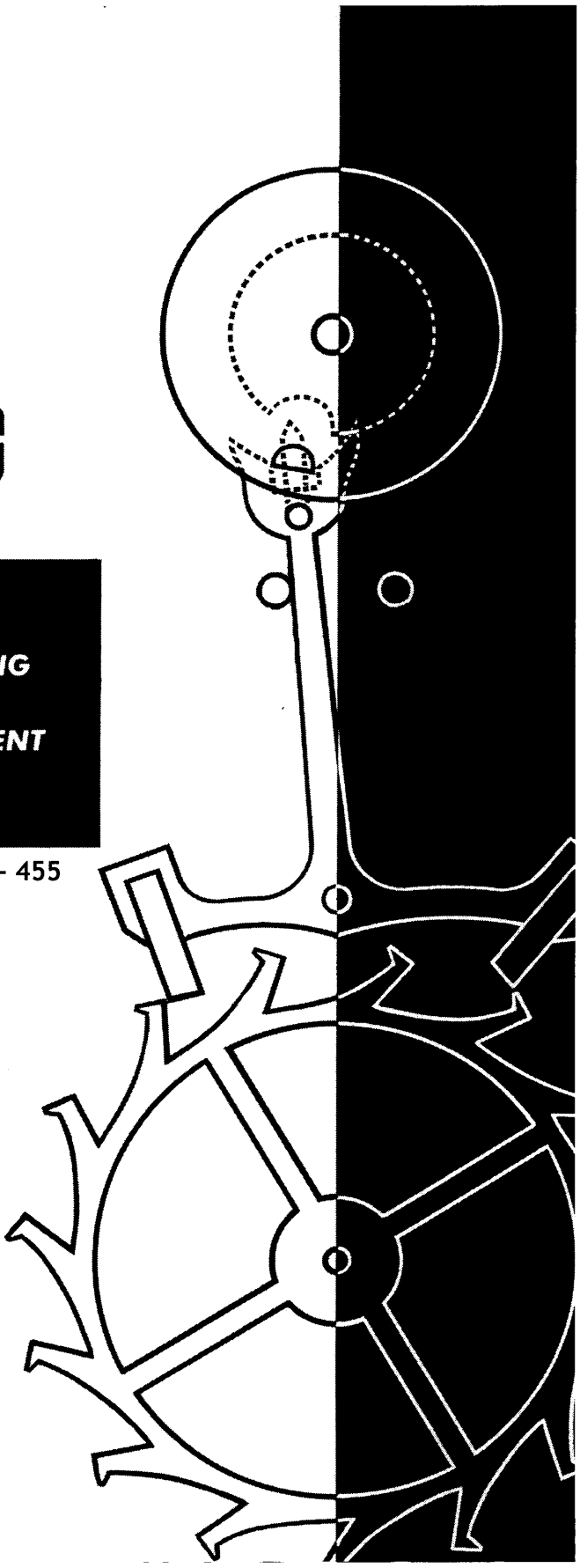
# Master WATCHMAKING

LESSON 26

## MATCHING THE ESCAPEMENT

Sections 445 - 455



CHICAGO SCHOOL OF WATCHMAKING
*Founded 1908 by* THOMAS B. SWEAZEY

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## SEC. 445—Reasons for Loose Pallet Stones

You have completed an elementary treatise on the purpose, function, and theory of the lever escapement as applied to the vast majority of pocket and wrist watches in use today. Many books have been written about the lever escapement and although they are comprehensive and theoretically correct, it is practically impossible for the student to ascertain if the escapement in the average watch is good or bad. Right now you can assume they are all good. The escapement holds a horror for many so-called watchmakers because they do not understand it. In the average shop there is so little actual escapement work that one man could do all of it in a few hours out of each month. When a watch leaves the factory we must believe that the escapement is properly matched and satisfactory for that type and grade or it should not pass inspection. After the watch leaves the factory there is not much possibility of the escapement getting out of order except through improper handling. In most cases, a pallet stone becomes loose because the watch repair man has left the pallet fork in the cleaning or rinsing solution too long, or in replacing the fork in the movement, he did not place the stones between the teeth of the escape wheel. It is now time to put to practical use the knowledge gained from the preceding lessons on theory and drafting. Follow each step carefully and if it becomes confusing, start over.

## SEC. 446—Checking The Movement

Before attempting to set the pallet jewels, a thorough check of the watch should be made as follows:

1. Check balance and cap jewels. They should be clean and freshly oiled in order that the balance may oscillate freely.
2. The pivots on the balance must be straight, polished and free from dust.
3. The staff must be riveted securely to the balance.
4. The roller table must be tight on the staff and the edge smooth and polished.
5. The roller jewel must be clean and set securely in the roller.
6. The train must be free.
7. The pivots on the pallet arbors must be straight and clean, and the jewels clean.

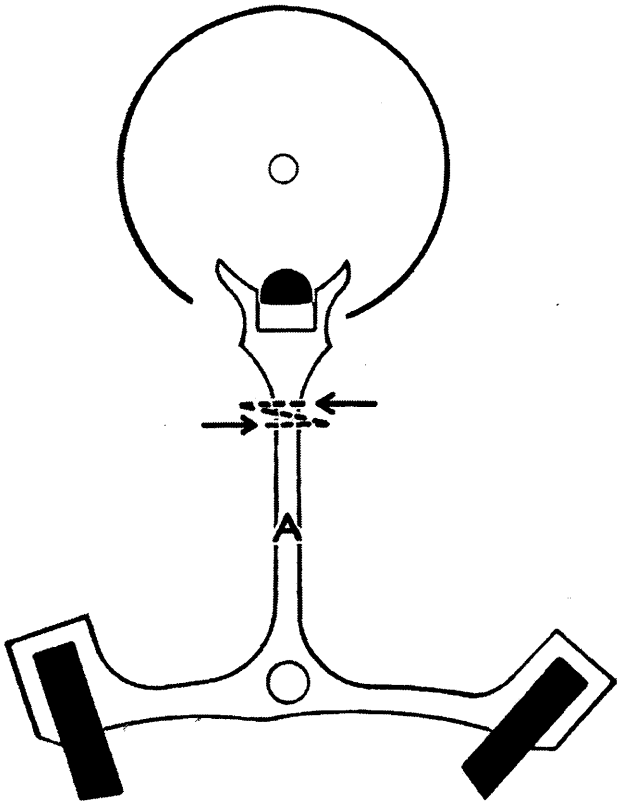


Fig. 26-1

## SEC. 447—Matching an Escapement with Movable Bankings

In matching an escapement with movable banking pins, plan each step before making any alterations or moving the pallet stones.

1. Check the roller jewel for freedom in the fork slot. (Reference: Sec. 320, Lesson 13).
2. To check the freedom of the roller jewel in the fork slot with the balance in place, proceed as follows:

A. Let down the power.

B. Turn balance until the roller jewel is in line with the slot in the fork, figure 26-1.

C. Hold balance in this position with thumb or forefinger and grasp fork at **A** with pair of fine tweezers.

D. Carefully move back and forth in direction shown by arrows.

E. If roller jewel is of the correct width, you can "feel" this freedom.

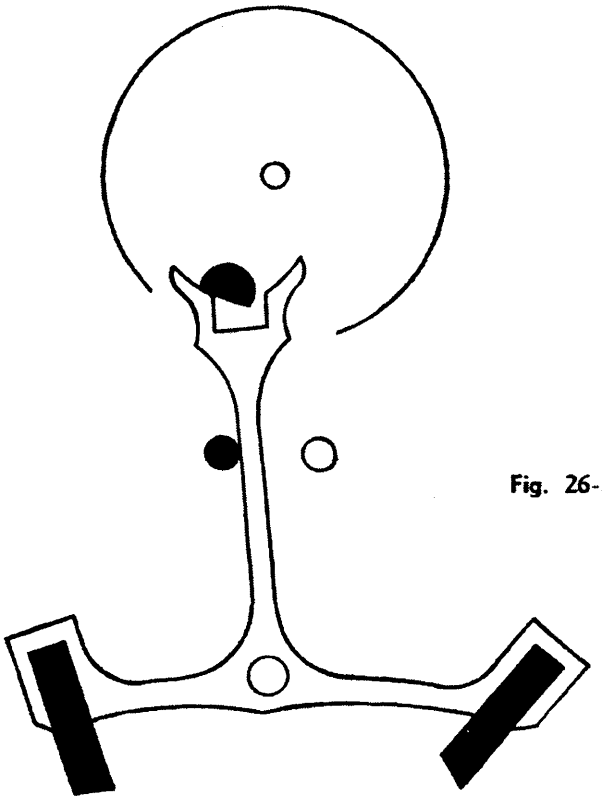

Fig. 26-2

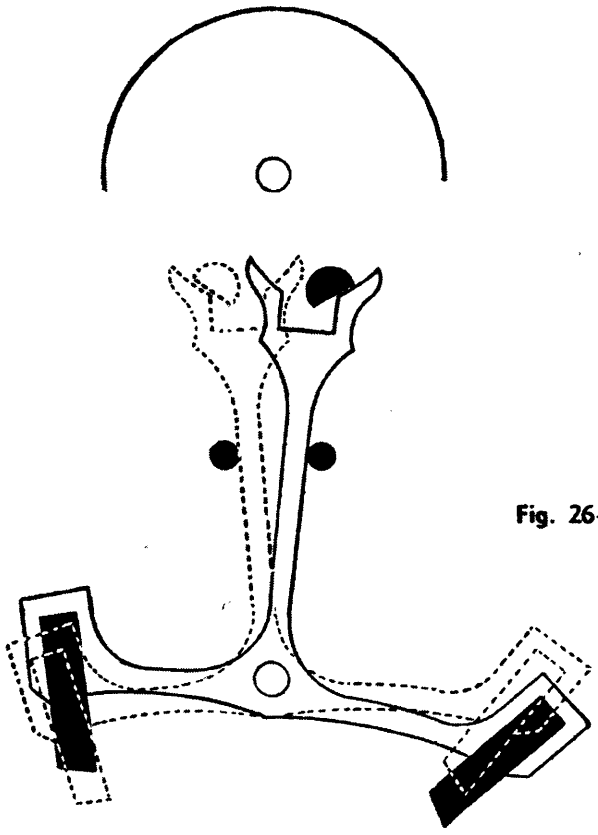

Fig. 26-3

3. Turn in one banking pin until the roller jewel will just pass through the horn of the fork and the corner of the fork slot, figure 26-2.

4. Turn in the opposite banking pin until the roller jewel will just pass by the opposite corner of the fork, figure 26-3.

The banking pins are left in this position until the stones have been set properly for lock, drop and draw and the safety action is found to be correct. Matching the escapement or making any safety action tests with the banking pins in this position is known as **banked to the drop.** When you are satisfied that the fork and roller action are correct, you may proceed to set the pallet stones.

## SEC. 448—The Pallet Warmer

Setting a pallet stone is similar to setting a roller jewel—with the exception of the tool used to heat the shellac. Figure 26-4 shows a common type of pallet warmer. The pallet fork


Fig. 26-4

is placed on the pallet warmer bottom side up with the upper pivot in the slot in the plate and then clamped in place. The cement is always placed on the under side of the pallet stones. The pallet stones are set flush with the top of the pallet fork and, in some cases, the lower side of the pallet stone will protrude a little on the underside. In case of a loose pallet stone, it is often possible to warm the pallet fork until the cement just melts in which case the pallet stone will again be set securely in place. However, it is best to remove the pallet stone and clean it. Place the stone between two pieces of pithwood which have been moistened with alcohol and rub the sides and face of the pallet stone until clean. Clean the slots in the pallet fork with pegwood and alcohol. In case there is an excess of cement on either the stone or the fork, use the tool described in Lesson 13, figure 13-20, to chip off the excess cement before cleaning.

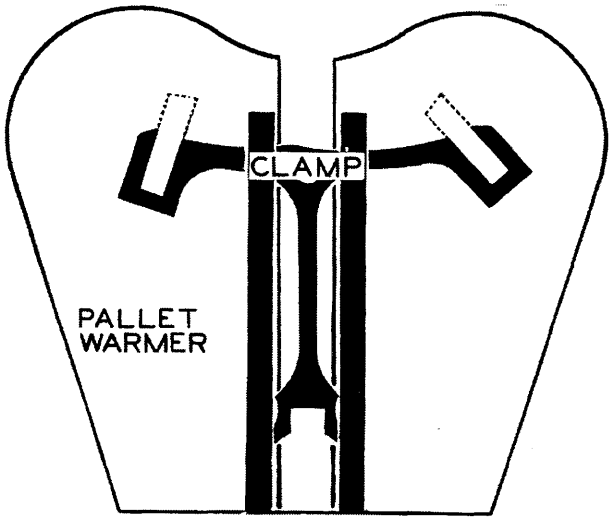


Fig. 26-5

## SEC. 449—Setting the Stone

In setting pallet stones, be very careful as the stones are easily chipped or lost. Do not attempt to pick up a pallet stone except by the sides and then toward the back of the stone so that you will not injure the face or locking corner of the pallet stone. Figure 26-5 shows a diagram of the pallet fork clamped on a pallet warmer upside down. The dotted lines illustrate the correct position of the pallet stones with regard to the angles on the lifting faces.

In some watches you will find one stone has more lifting angle than the other. The one with the greater angle is the **L** stone and the one with the lesser angle is the **R** stone. In small watches the angles are the same.

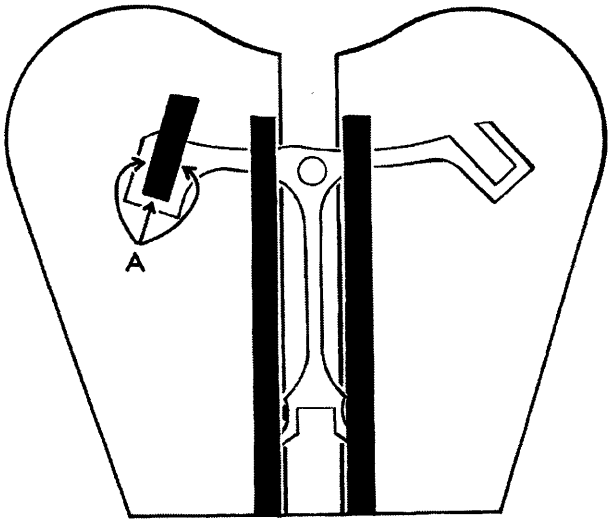


Fig. 26-6

Start with the **R** stone. After placing stone in position, push it to the bottom of the slot, figure 26-6. Use pegwood when moving a pallet stone. If the watch is one of excellent manufacture and has had careful handling, it is very possible that when the stone is pushed into the back of the slot, the amount of lock will be correct. Do not take this for granted, however. Warm slowly with alcohol lamp, heating one stone at a time. The pallet warmer is made so that one stone can be heated without danger of heating the other. Use shellac which has previously been drawn threadlike (Lesson 13, figure 13-21) and place on both sides and back of stone where it joins the pallet fork, arrows **A**, figure 26-6. Let cool before attempting to remove pallet from pallet warmer and remove any excess cement with the tool in figure 13-19, Lesson 13. Clean the lifting face and sides of the pallet stone with pithwood wet with alcohol. Now set **L** stone in place exactly the same as the **R** stone and as far back in the slot as possible, figure 26-7.

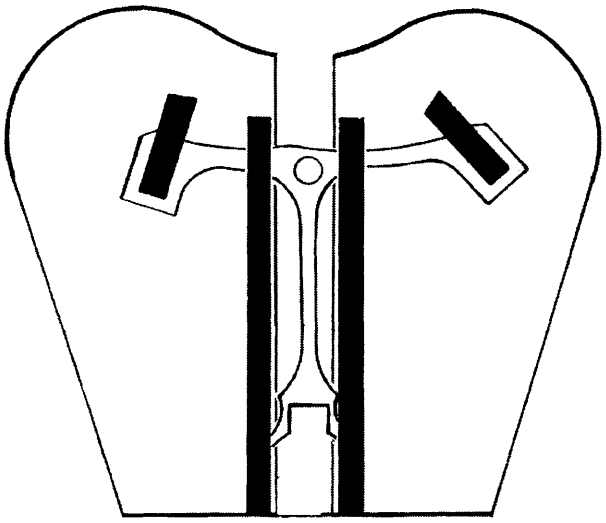

Fig. 26-7

Testing for lock and draw is always done with the power on. It is not necessary to wind the watch fully. The stones are adjusted until there is the correct amount of lock and drop. The fork should be arrested by the banking pin at the instant the drop takes place. When this occurs on the **R** stone and then the **L** stone, the escapement is banked to the drop. Each time it becomes necessary to move a pallet stone, the fork must be removed from the movement and reheated on the pallet warmer. Be careful not

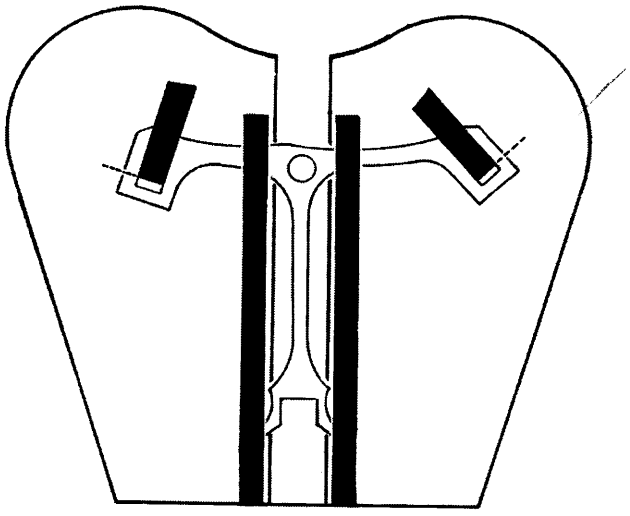

Fig. 26-8

to overheat or burn the shellac. If this should occur, it will be necessary to remove the stone and clean both it and the slot in the fork before applying new cement. Use pegwood when moving a pallet stone forward or backward. The distance you wish to move the stone can be carefully judged by the distance between the back of the pallet stone and the bottom of the slot, figure 26-8.

Figure 26-9 illustrates an **R** stone with too much lock. Moving the **R** stone in the direction of arrow **A** will decrease the amount of lock on the **R** stone but it will also decrease the lock on the **L** stone. Therefore, it would be necessary to move the **R** stone in and the **L** stone out until both locks are equal. This also holds true when there is too much lock on the **L** stone and not enough lock on the **R** stone.

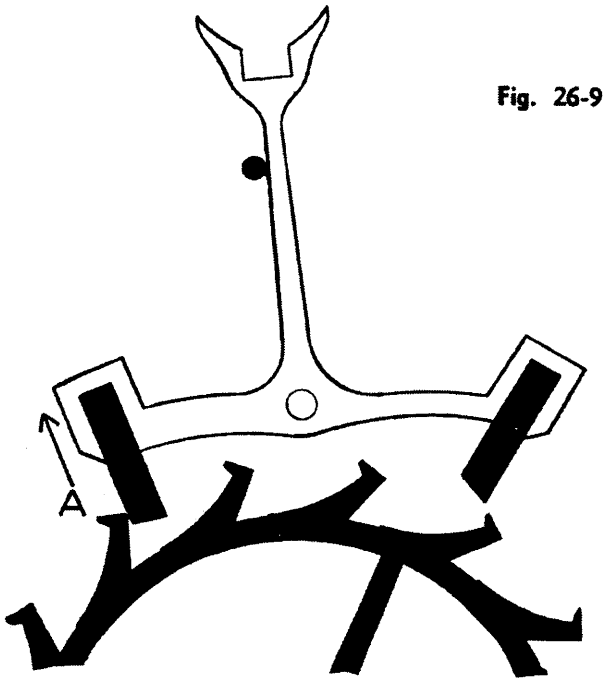


Fig. 26-9

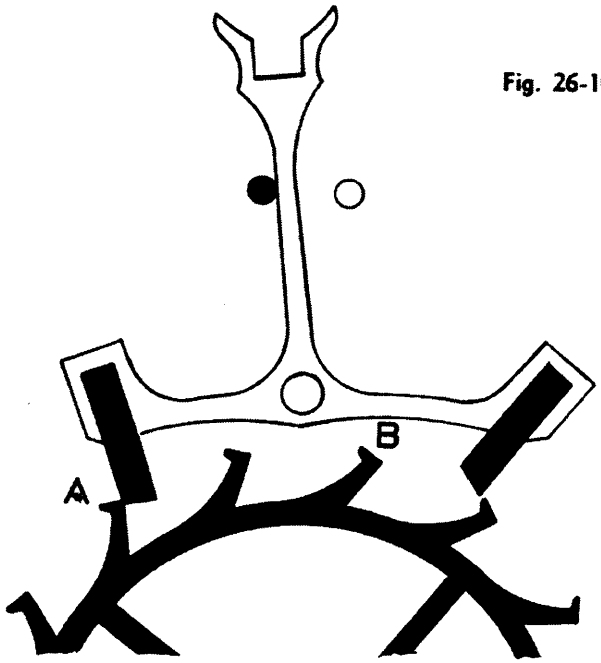


Fig. 26-10

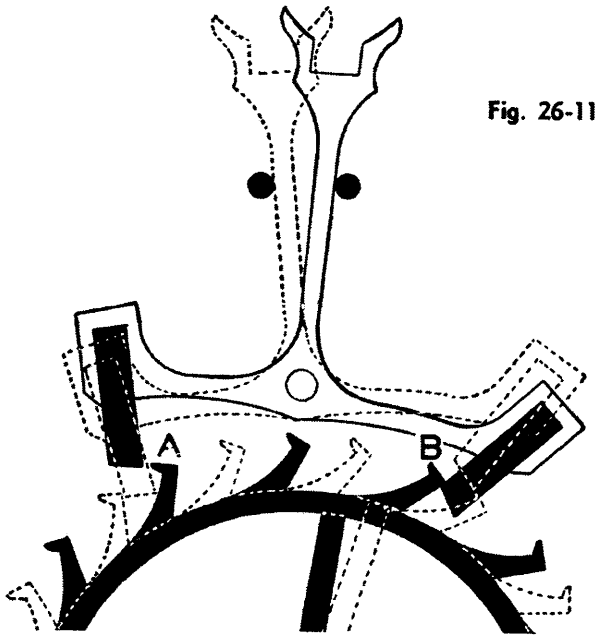


Fig. 26-11

Figure 26-10 illustrates the correct amount of lock on the **R** stone at the moment of drop. As the escape wheel tooth "lets off" from the **L** stone, the fork is against the banking pin and the **R** stone intercepts the escape wheel tooth **A.** When the fork is moved away from the banking pin far enough to allow the **R** stone to unlock, the escape wheel tooth **A** passes across the lifting face of the **R** stone and when the tooth has completed the lift, the fork will be against the opposite banking pin at the instant the escape wheel tooth **B** is arrested by the **L** stone, figure 26-11. The escapement is now banked to the drop. This can be seen readily by placing the escape wheel and fork in these positions and moving back and forth.

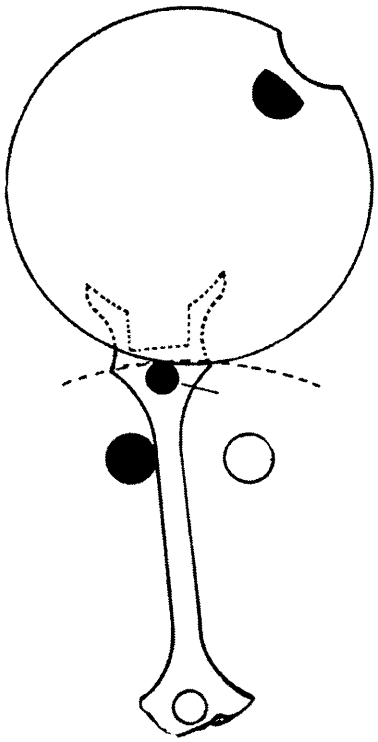

Fig. 26-12

## SEC. 450—The Safety Action

When you have banked your escapement to the drop, adjust the safety action. Figure 26-12 illustrates the guard pin in a single roller escapement set as close as possible to the edge of the roller when the fork is against the banking pin. Test the safety action on both sides.

Figure 26-13 illustrates the guard dart set properly in the double roller escapement. Test action on both sides.

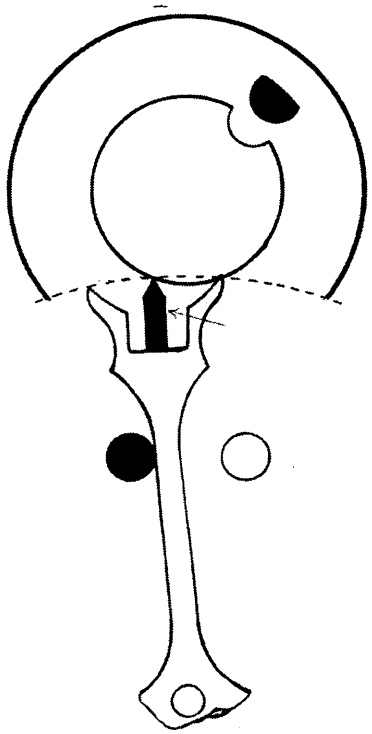

Fig. 26-13

Now open each banking pin slightly. This will allow the escape wheel tooth to slide on the face of the pallet stone, figure 26-14. The dotted lines illustrate the **R** stone after slide has taken place. Now the roller jewel will enter the horn in the fork without danger of it rubbing on the horn. There will be a small amount of clearance between the guard pin and the roller.

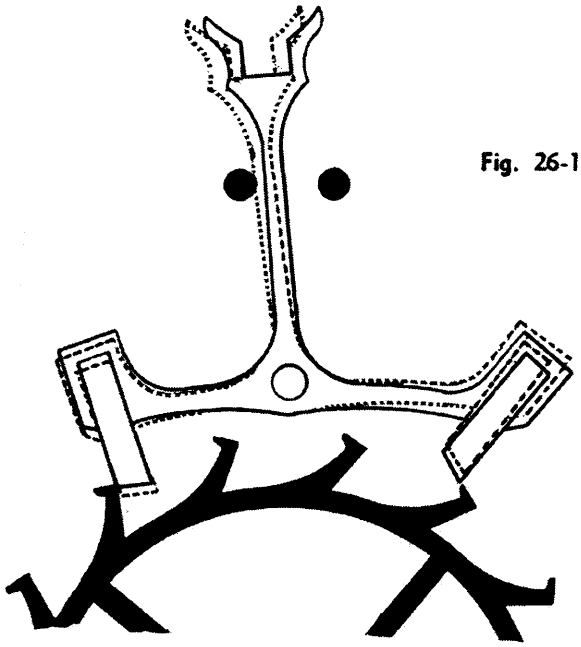

Fig. 26-14

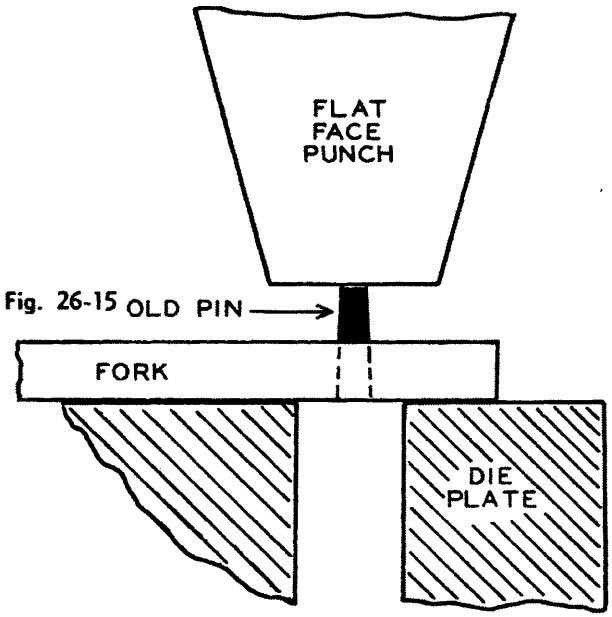


Fig. 26-15

## SEC. 451—Replacing Guard Pin in a Single Roller Escapement

The old guard pin is usually inserted from the bottom. It can be removed by placing pallet fork over a hole in the bench block and pressing out with a flat face staking punch, figure 26-15. If the guard pin bends, cut it off about .5 mm above the fork and stone the end flat with a hard arkansas slip before attempting to push it out, figure 26-15. If the guard pin was put in from the top, turn the fork over and push out with a small pointed punch or needle.

It is desirable at times to have small punches such as the punch used for forcing out the guard pin. Such punches are not manufactured. Figure 26-16 illustrates a method whereby any number of small, specially shaped punches can be made from tempered steel wire and held in a hollow staking punch. **A**, figure 26-16, represents a cross section of a round face hollow punch. **B** represents a length of blued steel wire shaped in the form of a sub-punch and placed in the staking punch. It should fit as closely as possible without binding. Notice that the punch **B** rests at the bottom of the hole in the staking punch and extends beyond the face just enough to serve the purpose for which it is intended.

Replace the guard pin as follows:

1. Remove old guard pin.

2. Select a brass stud pin that will enter hole as in figure 26-17. If student desires to make a tapered brass pin, refer to Sec. 386 Lesson No. 19, figure 19-13.

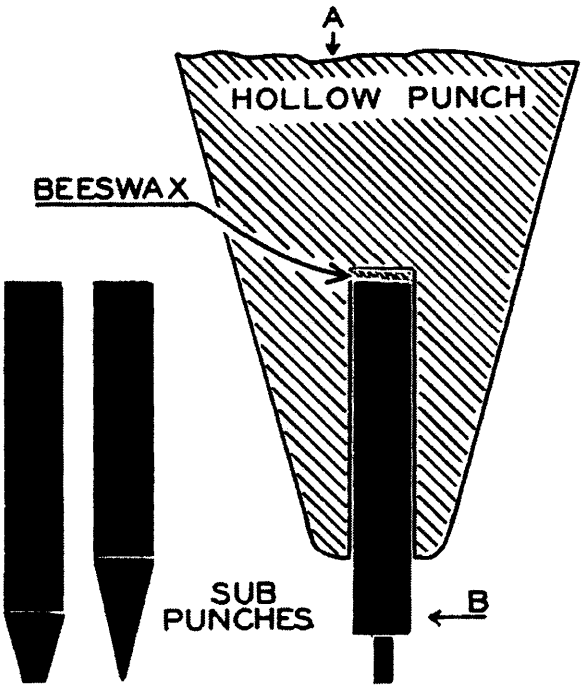


Fig. 26-16

3. Insert from the under side and press in until pin comes to a stop.

4. Cut off a little longer as illustrated and stone the end flat.

5. Press in until pin is flush with bottom of fork, figure 26-18.

6. Cut pin slightly longer than the top edge of roller table, figure 26-19, and stone flat with arkansas slip.

7. Adjust guard pin.

## SEC. 452—Replacing Guard Dart in Double Roller Escapement

Replacing the guard dart in a double roller escapement is not a difficult job but great care must be used when removing an old dart. The dart in a double roller escapement is usually put in from the front. Consequently, if the guard dart in a double roller should become loose, it would seem to be too long. Replacing a guard dart of this type allows the thicker portion of the pin to form the safety action with the safety roller.

It is usually an easy matter to force out the old pin with a pair of heavy tweezers. Figure 26-20 illustrates the method used when a small section of the guard pin extends through the hole in the "boss."

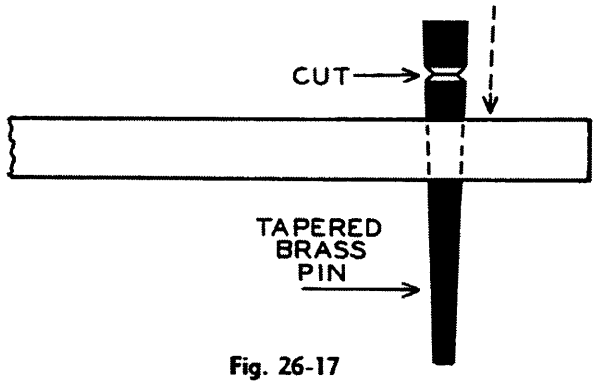


Fig. 26-17

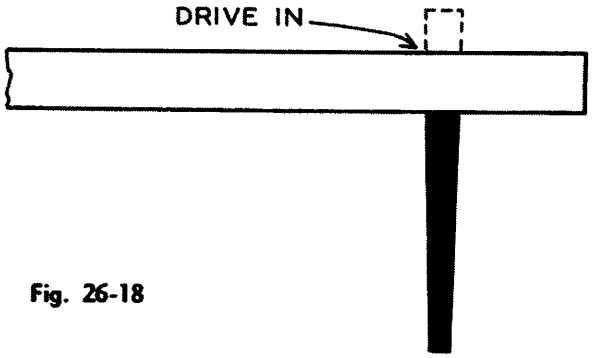


Fig. 26-18

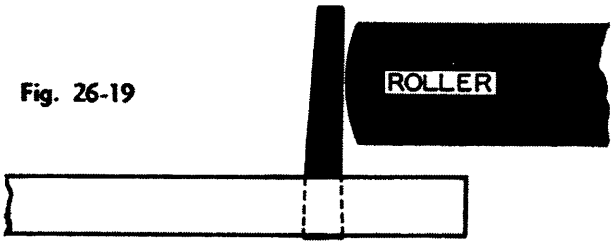


Fig. 26-19

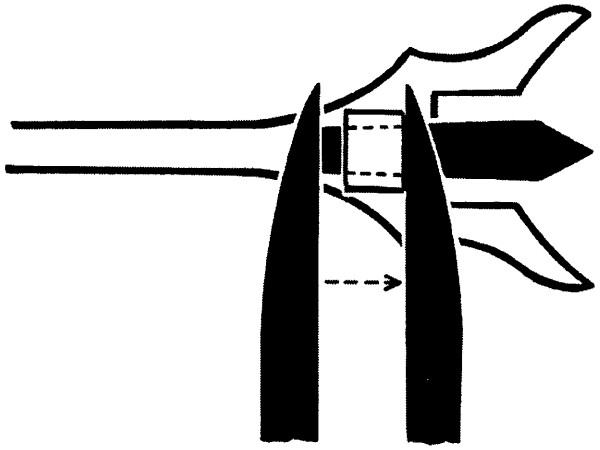

Fig. 26-20

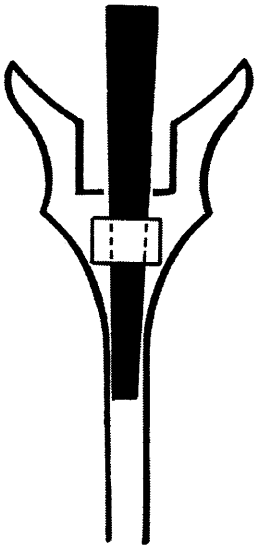

Fig. 26-21

In some forks the pin will be cut off flush with the "boss." Place the fork over a staking tool stump and force out the old pin with a sharp pointed punch or needle.

In replacing the guard dart, use a brass stud or taper pin and insert from the front, figure 26-21. Hold the fork with a heavy tweezer, the points of which can be rested on an anvil and tap in gently with the back of another pair of tweezers, figure 26-22. The pin must have very little taper in order to hold securely.

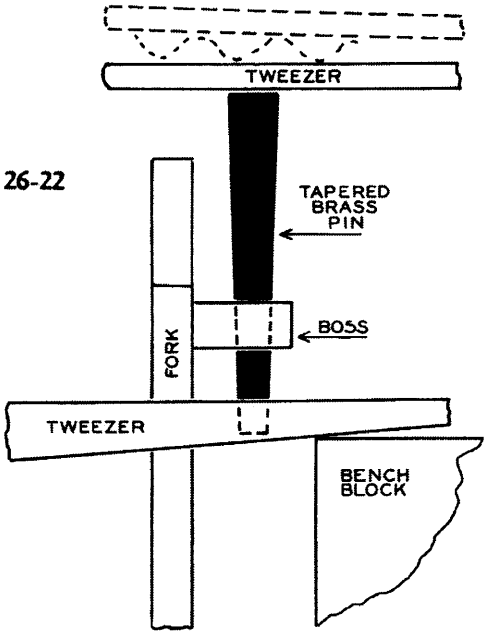


Fig. 26-22

Cut off pin a little longer than necessary with a pair of hairspring nippers and shape as in figure 26-23. This can be accomplished with a hard arkansas stone or needle file. In using either of these, place a piece of scotch tape over the side of stone or needle which comes in contact with the underside of the fork. This will prevent cutting or marring the under side of the fork. Cut each side a little at a time until shaped properly.

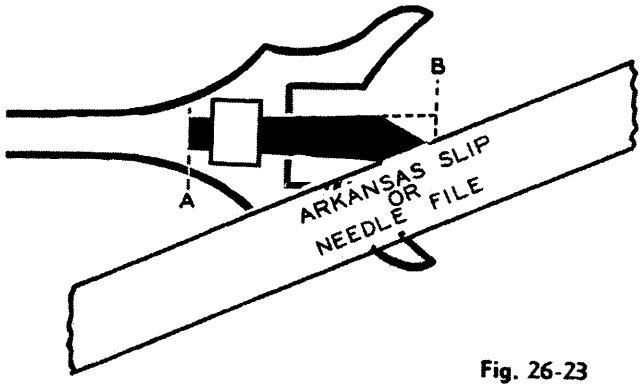


Fig. 26-23

## SEC. 453—Matching an Escapement with Immovable Bankings

Most Swiss watches use the permanent type of banking pins. In the better grades the bankings are often milled out of the plate. In the common type of Swiss watches, the bankings are considered immovable and are merely pins driven through a hole in the plate. It is possible but seldom necessary to bend them slightly as these pins were adjusted properly at the factory.

The procedure used to match this type of an escapement is identical with the procedure described for typical American watches with movable bankings except that you must allow for slide at the time you make each test of fork and roller action and lock and drop.

Use the same procedure as described in Sec. 447:

1. Test roller jewel in fork slot.
2. Test fork and roller action as in figure 26-2 by placing the face of the roller jewel opposite the corner of the fork slot. In figure 26-2, the roller jewel has only enough freedom to pass the corner of the fork slot. Figure 26-24 shows the space between the roller jewel and the corner of the slot when the bankings are immovable. This space is determined by the amount of slide allowed which is the difference between the position of the permanent banking **B** and the position of the banking when banked to the drop and illustrated by dotted circle **C.**
3. Proceed to set pallet stones in the same

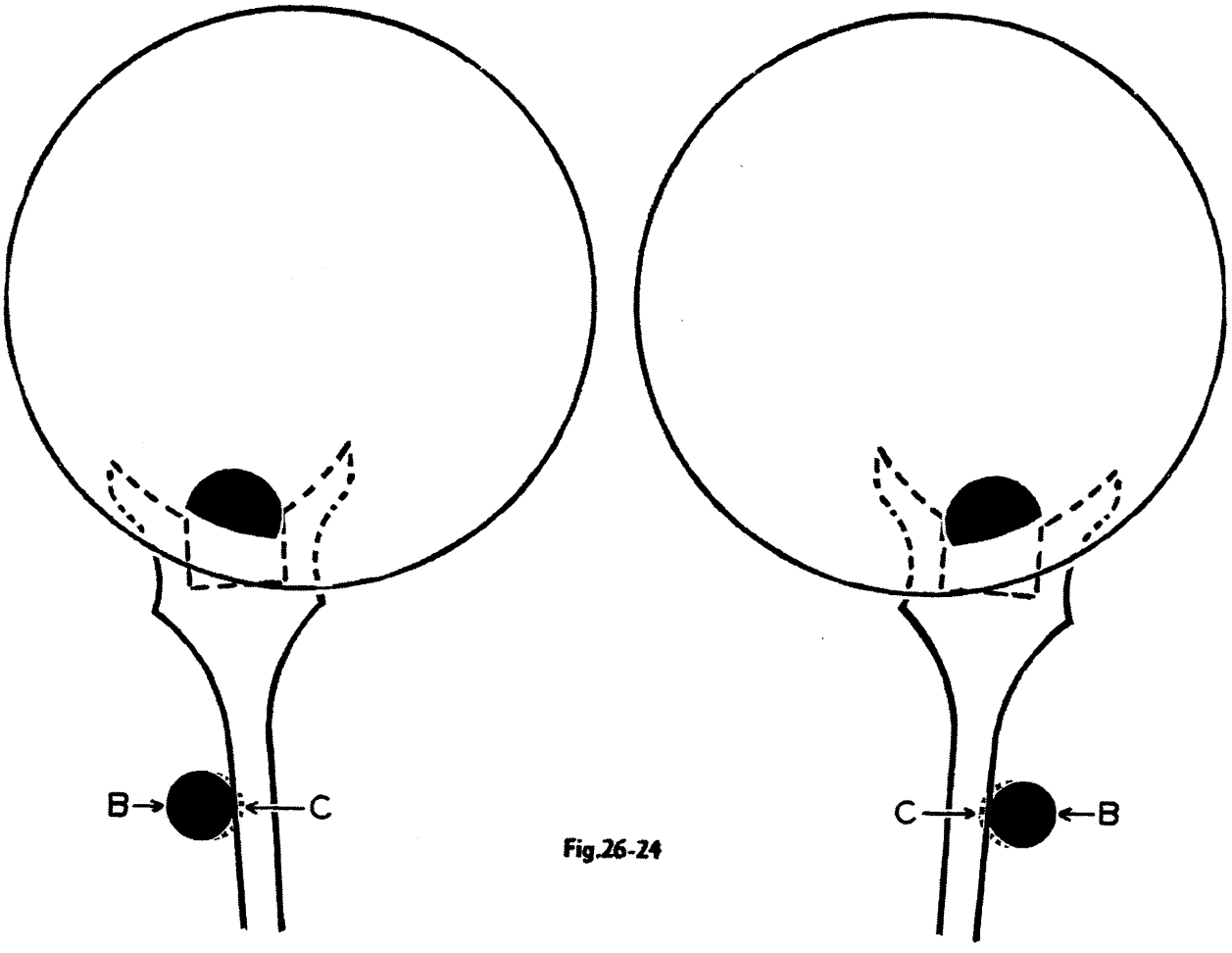


Fig. 26-24

manner as described in Sec. 449. At this time remember that the lock is exactly the same as described in this section, and illustrated in figure 26-25. The fork is illustrated to show the locking corner of the escape wheel tooth locked on the locking corner of the pallet stone at the moment of drop. Notice, however, that this fork is **not** against the banking pin. The space between the fork and the banking pin is the amount left for slide. This space must be equal on both sides and the student must be certain that he has the proper amount of lock **before** the fork rests against the banking pin.

One of the most successful methods of holding the fork stationary at this instant is to insert a small piece of pithwood under the fork as shown in figure 26-26. It is very easy to observe the amount of lock and drop on each stone and the distance the fork is from the banking pin. After you are certain the stones are set correctly, remove pithwood and test the draw.

## SEC. 454—Checking the Guard Action.

The guard action is tested next and this test is illustrated in figure 26-27. Notice that the guard dart is arrested by the safety roller when the fork is moved away from the banking but the escape wheel tooth is still **locked** on the corner of the receiving stone.

This then insures perfect safety action.

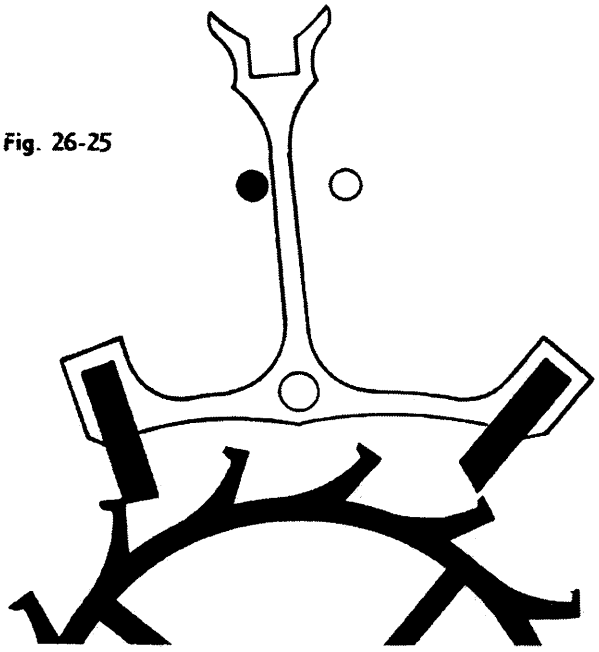

Fig. 26-25

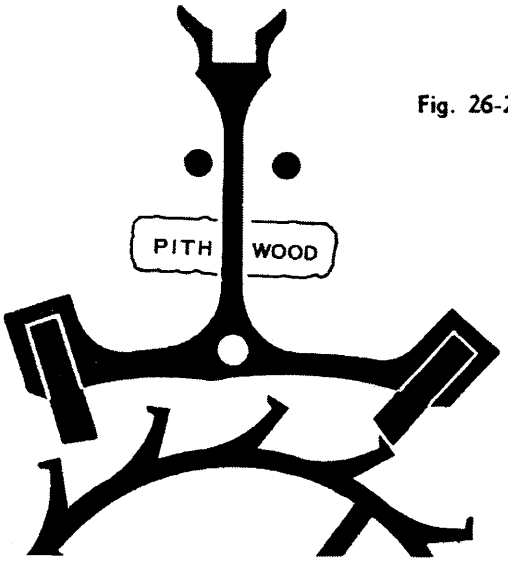


Fig. 26-26

This same action takes place between the guard pin and the edge of the roller table in the single roller escapement and is tested in the same manner. When the fork is arrested by either banking pin you should find:

1. A small amount of play between the corner of the fork slot and face of the roller jewel.
2. The proper amount of lock **and** slide.
3. Freedom between the safety roller and guard dart. There are very few watches in use today using immovable bankings with a single roller.

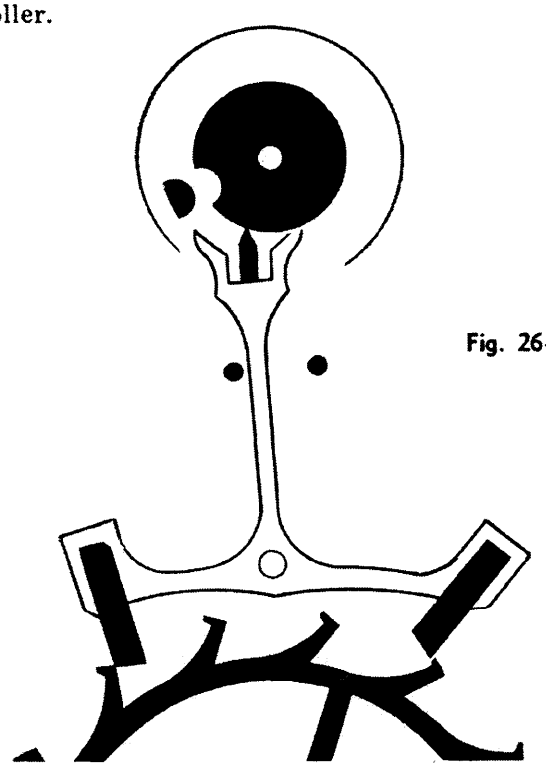

Fig. 26-27

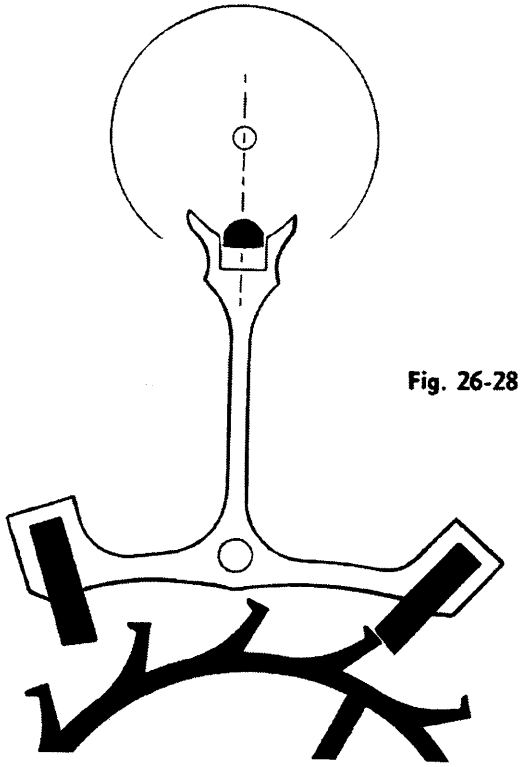

Fig. 26-28

## SEC. 455—Putting in Beat

Theoretically, the watch is in beat when the center of the roller jewel is in line with the center of the pallet arbor and the center of the balance staff. Figure 26-28 illustrates this condition and shows the escape wheel tooth about half way across the face of the **L** stone. If you apply a **small** amount of power to the train so that a tooth of the escape wheel rests equally on the faces of both the **R** and **L** stones, your watch should be in beat. Figure 26-29 shows an escape tooth which has come to rest at the front of the **R** stone. Notice too that the roller jewel is not in line with the fork. Turning the roller jewel in the direction of the arrow **A** until the roller jewel is in line will allow the escape wheel tooth to come to rest at the approximate center of the **R** stone, figure 26-30, and this amount is equal to the amount shown in figure 26-28. In this case the hairspring collet would have to be moved in the direction of the arrow **B**, figure 26-29. This is one of the best methods by which to determine if a watch is in beat.

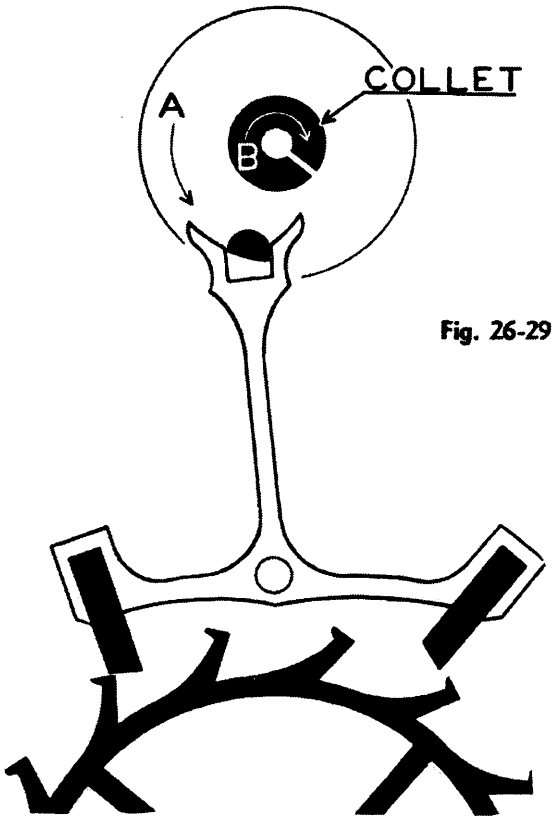


Fig. 26-29

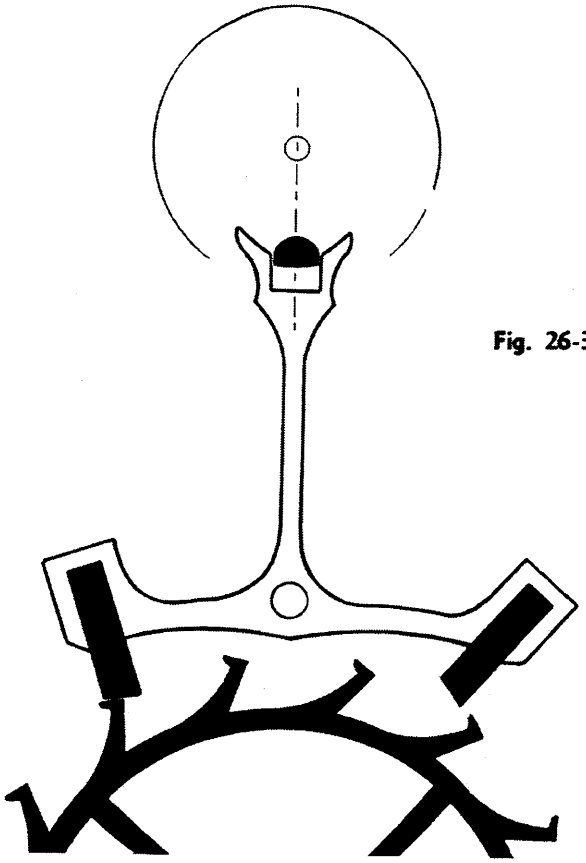

Fig. 26-30

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JOB SHEETS

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W26-J3 - Replacing Pallet Stone: "R" Stone (Receiving) in American Watch.

W26-J4 - Replacing Pallet Stone: "L" Stone (Let Off) in American Watch.

W26-J5 - Guard Pin: In Single Roller Escapement.

W26-J6 - Guard Dart: In Double Roller Escapement.

W26-J7 - Checking Escapement for Proper Function.

| UNIT | W7 |
|---|---|
| LESSON | 26 |

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

**JOB SHEET**

W26-J1

REPLACING PALLET STONE: "R" Stone (Receiving) in Swiss Watch

TOOLS, EQUIPMENT AND SUPPLIES:

Pallet Warmer - Shreaded Shellac - Alcohol Lamp

| PROCEDURE | REFERENCE Les. 26 |
|---|---|
| HOW TO REPLACE "R" STONE IN SWISS WATCH | |
| 1. Remove damaged stone and old cement from pallet.<br>NOTE: To remove stone place fork in pallet warmer, warm and push out stone. | Sec. 448 |
| 2. Select replacement "R" stone.<br>NOTE: To determine correct width of stone, measure slot in pallet with roller jewel gauge and determine metric thickness of stone. Replacement should be a snug fit. | Les. 13 |
| 3. Place fork on pallet warmer, bottom side up. | Sec. 448 |
| 4. Insert stone in pallet with angled impulse face of stone in proper direction. | |
| 5. Cement stone in place. | Sec. 449 |
| 6. Allow fork to cool, then remove from pallet warmer and clean. | Sec. 449 |
| 7. Place pallet fork in movement. | |
| 8. Test lock, drop and slide. Each should be equal to opposite or "L" side of escapement. | Sec. 453<br>Sec. 454 |
| 9. If adjustment is necessary, place fork on pallet warmer and move stone with pointed pegwood as required. | |
| 10. Continue testing and adjusting until you determine stone is in correct position. | |

NOTE: Moving "R" stone outward in slot increases lock on <u>both</u> stones.

Moving "R" stone inward in slot decreases lock on <u>both</u> stones.

REPLACING PALLET STONE: "L" Stone (Let Off) in Swiss Watch

TOOLS, EQUIPMENT AND SUPPLIES:

Pallet Warmer - Shreaded Shellac - Alcohol Lamp

| PROCEDURE | REFERENCE |
| --- | --- |
| | Les. 26 |
| HOW TO REPLACE "L" STONE IN SWISS WATCH | |
| 1. Remove damaged stone and old cement from pallet.<br>NOTE: To remove stone place fork in pallet warmer, warm and push out stone. | Sec. 448 |
| 2. Select replacement "L" stone.<br>NOTE: To determine correct width of stone, measure slot in pallet with roller jewel gauge and determine metric thickness of stone. Replacement should be a snug fit. | Les. 13 |
| 3. Place fork on pallet warmer, bottom side up. | Sec. 448 |
| 4. Insert stone in pallet with angled impulse face of stone in proper direction. | |
| 5. Cement stone in place. | Sec. 449 |
| 6. Allow fork to cool, then remove from pallet warmer and clean. | Sec. 449 |
| 7. Place pallet fork in movement. | |
| 8. Test lock, drop and slide. Each should be equal to opposite or "R" side of escapement. | Sec. 453<br>Sec. 454 |
| 9. If adjustment is necessary, place fork on pallet warmer and move stone with pointed pegwood as required. | |
| 10. Continue testing and adjusting until you determine stone is in correct position. | |

NOTE: Moving "L" stone outward in slot increases lock on <u>both</u> sides.

Moving "L" stone inward in slot decreases lock on <u>both</u> sides.

| UNIT | W7 |
|---|---|
| LESSON | 26 |

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

**JOB SHEET**

W26-J3

REPLACING PALLET STONE: "R" Stone (Receiving) in American Watch

TOOLS, EQUIPMENT AND SUPPLIES:

Pallet Warmer-Shreaded Shellac-Alcohol Lamp

| PROCEDURE | REFERENCE Les. 26 |
|---|---|
| HOW TO REPLACE "R" STONE IN AMERICAN WATCH | |
| 1. Remove damaged stone and old cement from pallet.<br>NOTE: To remove stone place fork in pallet warmer, warm and push out stone. | Sec. 448 |
| 2. Select replacement "R" stone.<br>NOTE: Pallet stones for American Watches are ordered for the particular make and model. When ordering the Make, Size and Model or Make, size and serial number of movement should be furnished. | |
| 3. Place fork on pallet warmer, bottom side up. | Sec. 448 |
| 4. Insert stone in pallet with angled impulse face of stone in proper direction. | |
| 5. Cement stone in place. | Sec. 449 |
| 6. Allow fork to cool, then remove from pallet warmer and clean. | Sec. 449 |
| 7. Place pallet fork in movement. | |
| 8. Test lock, drop, slide and guard action. Each should be equal to opposite "L" side of escapement. | Sec. 453<br>Sec. 454 |
| 9. If adjustment is necessary, place fork on pallet warmer and move stone with pointed pegwood as required. | |
| 10. Continue testing and adjusting until you determine stone is in correct position. | |

NOTE: Moving "R" stone outward in slot increases lock on both stones.

Moving "R" stone inward in slot decreases lock on both stones.

| UNIT | W7 |
|---|---|
| LESSON | 26 |

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

**JOB SHEET**
W26-J4

REPLACING PALLET STONE: "L" Stone (Let Off) in American Watch

TOOLS, EQUIPMENT AND SUPPLIES:

Pallet Warmer - Shreaded Shellac - Alcohol Lamp

| PROCEDURE | REFERENCE |
|---|---|
| | Les. 26 |
| HOW TO REPLACE "L" STONE IN AMERICAN WATCH | |
| 1. Remove damaged stone and old cement from pallet.<br>NOTE: To remove stone place fork in pallet warmer, warm and push out stone. | Sec. 448 |
| 2. Select replacement "L" stone.<br>NOTE: Pallet stones for American Watches are ordered for the particular make or model. When ordering the Make, Size and Model or Make, size and serial number of movement should be furnished. | Les. 13 |
| 3. Place fork on pallet warmer, bottom side up. | Sec. 448 |
| 4. Insert stone in pallet with angled impulse face of stone in proper direction. | |
| 5. Cement stone in place | Sec. 449 |
| 6. Allow fork to cool, then remove from pallet warmer and clean. | Sec. 449 |
| 7. Place pallet fork in movement. | |
| 8. Test lock, drop, slide and guard action. Each should be equal to opposite or "R" side of escapement. | Sec. 453<br>Sec. 454 |
| 9. If adjustment is necessary, place fork on pallet warmer and move stone with pointed pegwood as required. | |
| 10. Continue testing and adjusting until you determine stone is in correct position. | |

NOTE: Moving "L" stone outward in slot increases lock on both stones.

Moving "L" stone inward in slot decreases lock on both stones.

GUARD PIN: In Single Roller Escapement

TOOLS, EQUIPMENT AND SUPPLIES:

Heavy Tweezers - Bench Block - Staking Tool - Stud Pins

| PROCEDURE: | REFERENCE |
| --- | --- |
| | Les. 26 |
| HOW TO REPLACE A GUARD PIN IN SINGLE ROLLER ESCAPEMENT. | |
| 1. Remove old guard pin. | Sec. 451 |
| 2. Select tapered brass pin (stud pin) | Fig. 26-17 |
| 3. Insert from underside of fork to snug fit, cut off pin. | |
| 4. Drive pin tight. | Fig. 26-18 |
| 5. Adjust guard pin for proper guard action. | Les. 21-22-26 |
| a. Pin should be long enough so it protrudes just slightly above the roller but not so long that it will hit arms of wheel. | |
| b. Check guard action with wheel and pallet fork in watch, without hairspring. | Sec. 450 |
| c. With wheel held with roller jewel out of fork slot with slight pressure move the fork toward the balance, there should be slight freedom between guard pin and roller, freedom should be equal on both sides. | Sec. 454 |

GUARD DART: In Double Roller Escapement.

TOOLS, EQUIPMENT AND SUPPLIES:

Heavy Tweezers - Bench Block - Staking Tool - Stud Pins.

PROCEDURE — REFERENCE Les. 26

HOW TO REPLACE GUARD DART IN DOUBLE ROLLER ESCAPEMENT

1. Remove old guard dart, take care to remove in proper direction. Sec. 452
   NOTE: Guard darts in American Watches are usually put in from the front of the boss, the thick end of the pin toward the roller - In Swiss Watches the thin end of pin is toward the roller.

2. Select tapered brass pin (Stud pin).

3. Insert in boss from proper direction, press in tight and cut off unused part of pin.

4. Cut off guard dart at a point slightly longer than fork horns.

5. Shape end with arkansas slip. Fig. 26-23 Les. 21-22-26

   NOTE: Reducing guard dart to proper length is a matter of repeated trial and adjustment until properly adjusted. Section 454.
   a. Check guard action with wheel and pallet fork in watch, without hairspring.

   b. Until you determine that there is freedom between guard dart and roller, the balance should be put in the watch with roller jewel in fork slot.

   c. Check freedom by carefully turning balance wheel to determine if roller jewel will swing free out of the slot in both directions. If wheel will not swing without undue pressure, it indicates the guard dart is too long, reduce length of guard dart a small amount at a time until desired clearance is achieved.

CHECKING ESCAPEMENT FOR PROPER FUNCTION

PROCEDURE:

1. Check roller jewel.
   The roller jewel should be approximately .02 mm less in width than the fork slot. It must be of correct length to extend through the fork slot but not so long it will touch guard dart. It must be firmly cemented in an upright position in the roller without tilt in either direction. This can best be checked with balance out of the watch.

2. Check guard action.
   Proper adjustment of guard pin or dart will give a very slight clearance between roller and guard pin at the instant a tooth drops off a pallet stone. This clearance would be equal on both sides. As more clearance is desired in a properly functioning escapement, the slide which pulls the fork against the bankings will give that clearance. Testing must be done by "feel" as this can not be observed. Move balance wheel slowly to cause a tooth to drop off one stone onto the other. Stop the balance at the instant it drops. Then, with a needle like instrument, apply slight movement to the fork in direction of the roller. The amount the fork travels to bring guard pin or dart in contact with the roller should be slight.

3. Check lock.
   Lock occurs at the instant the tooth of the escape wheel drops on the pallet stone. The correct amount of lock for a particular watch is determined by the manufacturer and may be as much as 1/5th the width of the impulse face of the pallet stone or as little as 1/10th the width of the impulse face. The amount of lock should be the same on both stones. Lock is checked by turning the balance wheel slowly and stopping wheel at the instant a tooth drops on a pallet stone. The amount of lock may now be seen. Reverse the direction of the balance wheel and check opposite side for equal lock.

4. Check drop.
   Drop is the distance the escape wheel travels after tooth leaves let off corner of one pallet stone to the lock on the opposite stone. The drop may be observed at the same time as checking for lock by observing distance between tooth and stone opposite the one which has just let off.

5. Check Slide.
   Slide is the action of the pallet stone sliding up the escape wheel tooth after locking. The slide should not exceed an amount equal to the lock or less than half the lock. This may be checked immediately after checking the lock. When checking lock, the movement of the balance is stopped at the instant the tooth drops on a stone. By moving the balance wheel farther, the fork will then rest against the banking pin. Amount of slide may now be observed. The slide may be changed by either opening or closing the distance between banking pins.