



Master WATCHMAKING

SHOP TRAINING JOB GUIDES

LESSON 19

Colleting Hairsprings

—
Sections 385 - 386

CHICAGO SCHOOL OF WATCHMAKING

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SEC. 385—Centering Collet

The results obtained when truing a hairspring in the round or centering the collet are theoretically the same. As the student becomes more proficient at his trade many of the elementary principles he has learned will fade into the background. This is very evident in truing hairsprings in the round. The average watchmaker cannot begin to equal the speed of a factory trained man when it comes to truing a hairspring. A factory trained man can true a hairspring in the round and flat (sometimes with one bend) in a surprisingly short time. They average upwards of 200 a day. This speed comes only with constant practice.

The illustrations to follow show some of the common errors found when a hairspring is out of true in the round or when colletting a hairspring, and the closer the student gets the center of the collet to the theoretical center of the hairspring the less work he will have in truing the hairspring on the wheel. It is possible to make these corrections so exact that when the hairspring is put on the wheel it does not need any further corrections. However, this is the exception rather than the rule. It is, therefore, of the utmost importance that the student learn now the elementary principles of truing a hairspring in the round.

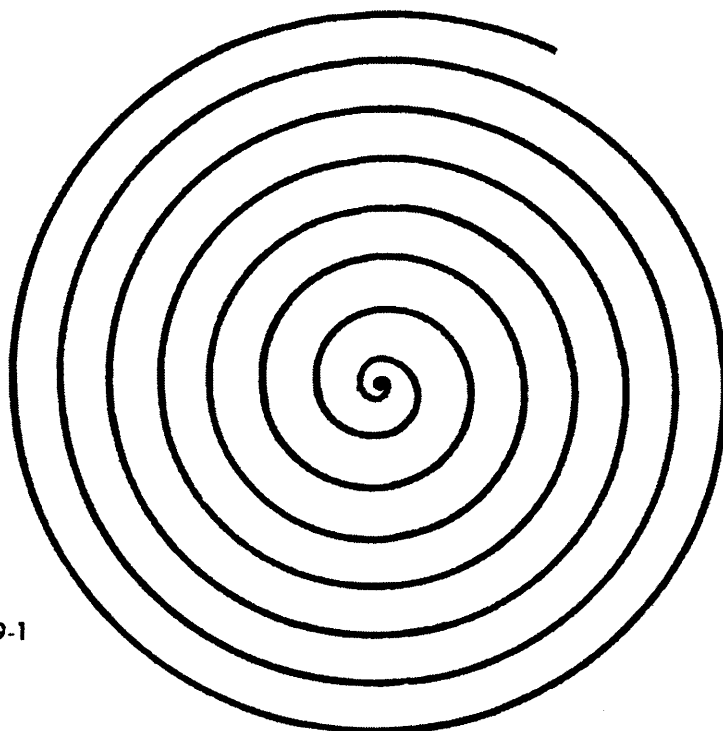


Fig. 19-1

At the expense of repetition let it be understood that when a hairspring is true in the round the exact center of the hairspring and the center of the collet are one and the same. In figure 19-1 the center of the hairspring is located at the inner end of the spiral and if the center of the collet concurred with this center the hairspring would be true in the round.

Figure 19-2 illustrates an enlarged view of the collet and inner coils of the hairspring. The small dot in the center of the collet is the theoretical center of the **collet** and **hairspring**. In order to illustrate that the removal of an excess amount of center coils does not in any way affect these centers, a dotted line is shown from the outside coil to the collet. This proves that any hairspring can be trued perfectly in the round provided there is enough space around the collet. The student must learn to visualize this.

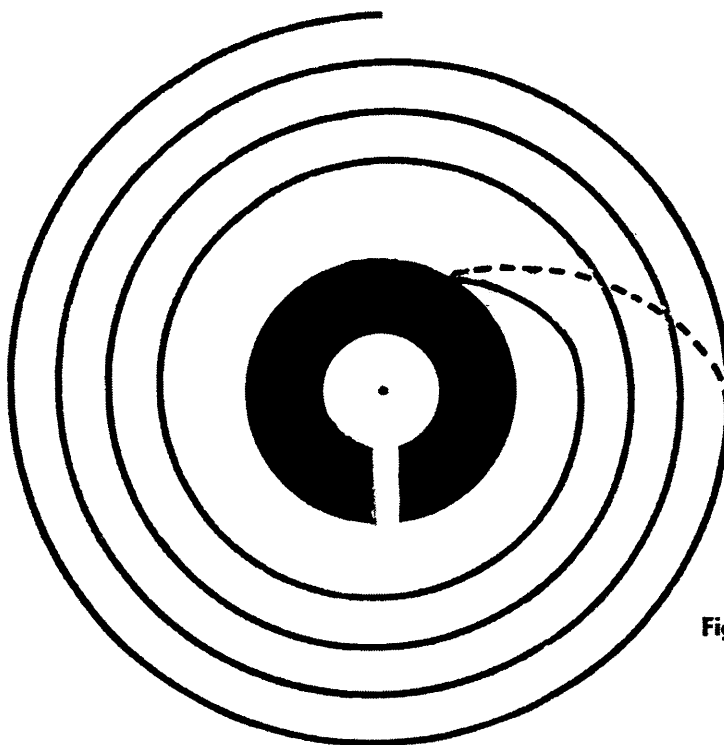


Fig. 19-2

The following illustrations show by the two black dots the theoretical centers of the collet and hairspring respectively. It is easy to see the direction in which the collet must be moved in order to make these centers coincide.

Figure 19-3: The center of the collet is to the left of the hairspring center due to the inside coil being too far from the collet where it leaves the collet. Closing this space until it appears as in figure 19-2 will center the collet. A pair of hairspring tweezers placed in the approximate position shown and carefully closed would bring the desired results.

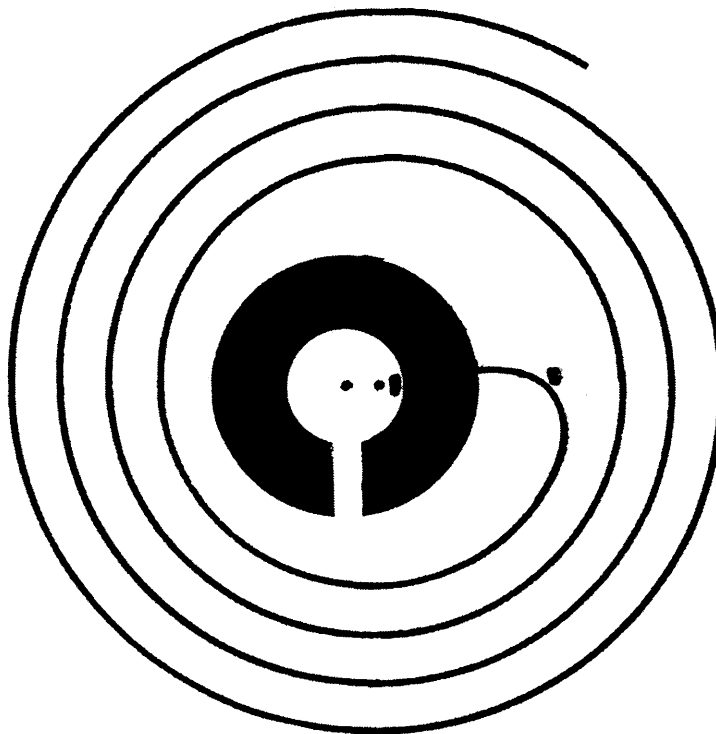


Fig. 19-3

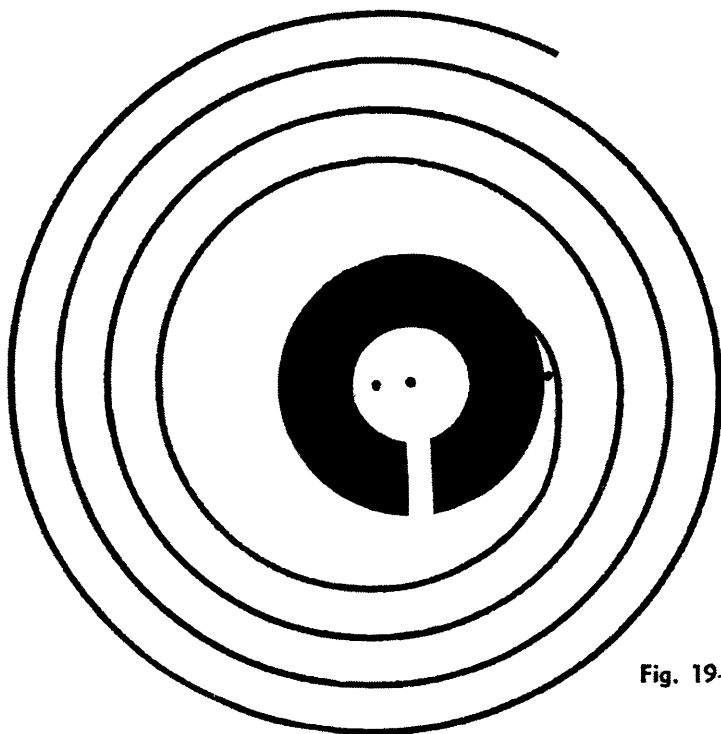


Figure 19-4: The center of the collet is to the right of the hairspring center due to the inside being too close to the collet as it leaves the pinning point. Inserting the taper pin between the collet and the inner coil will force collet in the proper direction. Refer to and compare with figure 19-2.

Fig. 19-4

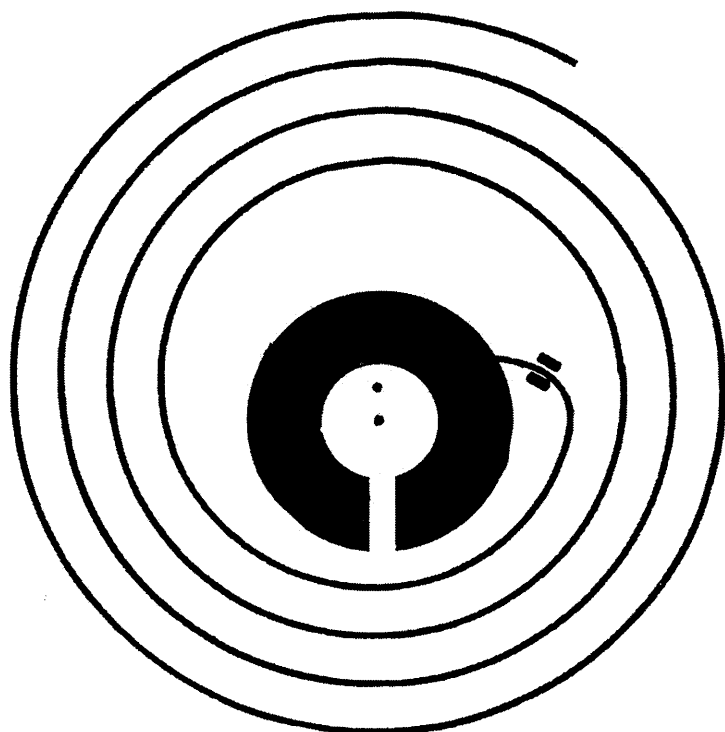


Fig. 19-5

Figure 19-5: The tweezers placed in the proper position and twisted in a manner which would bring the center of the collet toward the theoretical center of the hairspring would be the first correction. If in making this correction the center of the collet should swing slightly to the right of the hairspring center, it may be moved into the correct position with the taper pin.

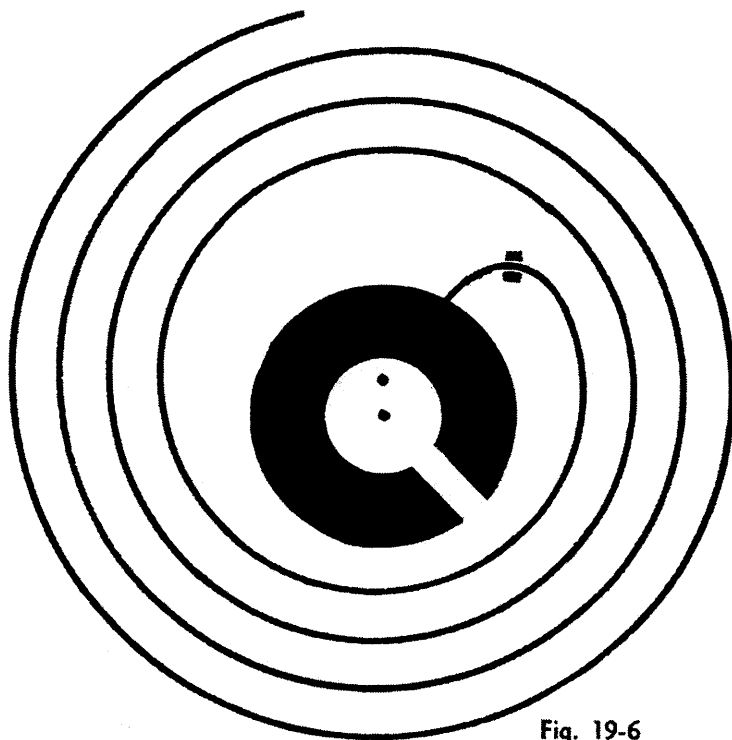


Fig. 19-6

Figure 19-6: To move the center of the collet toward the hairspring center place tweezers in approximate position shown and make the bend. In all probability the center of the collet will swing toward the left slightly making necessary another bend similar to figure 19-3. Check with figure 19-2.

Figure 19-7: The center of the collet should move easily and quickly to the hairspring center by placing tweezers in approximate position shown. In this case the best results would be obtained by applying pressure to the tweezers in order to flatten the curve of the hairspring between the tweezers slightly. Check with figure 19-2.

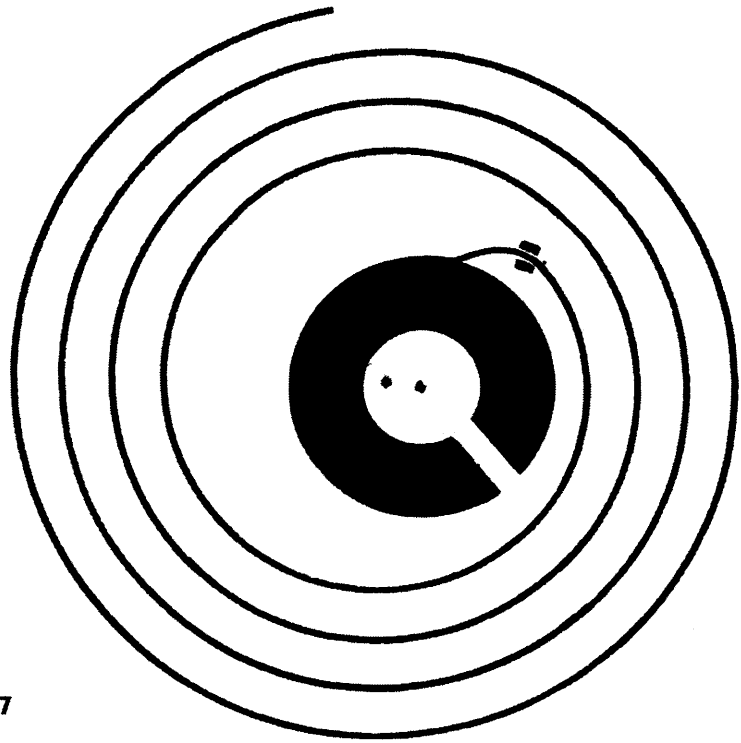


Fig. 19-7

Figure 19-8: The amount of space between the inside coil and the collet is excessive and with the tweezers placed in the approximate position shown carefully exert just enough pressure to close this space. In so doing another bend similar to the one illustrated in figure 19-7 may be required. Check with figure 19-2.

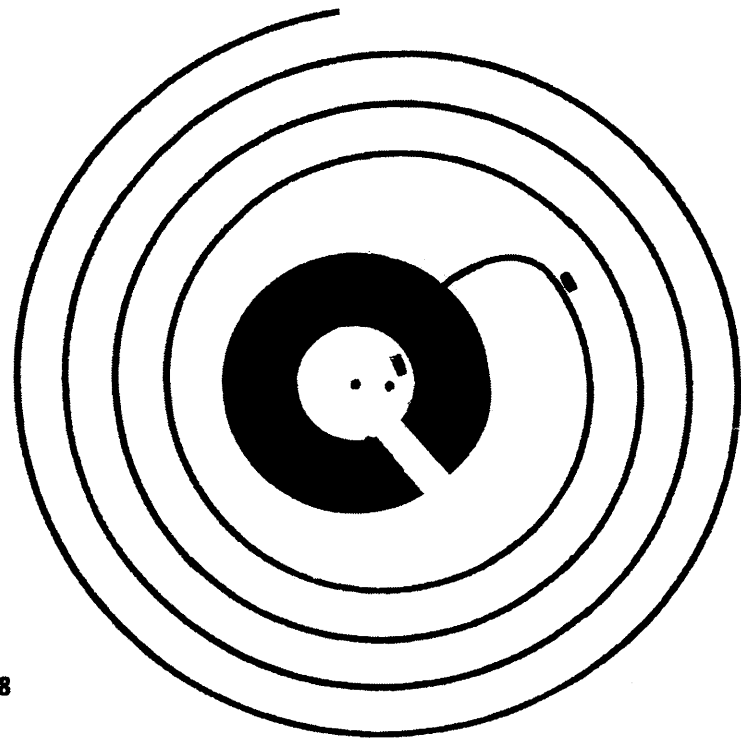


Fig. 19-8

Figure 19-9: The tweezers placed in the approximate position shown should enable the student to bring the center of the collet directly over the hairspring center easily. Compare with figure 19-2.

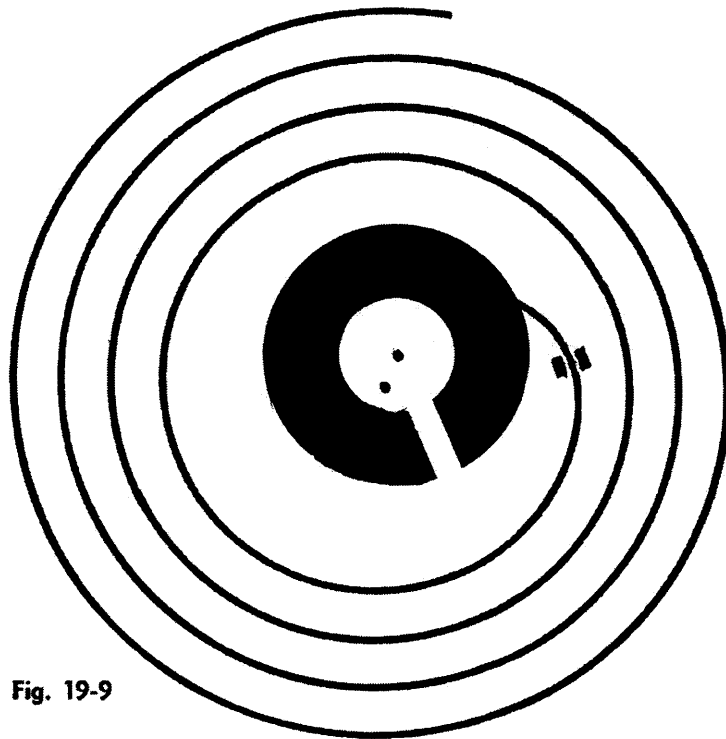


Fig. 19-9

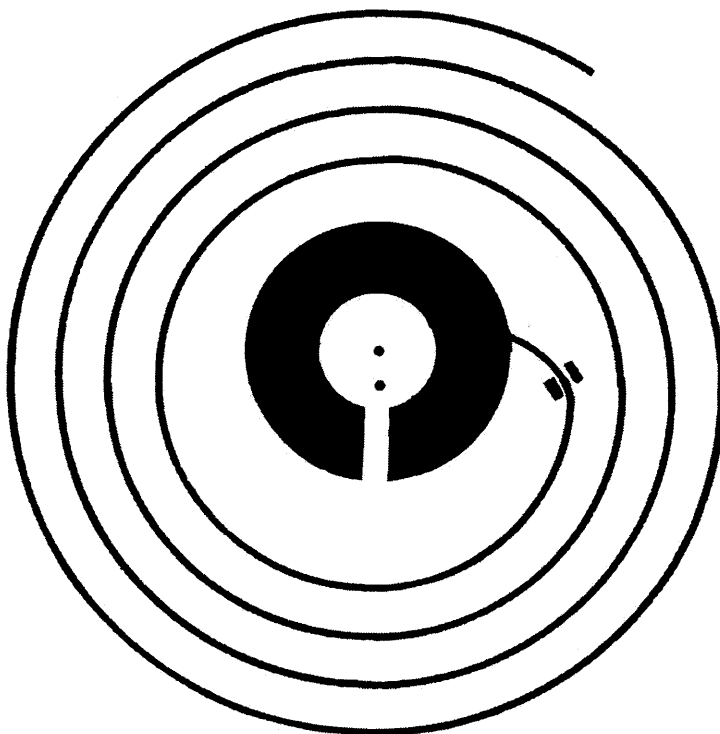


Fig. 19-10

Figure 19-10: This bend is made similar to figure 19-9. Compare with figure 19-2.

SEC. 386—Colleting the Hairspring

These illustrations should help the student when determining the procedure required to bring a collet to center. This is true not only when preparing to true the hairspring in the round but also when colleting a hairspring. If the student has a fairly good conception of the location of the collet center with the hairspring center it will be helpful when colleting a hairspring.

Colleting a hairspring is a job that the watchmaker is not often required to do in this day and age of modern watch repairing. Most new hairsprings come colleted and are selected to fit the collet shoulder properly. At times it is necessary to replace a collet when some careless watchmaker has endeavored to force a collet over a collet shoulder which is too large, which usually causes the collet to crack.

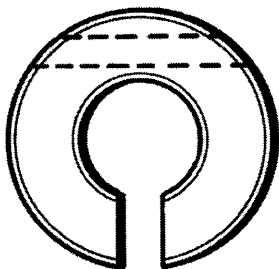
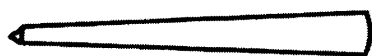


Fig. 19-11



STUD PIN

Fig. 19-12

The collet is a small split collar made of spring brass, figure 19-11. Directly opposite the slot in the collet is a small hole, illustrated by the dotted line, large enough to receive the inner end of the hairspring prior to pinning.

The small tapered brass pin illustrated in figure 19-12 is used to pin the hairspring in the collet. They may be purchased from a supply house under the name of hairspring stud pins.

At times the watchmaker is called upon to file his own stud pins or tapered pins of similar design. Figure 19-13 illustrates how this may be done. A small block of wood, preferably hard wood, has a notch cut in it with the edge of a file. The deepest end is toward the front and tapers up the block depending upon the length of taper

desired. A piece of brass wire of a small diameter is held in a pin vise and alternately rotated with the left hand while in the notch of the hardwood block. The file illustrated by the dotted line is moved lightly back and forth over the wire until the pin is formed.

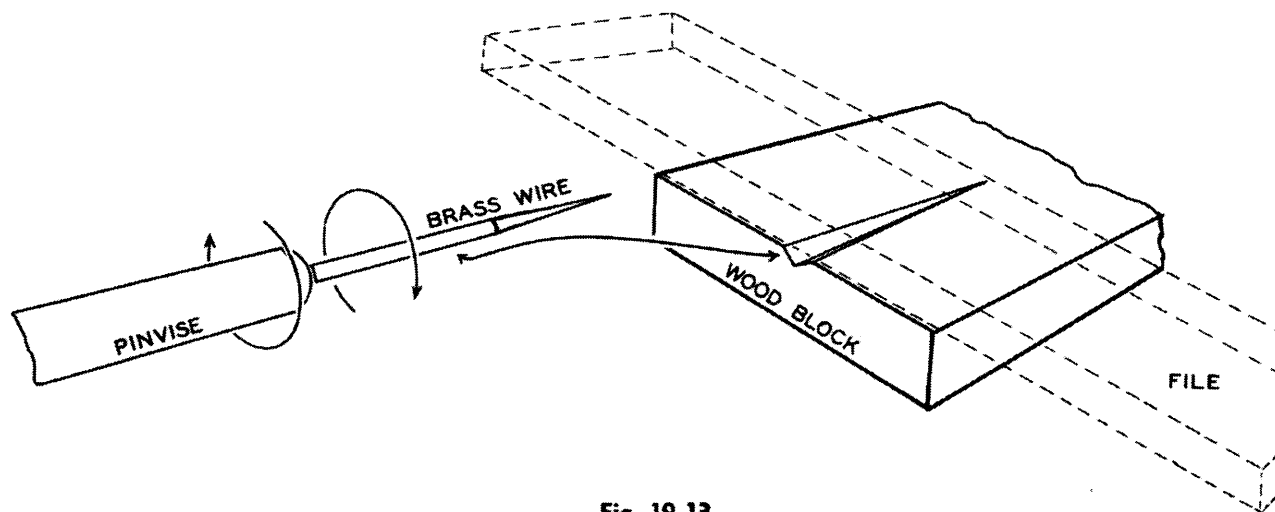


Fig. 19-13

When working on the collet or pinning the hairspring to the collet the collet can be held on a tempered tapered steel pin or a broach, figure 19-14. The pinning hole should be cleaned out with a small broach before attempting to pin the hairspring.

Always try the pin in the hole in the collet before attempting to pin the hairspring. It should go through the collet similar to pin illustrated in figure 19-15.

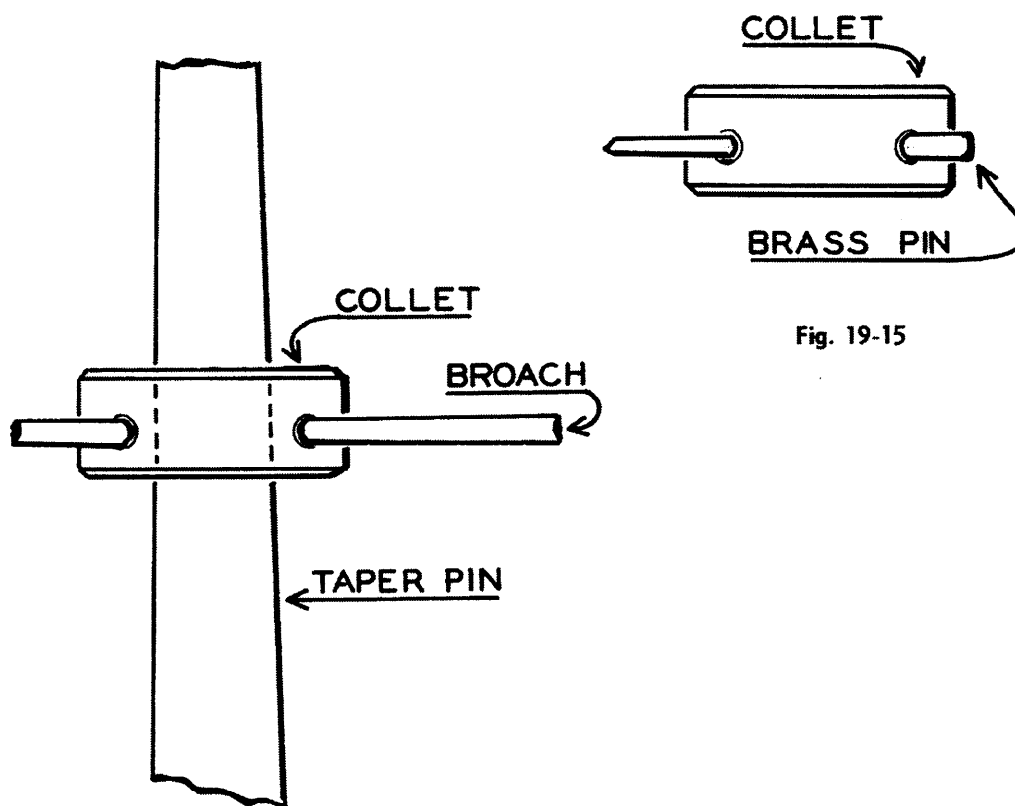


Fig. 19-15

Fig. 19-14

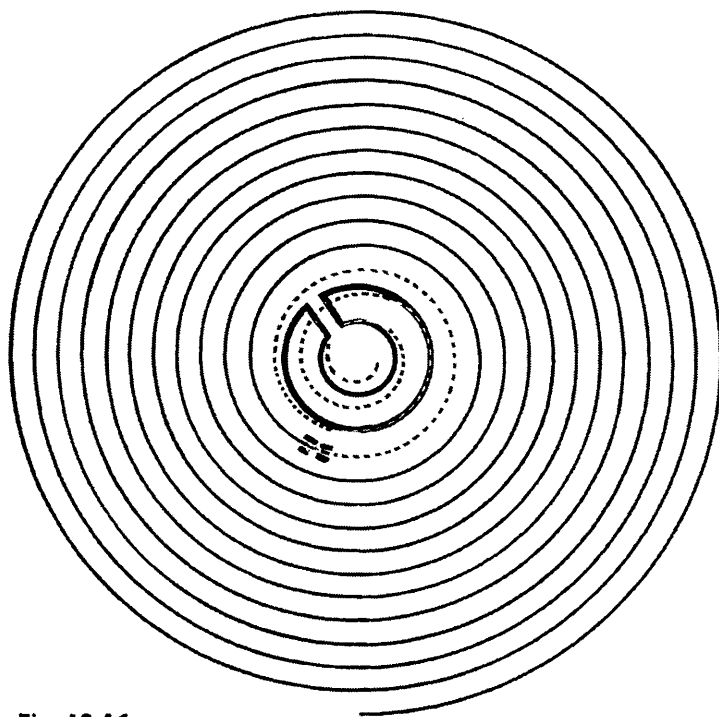


Fig. 19-16

It is sometimes necessary to break out the inner coil of the hairspring in order to get enough space between the coil and the hairspring to true it properly. Figure 19-16 illustrates a hairspring with the collet placed directly over the center of hairspring. Breaking the coil at the point where dotted line joins solid line will allow enough space for the collet. Break at this point by using two pairs of fine pointed tweezers held vertical with the points close together, twisting back and forth.

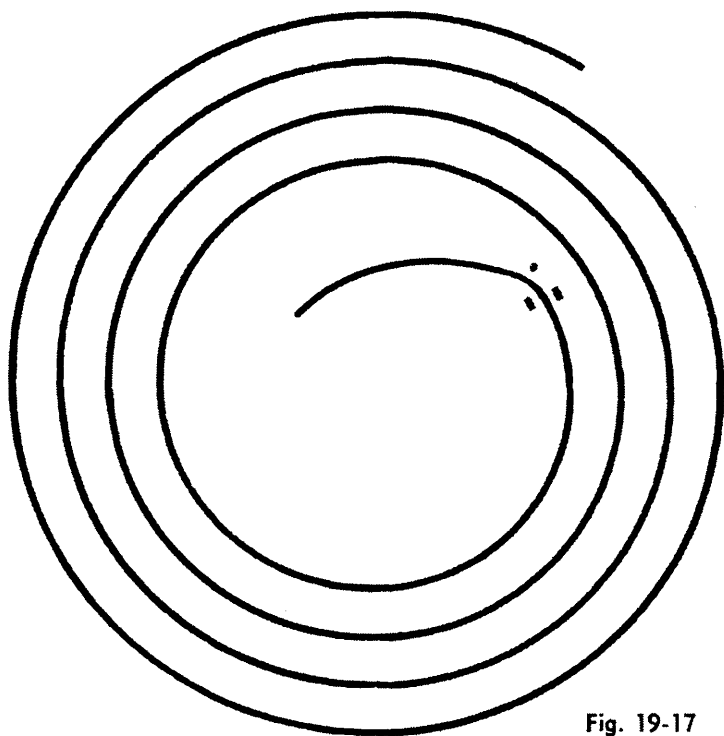


Fig. 19-17

A portion of the inner coil will be bent in the manner shown in figure 19-17, to form the tongue. The length of this tongue should not exceed the length of the hole in the collet. It is formed by holding coil with a pair of hairspring tweezers and bending with taper pin. The tweezers are represented by the two black dashes and the taper pin by the dot.

With the collet in place on the taper pin or broach which you will hold in your left hand, insert the tongue of the hairspring into the hole in the collet, figure 19-18.

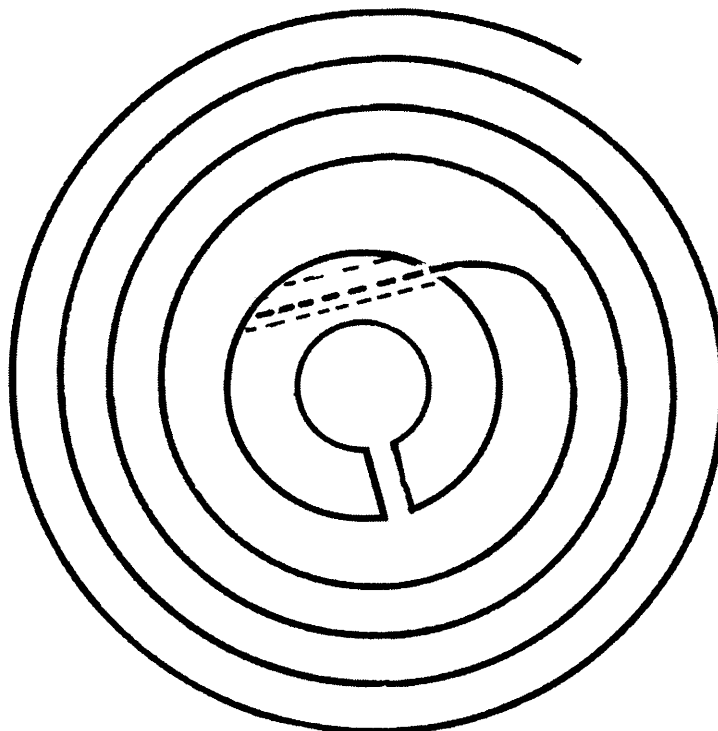


Fig. 19-18

In order to keep the hairspring level you may use the forefinger of your left hand as a guide, letting the hairspring rest upon this finger until the brass pin is in place, figure 19-19.

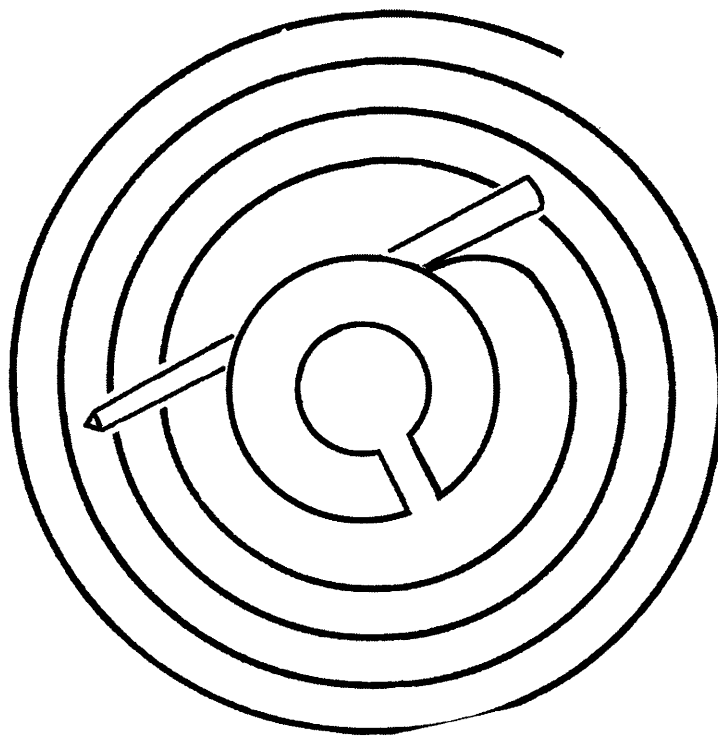


Fig. 19-19

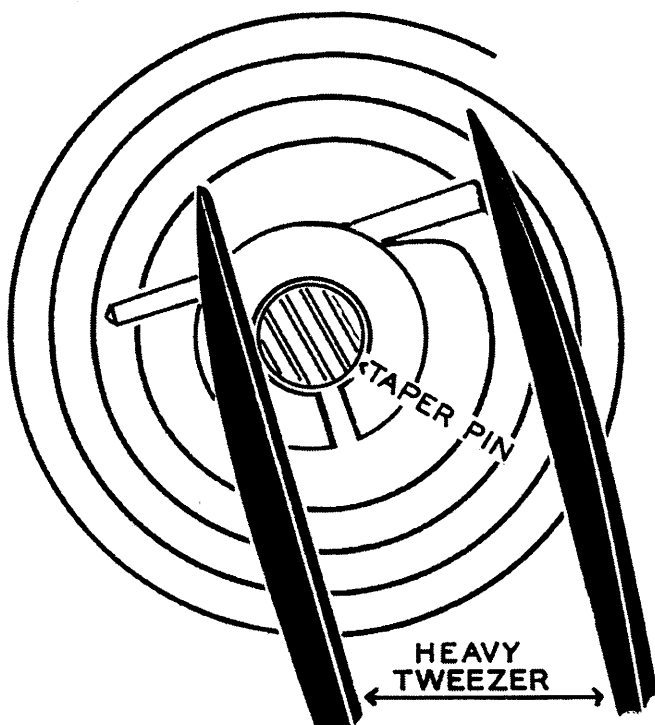


Fig. 19-20

The pin may be forced into place with a pair of heavy tweezers in the manner shown in figure 19-20. However, before forcing the pin in as far as it will go make certain that the inner coil is parallel with the top or bottom of the collet as shown in the upper illustration in figure 19-21. In this illustration the body of the hairspring is held below the hole in the collet by the pin which has not been cut off as yet, but the inner coil is parallel with the upper edge of the collet. When the pin is cut off the body of the hairspring will resume its position in the same plane as the inner coil.

The center and lower illustrations, figure 19-21, show the inner coil out of position prior to forcing the pin in as far as it will go. If the hairspring is pinned properly it will not require much truing in the flat.

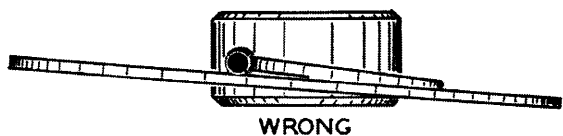
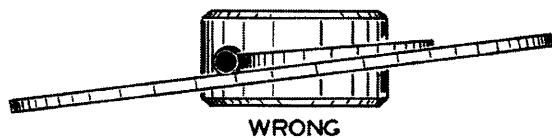
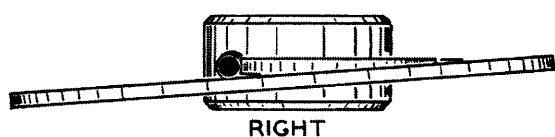


Fig. 19-21

There are other methods of pinning the hairspring to the collet and every watchmaker uses the method he prefers, usually the one he adopted when learning the trade. No matter what method is used the student or watchmaker must use the greatest of care not to make a slip and ruin his work. This is very true when cutting off the pin after it has been forced into place. One of the oldest methods of performing this operation is with a small **sharp** knife or heavy razor blade. If carefully executed it will assure the workman of a clean job and there is no danger of leaving the pin protruding.

The collet is held in place on the taper pin and the end of the knife blade is worked across the pin in a sawing manner. Only the very end of the blade is used. The blade is used tangent to the collet at the pin which is illustrated by the dotted line in the upper illustration of figure 19-22. When the pin is cut almost through the remaining portion may be removed with the tweezers.

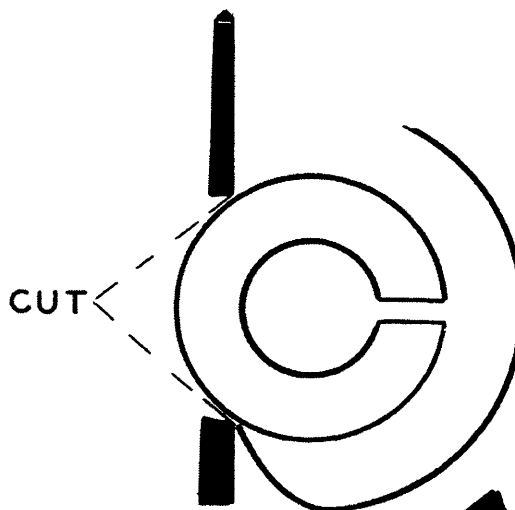
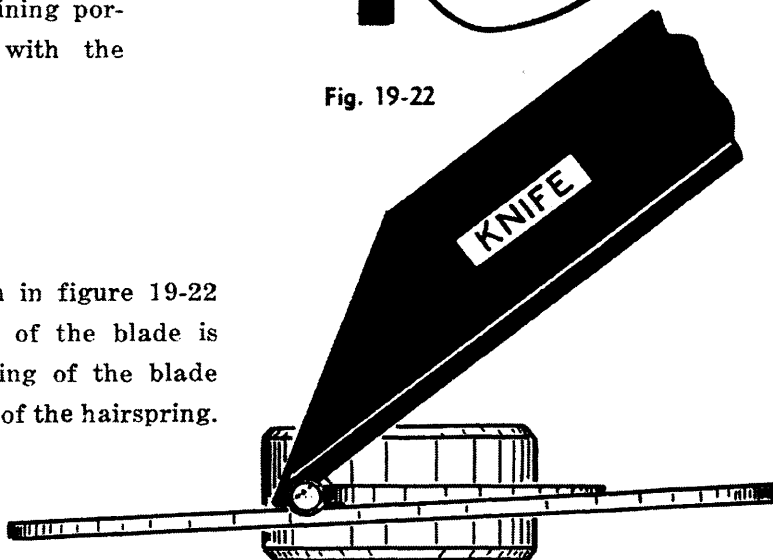


Fig. 19-22

The lower illustration in figure 19-22 shows why only the tip of the blade is used. Any further lowering of the blade would endanger the body of the hairspring.



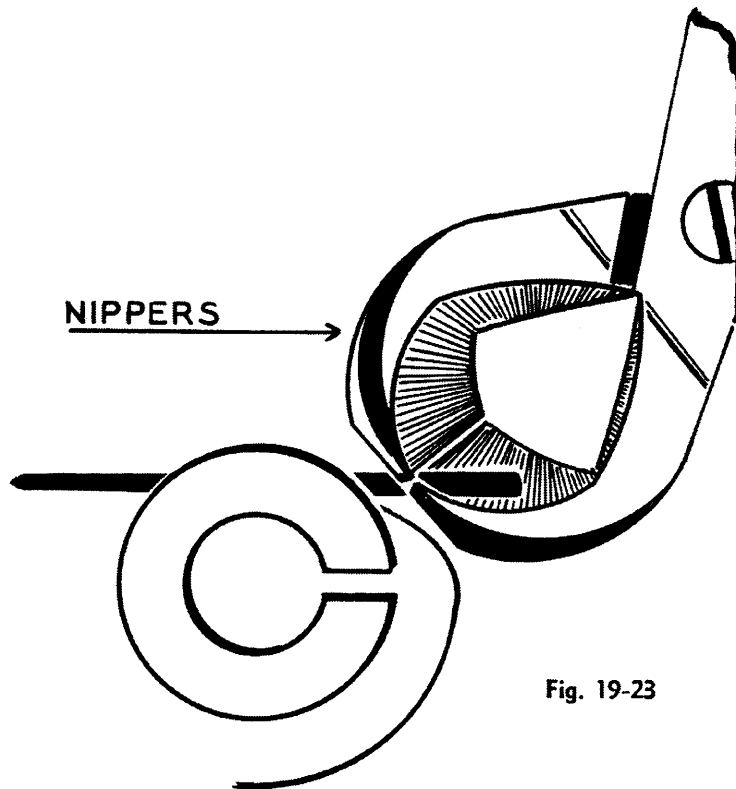


Fig. 19-23

Another method of cutting off the pin is shown above. The jaws of the nippers are ground especially for this purpose and should not be used for any other purpose than cutting small brass pins. The cut off is made before the pin is pushed into place. The protruding end may be removed in the same manner making certain that the nippers are as close to the collet as possible. The methods explained above are the same as will be used when pinning the outside coil of the hairspring to the stud.

(Note - Insert in lesson text 19)

Colleting the Hairspring

If the collet that is in the watch fits correctly and is not damaged, the spring should be recolleted using this collet. You'll note that hole in collet into which hairspring is pinned is not generally centered between top and bottom of collet. The location of this hole and the fact that you are fitting a flat hairspring determines which side of the collet is the top. The top is the side to which the pinning hole is closest. This applies to fitting flat hairsprings only; the opposite is true when fitting an overcoiled spring. If collet needs replacement, select a collet that compares with the original; i.e., correct size to fit collet seat, same height of collet, hairspring pinning hole in same position, etc.