot be accomplished until the movement has been taken apart, including the winding and setting parts, and all cap jewels removed and cleaned before reassembling. The difference between the so-called "cheap" cleaning job and that done in a shop catering to better-class work most often is merely a difference in thoroughness.

As a general rule, a watch does not get dirty as we think of dirt on larger machinery. The modern watch case, if closed tightly, protects the movement against particles of dirt and lint, but in spite of the care manufacturers take to exclude dirt, dust is bound to penetrate into the movement one way or another. The particles of lint and dust work into the train and increase friction, eventually causing the watch to stop. When the oil becomes impregnated with dust, abrasive action follows and the highly polished surfaces of the pivots become roughened and, if left without cleaning and oiling, the pivots may be cut to such an extent as to ruin them. Rough pivots and gummy oil, or lack of oil, cause undue friction which, in turn, slow down the motion and change the rate of the watch.

When a watchmaker takes in a watch to be cleaned he frequently finds, upon taking it apart, that other repairs are necessary. If the watch belongs to a regular customer it is fair to suppose that unless it has met

with an accident it is in good condition otherwise than the thickening of oil and accumulation of dirt. It is therefore good practice to make a thorough examination of the parts during the process of taking it apart, and a final examination after the parts have been thoroughly cleaned.

At this point the student is handicapped because of his inability to make all the necessary repairs. As he progresses with the lessons these repairs will be made. However, we will suggest a short form of examination for the student to follow.

SEC. 236 — Examination of Parts

Examine the case. See if it closes tightly, both front and back. Examine the crystal and run fresh cement in bezel if necessary. See if the case shows dents or other evidences of misuse. This may be an indication of the sort of treatment to which it has been subjected and is often a guide to the watchmaker in determining the cause of trouble. Check winding and setting before removing from the case. Frequently a watch winds or sets hard when in the case, due to faulty alignment of the movement with the pendant. If pendant set, check the winding and setting before removing from the case.

Remove movement from the case and make certain the case screws hold the movement firmly in place. Remove dust band. Check hands to see if they are fitted properly. The hour and minute hand should fit securely; the second hand just tight to be movable on the fourth pinion pivot without endangering the train or escapement. After the hands and dial have been removed, examine the dial wheels, including the cannon pinion, minute and hour wheels.

See that the hour wheel has sufficient sideshake to be free on the cannon pinion without rocking, and that the length of the pipe is just sufficient to be visible beneath the hand shoulder of the cannon pinion.

Examine the balance wheel. Stop it at the point of rest, then release it, allowing it to gradually come up to a motion. If the balance is out of true in the round it can be easily determined by looking directly down

upon the balance. Look at the balance from the side to see if it is out of true in the flat.

Examine the hairspring in the same manner to detect errors in the round and flat. When a spring is true in the round there will be no appearance of jumping; the coils will appear to uniformly dilate and contract. The hairspring must be level and centered. These conditions and the method of correcting them will be taken up in future lessons.

Examine the escapement. Bring the roller jewel in perfect line with the balance staff and pallet arbor. This is the point of rest. Try the shake of the fork slot of the roller jewel. This is done by grasping the fork with a pair of fine pointed tweezers and carefully moving from side to side while holding the balance.

Remove the balance and examine the pivots on the balance staff. See that they are straight and have no grooves. Students often injure the ends of balance pivots by forcing the balance cock into place when the pivot is not in the jewel hole.

Make sure the roller jewel is securely set, perfectly upright, and is not chipped.

Let down the mainspring and remove the pallets. Examine the pallet stones for imperfections. Check the guard pin. Check the pivots on the pallet arbor. Examine each and every wheel and pinion as it is removed. Examine other parts as they are removed. When you are capable of making all repairs you will find that it pays to find and correct these repairs before cleaning a watch.

SEC. 237 — Common Cleaning Method

There are many different methods used in cleaning watches. Prepared cleaning solutions sold by material houses are probably the most common type used today and are used in place of cyanide.

One of the most common methods of cleaning a watch is to use benzine or naphtha to cut the old oil and grease, scrub with soap solution, dip in a potassium cyanide solution in order to brighten the plates and wheels thoroughly, rinse with clean water, dip in alcohol and dry in sawdust. As far as the actual cleaning of the watch and parts are concerned, little improvement has been made over this process. Cyanide of potassium is such a deadly poison and must be handled so carefully that we strongly advise against its use at any time. Much time and care must be used in brushing every particle of the sawdust from the parts lest a small particle be overlooked and eventually work its way into the train or escapement.

In the modern system of cleaning about to be described, advantage is taken of certain chemicals which eliminate the necessity of using sawdust and which clean with less effort than the method described. There should be no compromise as to the thoroughness of your work. EVERY PART MUST BE CLEANED.

SEC. 238 — Modern Cleaning Method

The method we are going to explain is an excellent one and is recommended by several watch factories. If you have occasion to discuss this new and modern method with others, you will, in all probability, find those (especially "old timers") who will disagree with your method. There will be those who say three solutions are enough, that so-and-so brand of cleaner is superior. This is true no matter what you are undertaking and will be prevalent throughout your entire career as a watchmaker. You do not have to accept another person's methods as being correct. If, for some reason or other, you feel that other methods are better than the ones you have been taught, test them. Prove to yourself conclusively that they are better. As you progress even the most up-to-date methods of today will sometimes be improved upon. The methods we teach you are modern, up-to-date and tested. In our opinion they are the best. It is through years of experience that inferior methods have been discarded.

SEC. 239 — Cleaning by Hand

In your first attempt at cleaning a watch use a 12 or 16 size watch movement. In addition to the tools already used you will need the following:

- 7 Glass Jars (½ pint capacity) or Alcohol Cups
- 1 Bunch White Metal or Brass Wire
- Bench Block
- Blower
- Jewel Pusher
- Jewel Screw Drivers, Set of 3
- 1 Bottle of Watch Oil
- Gold Tipped Watch Oiler
- Oil Cup
- 1 Bunch Pegwood
- 1 Hard Watch Brush
- 1 Soft Watch Brush

For practice in cleaning watches any type of glass jar with a wide mouth and a cover will be suitable. Figure 10-1 illustrates ½ pint jar with a screw top which is very satisfactory.

Label jars from 1 to 7 and fill about ¾ full of solution as follows: carbon tetrachloride in jar #1, denatured alcohol in jar #2, etc.:

- No. 1 Carbon Tetrachloride
- 2 Denatured Alcohol



FIG.10-1

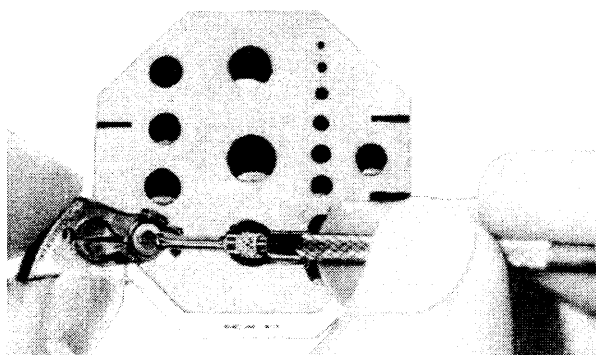


FIG.10-2

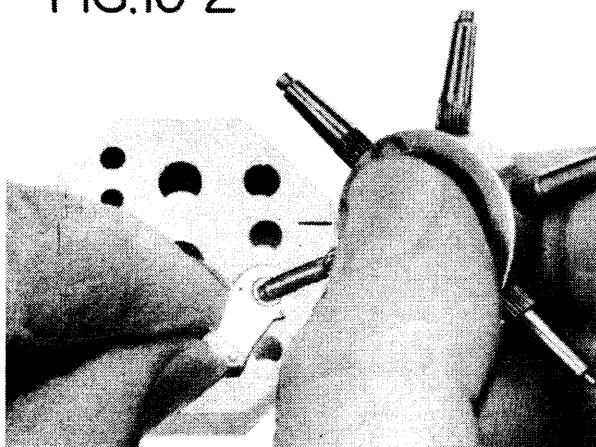


FIG.10-3

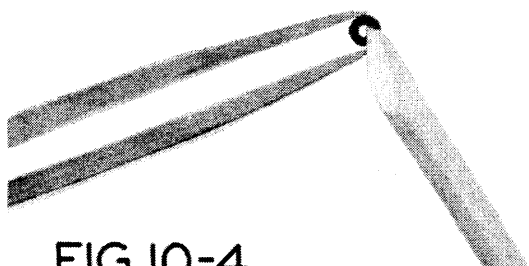


FIG.10-4

3 Soap Solution (formula to follow)

4 Tap Water (change frequently)

5 Distilled Water

6 Denatured Alcohol

7 " "

The denatured alcohol used in jars #2, #6 and #7 should be of the highest quality. Denatured alcohol that is yellow in color should be avoided.

For making soap solution used in jar #3 secure from your druggist:

2½ ozs. Tincture of Green Soap

28 ozs. Household Ammonia

1 gal. Distilled Water

From the gallon of distilled water remove one quart, add the tincture of green soap and ammonia to the remaining distilled water and refill with distilled water. This will give you one gallon of watch cleaning solution for use in cleaning watches manually. The carbon tetrachloride is procurable at a drug store but should the druggist be unable to supply it ask him for a high grade degreasing agent, preferably non-inflammable.

SEC. 240 — Removing Balance and Cap Jewels

Let down the power and completely disassemble your practice movement as described in Lesson No. 8 and place the parts in a movement tray and cover. Keep the plates and wheel segregated. It is necessary to remove cap jewels. The cap jewels are found directly above and below the balance wheel and are the jewels upon which the ends of the balance pivot rotate. This is true in most 7, 15 and 17 jewel watches. In watches of 19 and 21 jewels you will usually find another pair of cap jewels at the end of the escape pinion or pallet arbor, but for your practice work we recommend using only 7, 15 and 17 jewel watches, having upper and lower balance cap jewels only.

Figure 10-2 illustrates removing 2 jewel screws that hold cap jewel in place in the balance cock. After removing jewel screws invert bridge over hole in bench block and push jewels out with jewel pusher as in figure 10-3. Be sure hole in bench block is larger than diameter of jewel settings. You will now find that you have two jewels in settings, one with a hole in it called the balance hole jewel and one without a hole called the cap jewel.

Sharpen one end of a piece of pegwood to a point and the other end to a chisel shape. Dip the pointed end of pegwood into the carbon tetrachloride and clean surface and hole of balance jewel. This will loosen the old oil. The same procedure should be repeated on the flat side of the cap jewel, figure 10-4, using the chisel shaped end of your pegwood. Replace

balance jewel in setting in balance bridge, shoulder side down and replace jewel screws. Place cap jewel in material tray and remove the lower balance and cap jewel from pillar and clean in the same manner as the upper jewels. Keep cap jewels separate and remember which is the lower and which is the upper. The reason we replace the balance jewels in the balance cock and the pillar plate is to keep them from getting mixed.

SEC. 241 — Preparatory to Stringing

Examine closely every wheel and pinion and if you find pieces of dirt or rust in any of the teeth or pinion leaves, remove it by means of pegwood, figure 10-5. The gummed oil or pieces of dirt will come off easily enough but if there is rust between the leaves, mix a little Lap Powder with oil to the consistency of thick cream and apply this on the chisel shaped end of the pegwood rubbing back and forth until the rust is all removed. Dip each wheel into carbon tetrachloride (solution #1) and press the leaves of the pinion into pithwood to remove dirt and old oil. Examine carefully under a double loupe. Repeat if necessary.

SEC. 242 — Removing the Mainspring

Many watchmakers do not remove the mainspring from the barrel when cleaning a watch provided the oil seems clean and the mainspring is in good shape, but instead take off the cap and lift out the arbor and clean these two parts separately; then with a clean cloth or watch paper wipe off as much of the old oil as possible on the coils of the spring and inside of the barrel, and apply fresh oil. In this case the barrel should not be put into the solutions as described in the following instructions. However, it is difficult to tell whether the mainspring is set unless it is removed from the barrel and to do a master job of cleaning make it the rule rather than the exception to remove the mainspring.

SEC. 243 — Stringing the Parts

It is necessary to prepare at least three wires to string parts while they are in the different solutions. The illustration at figure 10-6 gives an idea of the form used. This is made from a piece of brass wire about 7/10 mm in diameter. Smaller sizes of wire are used for the small parts and for the train wheels, and the larger size wire for the heavier parts, such as the plates and the bridges.

On one of the wires which you have prepared, string all the bridges and plates including the pillar plates, barrel and train bridge, pallet bridge, barrel, large winding wheels and balance cock. Hook the end of

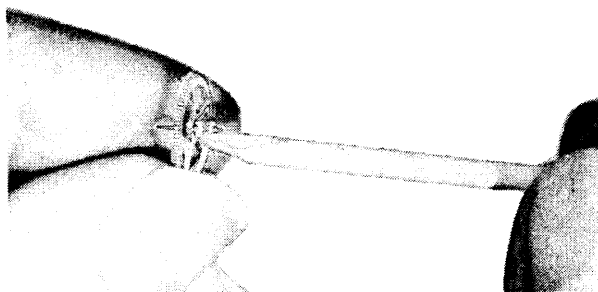


FIG.10-5

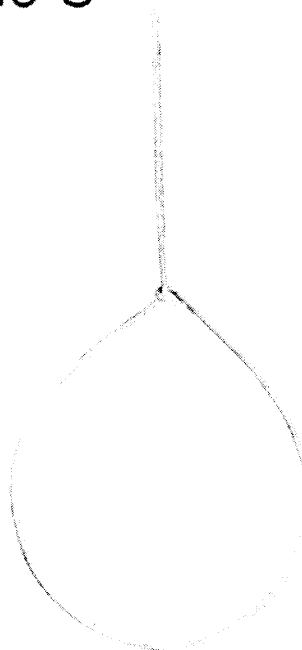


FIG.10-6

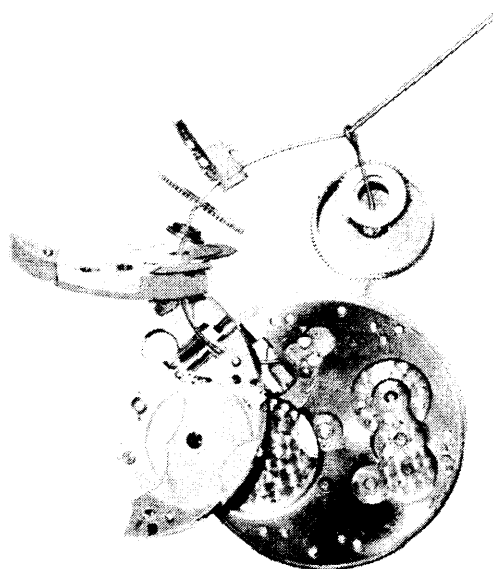


FIG.10-7

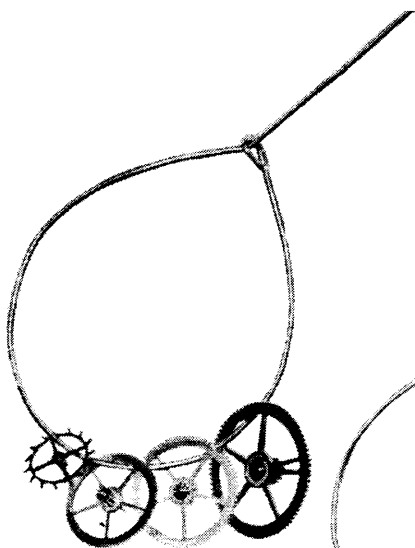


FIG. 10-8



FIG. 10-9



FIG. 10-10



FIG. 10-11

the stringing wire and lay to one side, figure 10-7. On another wire string all the wheels except the balance wheel and lay to one side, figure 10-8.

It is best to string the balance with hairspring attached on a separate wire, figure 10-9. Before stringing the balance press the pivot into a piece of pithwood, figure 10-10. Press the pithwood down to the roller on one end and to the hairspring collet on the other. This will remove surplus dirt and oil.

SEC. 244 — Procedure for Cleaning

Plates and Bridges (figure 10-7):

1. Dip into solution #1. Stir rapidly with a circular motion, reversing the direction about every five revolutions, for approximately twenty seconds.
2. Scrub parts thoroughly with the hard watch brush.
3. Repeat step one to rinse parts.
4. Remove and shake off as much solution as possible before placing in solution #2.
5. Stir rapidly in solution #2 for approximately ten seconds to remove carbon tetrachloride.
6. Dip in solution #3 and scrub thoroughly with hard watch brush.
7. Rinse in solution #4 for ten seconds.
8. Rinse in solution #5 for ten seconds.
9. Rinse in solution #6 for ten seconds.
10. Rinse in solution #7 for ten seconds.
11. Remove from solution #7 and shake parts back and forth for about 45 to 60 seconds or until parts are dry.

Now place parts in preheated pan which is fairly warm but not hot. Figure 10-11 illustrates an excellent warming pan which has been riveted on to the reflector of bench lamp. Place a piece of clean watch paper in pan before drying plates and wheels. After they are dry allow the parts to slide off the wire into a clean material tray or piece of watch paper and cover immediately with movement cover.

Train wheels and pinions (figure 10-8): Follow same procedure as in cleaning plates and bridges.

SEC. 245 — Cleaning Balance

Balance wheel (figure 10-9):

1. Dip in solution #1 and stir slowly with a circular motion for about ten seconds.
2. Rinse in solutions #2, #3, #4, #5, #6 and #7 for approximately five seconds for each solution.

Figure 10-12 illustrates the method used in removing the surplus solution from the balance wheel and hairspring with the blower. Hold the balance above a piece of pithwood. The upper balance pivot should be touching the pithwood. Carefully blow through the

hairspring and balance wheel until dry. Place on watch paper in warming pan.

The pallet fork and arbor are cleaned by holding the fork in a pair of tweezers and swishing back and forth through solutions #1 and #2. Remove surplus solution by placing fork over pithwood and using blower as in figure 10-13. Press faces of pallet stones into pithwood, then brush carefully with soft watch brush. See that the faces of the pallet reflect light evenly. Be careful that the balance and the pallet fork are not left in any of the alcohol solutions for over five seconds as the alcohol will attack the shellac which keeps these jewels in place.

SEC. 246 — Cleaning Small Parts

To clean the screws and small parts which cannot be strung on wire, provide yourself with some sort of strainer. A tea strainer with fine mesh is suitable and prevents the small parts from falling through. Place all the small parts in the strainer and swish it back and forth in solution #1, lift out of the solution and let drain, then through solutions #2 to #7. Lift out and let drain. Invert strainer over a clean lintless cloth held in the palm of the hand allowing all the parts to fall into the cloth, figure 10-14. See that none are left in the strainer.

Catch up the corners of the cloth. Hold it closed at the top with one hand and with the other rub the parts against it until dry. Empty the contents carefully on to a piece of watch paper. Inspect. See that they are bright and clean. Should there be any particles of lint on any of the parts, brush with your soft brush, figure 10-15. Use blower if necessary.

SEC. 247 — Cleaning the Mainspring

Clean the mainspring by swishing it in solutions #1 and #2. Dry on a soft cloth. If the mainspring appears clean and you wish to remove the oil from its surface, it is possible to take a piece of watch paper and folding it over the end of the mainspring draw the spring through the paper, figure 10-16. Be careful not to straighten out the mainspring.

Self taught workmen clean poorly. Such work never gives satisfaction. Be satisfied only when you give your very best effort. Build up your reputation by doing good work and you never need to worry about being able to get plenty of watch work.

SEC. 248 — Oiling

In reassembling the watch, it is necessary to oil each bearing surface as we assemble and if you follow the instructions carefully, you will not skip any place that requires oil.

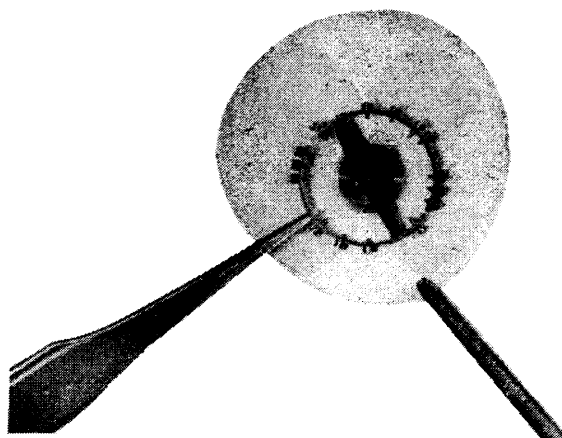


FIG.10-12

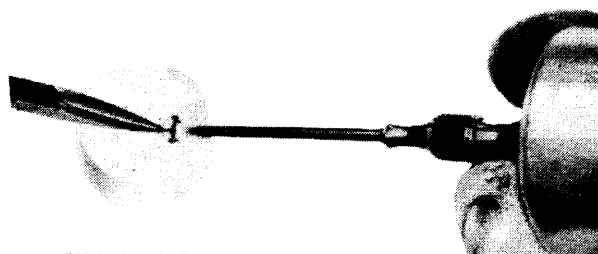


FIG.10-13

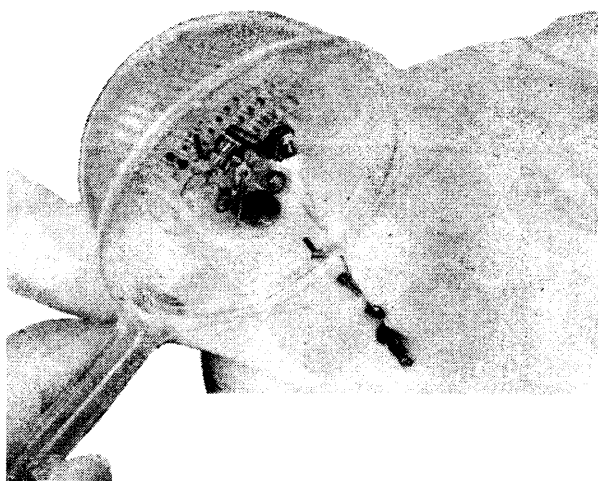


FIG.10-14

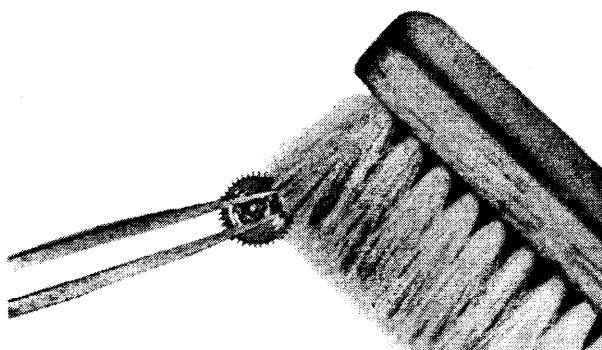


FIG. 10-15



FIG. 10-16

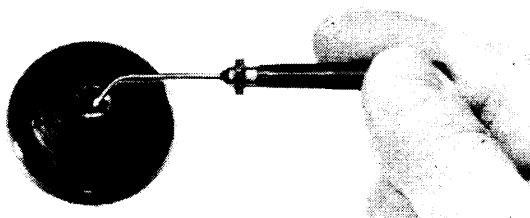


FIG. 10-17

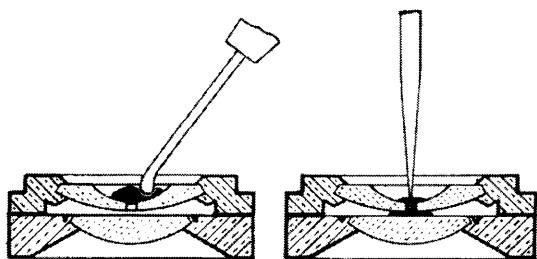


FIG. 10-18



FIG. 10-19

It is best to keep your watch oil in an oil cup, figure 10-17. Be certain to replace the cover whenever you are not using the oil. A medium sized drop of oil will oil several watches; consequently, it is only necessary to keep a small amount of oil in the oil cup. It is best to clean the oil cup every day and refill with fresh oil. It is necessary to oil the moving parts of a watch as you would any piece of machinery or wherever friction develops.

SEC. 249 — Oiling Balance Jewels

Replace all cap jewels before assembling the watch. Place a small amount of watch oil in the recess of the balance hole jewel, figure 10-18. Place a needle or a pointed steel wire, which has been dipped in watch oil, in the hole of the jewel. This will force the oil through the balance jewel and down to the cap jewel. When you remove your needle there should be no trace of oil left in the cup of the balance hole jewel. In watches that have cap jewels other than the balance cap jewels such as a 21 jewel watch, which has cap jewels on the upper and lower ends of the escape pinion and pallet fork, the same procedure is followed in cleaning and oiling these additional jewels.

SEC. 250 — Reassembling the Watch

Replace the mainspring and arbor in the barrel and oil as described in Lesson No. 5.

Figure 10-19 shows the winding pinion, winding arbor, clutch and setting plunger from left to right. In this particular style assembly a small amount of oil should be placed on the setting plunger at A. At B oil all four sides of the winding square, being very careful not to get an excess amount of oil on any side of the square. Actually you should not be able to see any oil on the square. Lightly oil the upper portion of winding arbor at C and assemble.

SEC. 251 — Procedure for Oiling Train

The lower plate or pillar plate shown in figure 10-20 should have a small amount of oil placed on the bearings for the winding and setting illustrated by Arrow A, and for the set lever illustrated by Arrow B. Place a small amount of oil on lower plate bearing which receives the barrel arbor, Arrow C.

Figure 10-21 illustrates the barrel and the winding pinion, clutch assembly and setting lever in place. Oil arbor at A and place small amount of oil in center jewel at C and on the upper and lower end of the winding arbor at B. Replace train wheels, train and barrel bridge and crown wheel as in figure 10-22. Place a small amount of oil at A and B, figure 10-22. Oil crown wheel at C. Replace click, ratchet wheel

and crown wheels, figure 10-23; oil center wheel at A. 3rd wheel at B, 4th wheel at C and escape wheel at D. Place just enough oil in these jewels so that it will flow through the jewel and around the pivot similar to the darkened portion of figure 10-24.

SEC. 252 — Oiling from Dial Side

Turn movement dial side up, figure 10-25, and place small amount of oil on 2 or 3 teeth of the clutch as illustrated by Arrow A. Oil bearings for intermediate setting wheels at B. Some watches have only one intermediate setting wheel. Place small amount of oil at C for clutch lever. Do not oil arbor at D where minute wheel is placed. Previously we oiled the center jewel from the other side but you should check at this time to see if there is enough oil in the oil cup. If not, add to it, Arrow E. Replace cannon pinion and setting parts and place small amount of oil where friction occurs as indicated by Arrows A in figure 10-26. Oil lower 3rd wheel pinion at B, lower 4th wheel pivot at C and lower escape pivot at D.

SEC. 253 — Oiling Escape Wheel Teeth

After you have assembled and oiled your watch DO NOT use your blower where it might spread the oil.

With one of your bench keys wind watch three or four turns and observe the action of the train wheels. If it is in first class order, the train will run down, come to a complete stop, and the escape wheel will then reverse its direction, running backward for three or four turns. In high grade watches this action happens so fast that it is necessary to watch the 4th wheel instead of the escape wheel. This is usually an indication that the train of the watch and the winding mechanism are in good order, that is, up to this point. When you are satisfied that the train of the watch is in good order the next step is to oil 4 or 5 teeth of the escape wheel illustrated by Arrow A, figure 10-27. Be careful to oil only the face of the escape wheel teeth. A surplus of oil will collect dirt and dust. As the watch runs the teeth of the escape wheel will carry the oil to the locking and impulse faces of each pallet stone. Replace pallet fork, arbor and pallet bridge. Oil upper pivot as indicated by Arrow A in figure 10-28. Replace the balance and balance cock. See that the roller jewel enters the fork and that the balance is free and has the right amount of end-shake. CAUTION! DO NOT OIL THE ROLLER JEWEL OR PALLET STONES. Turn movement over. Replace minute and hour wheel and oil lower pallet arbor pivot as indicated by Arrow A, figure 10-29. Replace dial and hands.

Wind the movement four or five turns using one of your bench keys. The balance should start off immediately and take about one full turn.

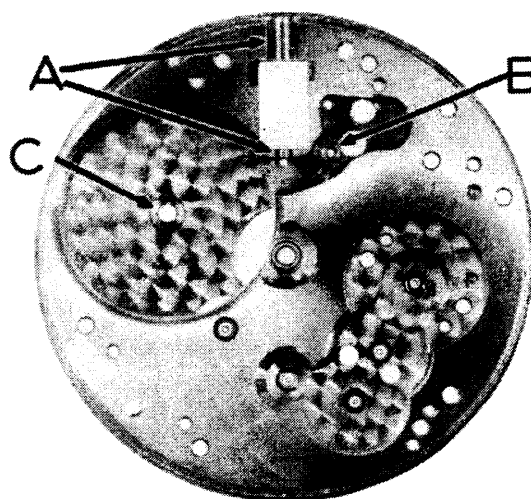


FIG. 10-20

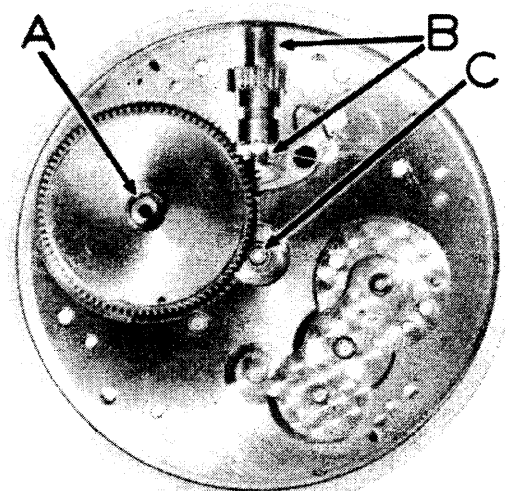


FIG. 10-21

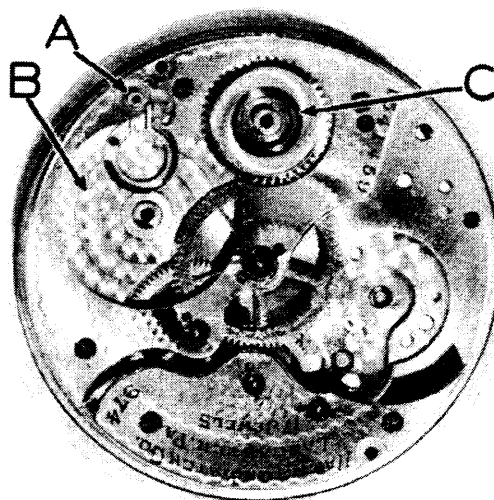


FIG. 10-22

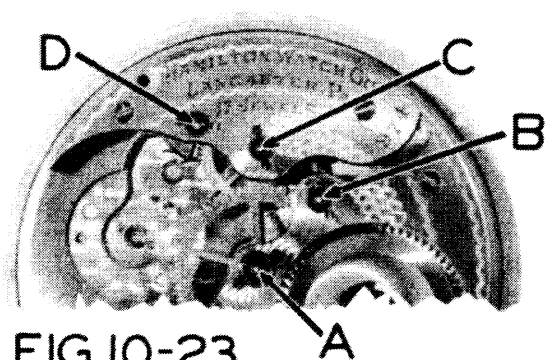


FIG.10-23

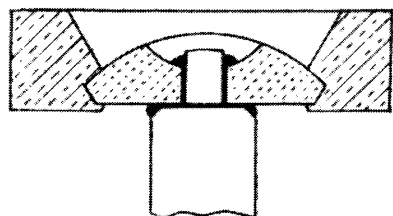


FIG.10-24

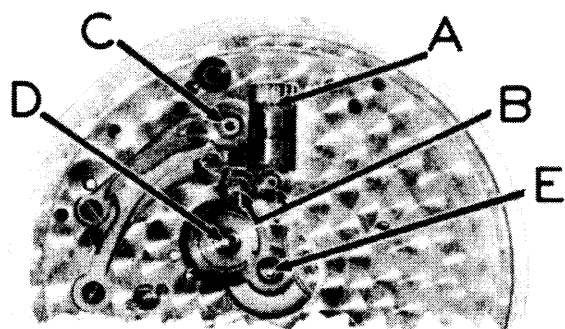


FIG.10-25

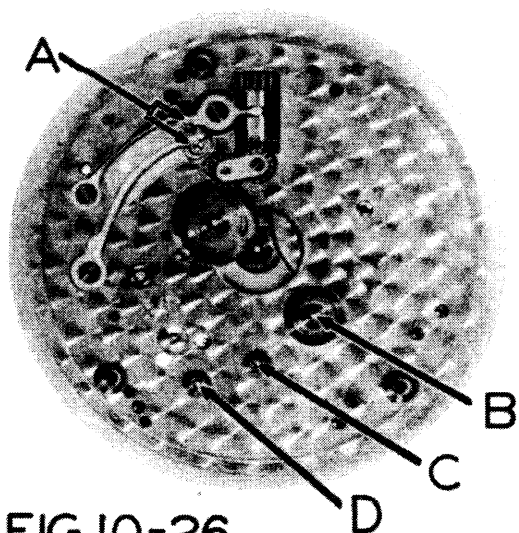


FIG.10-26

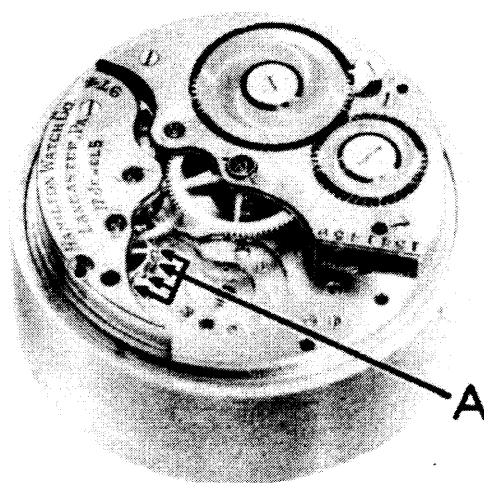


FIG.10-27

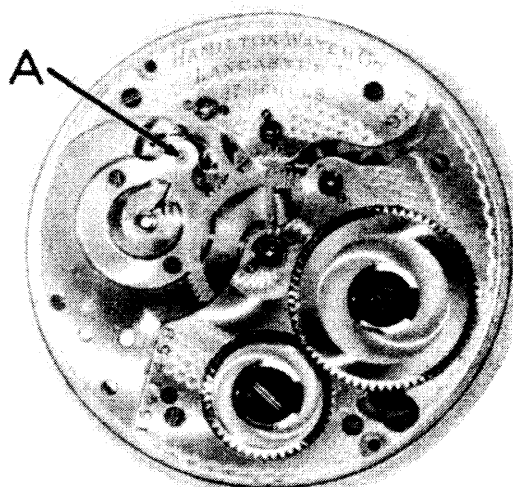


FIG.10-28

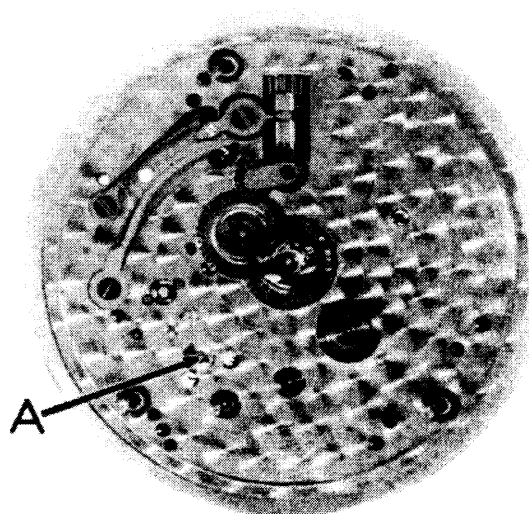


FIG.10-29

SEC. 254—Cleaning the Dial

There are two common types of dials—the enameled dial and the metal dial. The older style or white enameled dial is made of glass hard enamel baked on a copper base and can be cleaned in any solution used in cleaning watches. Unless very dirty, it is the common practice merely to clean any dirt or finger marks from this kind of dial with a dry clean cloth or even a piece of watchpaper. The figures on this dial are baked into the enamel and there is no danger of rubbing them off when cleaning.

In the better grades of metal dials the numerals are enamel and these dials may be cleaned by dipping in cleaning solutions.

Metal dials frequently are lacquered but in spite of this have a tendency to tarnish. The lacquer may come off in places leaving the dial with a blotched or streaked appearance. A cyanide dip will generally help in brightening a tarnished metal dial but great care must be used. Another method is by means of common baking soda, a small quantity mixed to the consistency of cream being placed on the dial with the finger and rubbed with a light circular motion. When the dial is sufficiently brightened, rinse with water and dry by patting with a soft cloth or place in warming pan.

Metal dials with painted numerals must be handled carefully lest the figures come off. They may be cleaned with prepared dial cleaner. Be careful about rubbing off the figures.

At first you may have difficulty in seeing whether a metal dial has enameled figures or not but after examining a few you should be able to tell at a glance. As a general rule the enameled figures lie flatter on the dial being flush with the metal or even a trifle below the surface while the other type shows the numerals on the metal as though painted or printed on top of the surface of the dial.

SEC. 255—Cleaning the Case

Whenever you clean and reoil a watch you should also clean the case. If the case has a polished finish and you have access to a polishing motor, it is well to re-polish the case. This is about the only part of the watch your customer can see and he is liable to judge your ability by the outside appearance of the completed job. If you are not so equipped, polish as best you can by using a polishing cloth. To wash the case use a stiff brush with soap and ammonia and scrub thoroughly. Rinse in water to remove all traces of soap and then dry with a clean cloth. In spite of your utmost efforts there will be some water remaining around the stem and crown and perhaps the joints of

the case. Dip the entire case in a cup of alcohol to remove the last trace of water and then dry again with the clean cloth. Last, heat the entire case pendant down over an alcohol lamp until it is as hot as your hand will bear and the excess alcohol will burn off.

If it is a pendant set case with sleeve, place a small amount of oil on the stem where it comes in contact with the sleeve as has been described in Lesson No. 2. Wash the bezel and glass, wiping dry, and see that there are no marks, streaks or lint left on the glass.

SEC. 256—Formulas for Cleaning Solutions

Place the regulator in the center of the balance cock. See that the hands are adjusted properly. They should not come in contact with each other at any place. Replace movement in case. Check hands again. They must not touch the glass.

Wind and set the watch. Endeavor to set second hand with the second hand on a watch or clock which keeps correct time.

The following formulas are for your reference. Each of the ingredients may be ordered from your druggist. Be careful in handling the 29% solution of ammonia as it is highly concentrated. Keep from breathing the fumes and only order enough to make the desired, necessary amount of solution.

Solutions for Manual Cleaning Method

- 1 Part Tincture of Green Soap
- 3 Parts Ammonia (29% solution)
- 44 Parts Distilled Water

Solutions for Machine Cleaning Method

- 1 Part Tincture of Green Soap
- 2 Parts Ammonia (29% solution)
- 45 Parts Distilled Water

SEC. 257—Watch Cleaning Machine

The student will hear a great deal about watch cleaning machines. Today the most modern shops use cleaning machines and when used properly, have increased the profits of the repair department. When watch cleaning machines were introduced there were some claims that it was not necessary to take the watch apart in order to clean it. This brought a sincere condemnation from all expert watchmakers and for a while the machine was not accepted among the trade. However, as with everything that has merit, the machine was gradually accepted by qualified watchmakers who proceeded to experiment with it and the solutions necessary to make the machine produce excellent results. It remains a fact, however, that any machine in the hands of an indifferent workman will not produce the best results.

There are many good machines on the market similar to those illustrated in this lesson.

SEC. 258—Machine Cleaning Method

The following is the commonly accepted procedure used with few variations with a machine using the 3 jar method and the prepared solutions furnished by the manufacturer of any particular machine.

1. Take watch completely apart.
2. Make necessary repairs.
3. Brush parts with carbon tetrachloride or naphtha to remove old oil.
4. Place bridges, plates, barrel, etc., into the largest compartment, C-Fig 10-30.
5. Place all screws, levers, etc., which you know will not slip through holes in basket in separate compartment. B-Fig 10-30.
6. Place train wheels into separate compartment. A-Fig 10-30.
7. Place pallet fork and balance in separate compartment. A-Fig 10-30. (Do not put hairspring in cleaning machine. Clean separately.)
8. Place cover on basket and clamp basket in machine.
9. Run slowly in solution #1 for approximately

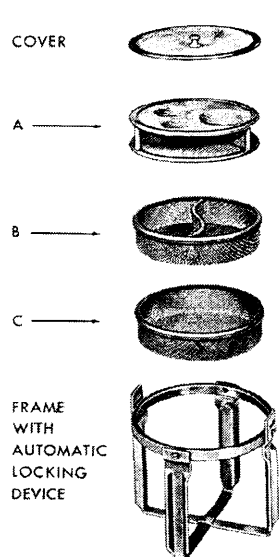
60 seconds. The speed can be controlled by the rheostat.

10. Spin off surplus solution in upper half of cleaning jar. Some machines have a separate jar for spinning off solutions.
 11. Rinse in solution #2 for approximately 60 seconds.
 12. Spin off surplus solution.
 13. Repeat operations 11 and 12 with solution #3.
 14. Place in heater compartment, spinning for 3 or 4 minutes, or until dry.
- Remove parts carefully and examine.

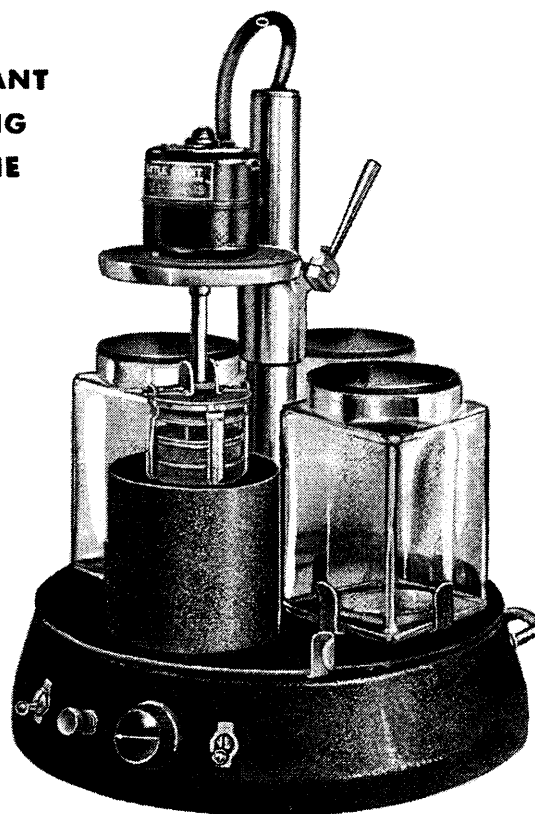
SEC. 259—Superior Method of Machine Cleaning

The following method is recommended by several of the large American watch factories. Obtain additional jars and use the same solutions in the same order as listed in Sec. 239. This method will produce superior results.

By now you can understand that the cleaning of watches is only one more step toward your goal as a master watchmaker. The many other repairs necessary to put a watch in good order follow in succeeding lessons and you must master each one.

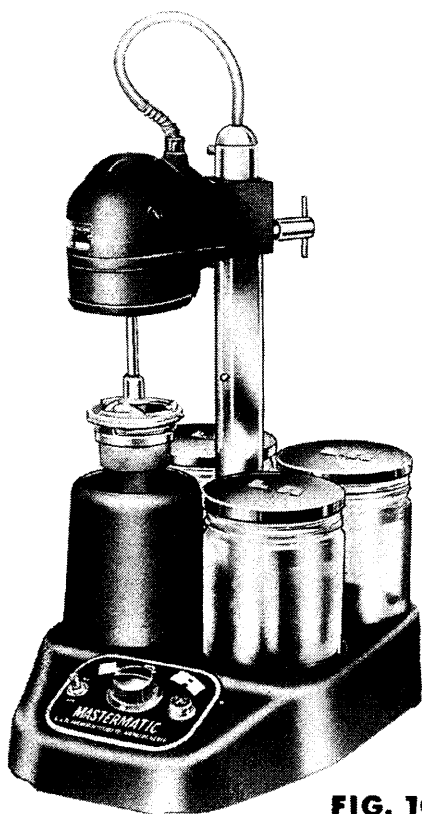


**LITTLE GIANT
CLEANING
MACHINE**



Square jars prevent solution from excessive whirling and instead force it through the basket, which results in more thorough cleaning. Has three jars: One for cleaning solution, one for Rinse No. 2 and one for Rinse No. 3. Metal shielded compartment is a drier with an electric heater.

FIG. 10-30

**FIG. 10-31****L&R CLEANING MACHINES****FIG. 10-31 - MASTERMATIC**

Uses three jars. One for watch cleaning solution No. 1, one for Rinse No. 2 and one for Rinse No. 3. Has a metal-shielded heating unit for drying parts. Comes with or without automatic reverse.

FIG. 10-32 - HEAVY DUTY

This machine is useful where greater production is needed. A special basket holds three separate complete movements. Uses three jars like the Mastermatic. Shielded heating unit.

FIG. 10-33 - AUTOMATIC

A fully automatic machine. Just push button and machine will automatically clean, rinse and dry the watch parts in basket. Shuts off automatically when cycle is complete. Uses three jars like the others.

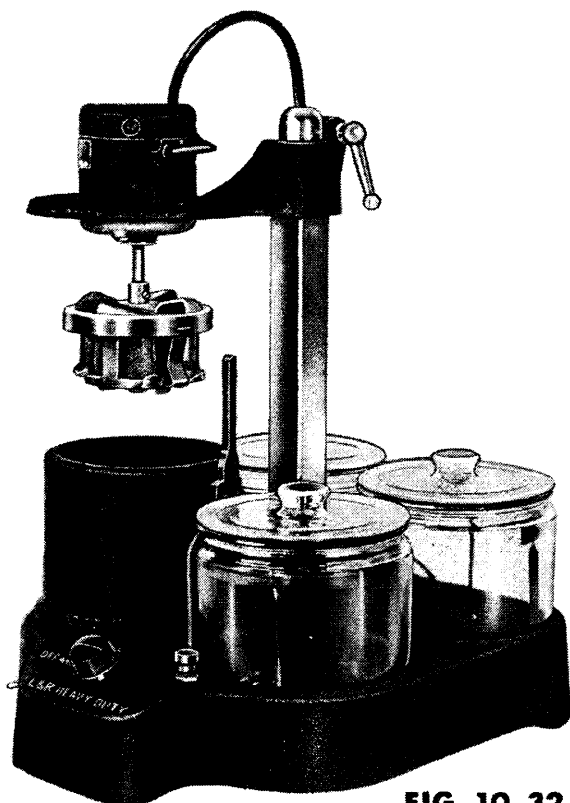
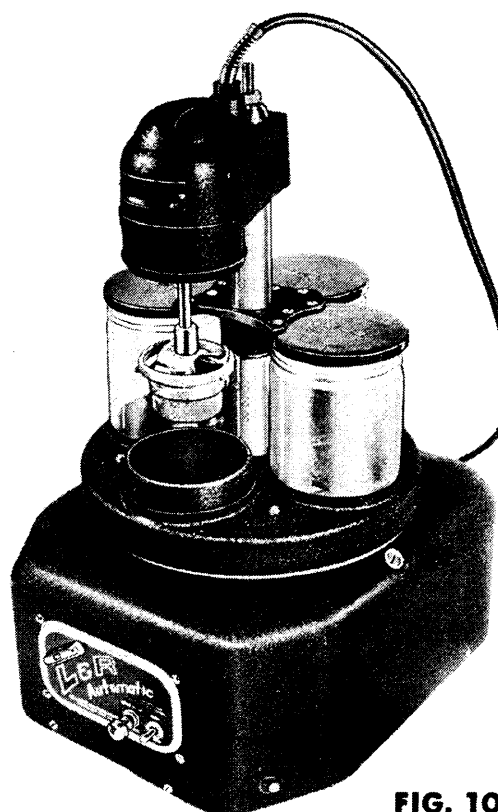
**FIG. 10-32****FIG. 10-33**

TABLE OF CONTENTS: Unit WIII - Lesson 10

JOB SHEETS

W10-J1 - Cleaning Watches: Preparation and Methods.

W10-J2 - " " Machine Method.

UNIT	W III
LESSON	10

Master Watchmaking
CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET
W10-J1

CLEANING WATCHES: Preparation and methods.

INTRODUCTORY INFORMATION

A fine cleaning job can be done by either hand or machine. You may use commercially prepared solutions or you may prepare your own solutions.

PREPARATION FOR CLEANING

Before cleaning the movement should be completely disassembled. Use sharpened piece of pegwood and peg out pinions (Sec. 241.) Break up accumulation of oil and dirt on surfaces of jewels and peg out the holes. Repairs should be performed before cleaning. If hand method of cleaning is used, the parts should be strung on brass wire (Sec. 243.)

AFTER CLEANING

As movement is being assembled, each bearing surface should be oiled. See sections 248 through 253.

HAND CLEANING PROCEDURE

A. USING STRONG SOAP, CYANIDE, ALCOHOL* AND BOXWOOD SAWDUST

1. Scrub with stiff brush and strong laundry soap.
2. Rinse in soft water.
3. Dip in cyanide solution for not longer than 10 seconds.
NOTE: Cyanide is a deadly poison. Mixed with acid it becomes a lethal gas. Do not allow any part of your body to come in contact and do not inhale the fumes of cyanide. If cyanide comes in contact with the skin wash thoroughly with soap and water.
NOTE: Cyanide cleaning solution is prepared by dissolving one ball in a quart of luke warm water.
4. Rinse in soft water.
5. Rinse in alcohol* to remove water.
6. Dry in warm Boxwood sawdust.
7. Sift sawdust through strainer, remove all watch parts.
8. Brush each part with soft brush to remove sawdust particles, peg each jewel.

(OVER)

B. USING SOAP SOLUTION, ALCOHOL* AND BOXWOOD SAWDUST

1. Scrub with brush and soap solution.

NOTE: Use formula in section 239 to prepare soap solution,
or 1 pint hot water, 1 tablespoon Soilax or Spic and Span
and 2 oz. household amonia.

2. Rinse in soft water.
3. Rinse in alcohol*.
4. Dry in warm Boxwood sawdust.
5. Sift sawdust through strainer, remove all watch parts.
6. Brush each part with soft brush to remove sawdust particles,
peg each jewel.

HAND CLEANING PROCEDURE:

C. USING CARBON TETRACHLORIDE, SOAP SOLUTION, ALCOHOL*

REFERENCE

1. Scrub in Carbon Tetrachloride. Section 244
2. Rinse in alcohol*.
3. Scrub in soap solution.
NOTE: Use formula in section 239 to prepare soap solution.
4. Rinse in two separate jars of distilled or soft water.
5. Rinse in two separate jars of alcohol*.
6. Shake or blow off solution.
7. Dry parts. (Fig. 10-11,12,13,14)

ALCOHOL* - Use a highly refined alcohol, sometimes called Solvent #1.

UNIT	W III
LESSON	10

Master Watchmaking
CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET
W10-J2

CLEANING WATCHES: Machine Method.

SUPPLEMENTARY INFORMATION

Cleaning machines do a fine job if proper procedure is followed in preparing the watch and operating the machine. Most machines have three cleaning jars, one jar for cleaning solution and two for rinse. Some machines have 4 jars, the extra jar may be used for a throw off of surplus solutions or as an extra rinse. Most machines have a reversing feature which will allow the basket to spin in both directions, some are automatic, some are manual reverse. The basket may be reversed while in solution but should not be reversed while basket is spinning free of solution. Most machines have a drying well, some use a heating unit and a fan, others just the heating unit. The basket is lowered over this heating unit and revolved slowly. Some heating units have a timing device, others no timing, so on these the operator has to determine the length of time required to properly dry the parts. Length of time in solutions may vary some for different makes of cleaning solutions, instructions are usually printed on the containers. Jars should contain just enough solution to cover basket.

MACHINE CLEANING PROCEDURE

USING COMMERCIALLY PREPARED SOLUTIONS IN CLEANING MACHINE

REFERENCE
Sec. 257-258

1. Peg all jewels to remove old oil.
2. Scrub parts in carbon tetrachloride.
3. Distribute parts in cleaning basket and attach to cleaning machine.
4. Lower basket into cleaning solution, allow to soak about 30 seconds and then rotate basket for a period up to 3 minutes.
5. Raise basket just above level of cleaning solution and spin to throw off surplus solution.
6. Lower basket in first rinse and spin for a period of up to 3 minutes.
7. Spin off solution.
8. Lower basket into second rinse and spin for a period of up to 3 minutes.
9. Spin off surplus solution.
10. Lower basket into preheated heating well, revolve basket slowly for a period of 3 or 4 minutes. (Trial and examination of parts will determine correct drying time for your particular machine.)
11. Remove basket and place watch parts in movement tray.

ALCOHOL* - Use a highly refined alcohol, sometimes called Solvent #1.