HE ELGIN SERVICE BUREAU BULLETIN

Subject:
Balance Poising

Issued by the
Elgin National Watch Company
Elgin, Illinois, U. S. A.

Introduction

IF close time keeping is desired the balance of the watch must be in perfect poise, and we give in this Bulletin a few notes on this important subject.

Before the poising operation is begun the balance should be in good order otherwise. By "good order" we mean: balance pivots perfectly true, straight and well polished, balance true in both the round and flat, roller and pin in place on the staff and the balance free from magnetism.

PREPARATION

After taking the balance out of the watch the hair spring should be removed and put in a safe place and the balance staff pivots carefully examined by means of a double eyeglass to see that they are perfectly straight. A bent balance staff pivot is a hindrance to the operation of poising, as it will sometimes cause the balance to remain at rest even when the balance is considerably out of poise.

If the staff is bent but slightly it can be readily straightened. This is done by first placing it in the lathe, holding it by a split chuck of suitable size, and carefully centering it with the finger before tightening the chuck. Then by running the lathe slowly and holding the bent pivot between the jaws of a pair of brass or soft metal tweezers the pivot can be easily straightened. If the bend is a bad one the only satisfactory way to do is to change the staff, as a bent pivot not only makes correct poising impossible but is frequently the obscure cause of the poor performance of a watch which is apparently in perfect order.

After the pivots have been taken care of, the balance should be put in the truing calipers and examined for truth. If it is found to be out it should be carefully trued both in the flat and in the round.

A Bulletin on the subject of Balance Truing has been issued by the Service Bureau. If you haven't a copy we shall be pleased to supply one upon application.

The roller should next be examined to see that the jewel pin is set straight, and is firmly in place. All surplus shellac should be carefully scraped off, using for the purpose a piece of brass or nickel wire filed to a sharp triangular point. After this is done the roller should be placed in position. When staking the roller on the staff see that it fits the staff tightly and rests snugly against the hub.

It is a good plan to locate the roller so that the jewel pin is midway between the balance arms, as by doing this the fork and roller action may be observed more readily when the balance is in the watch.

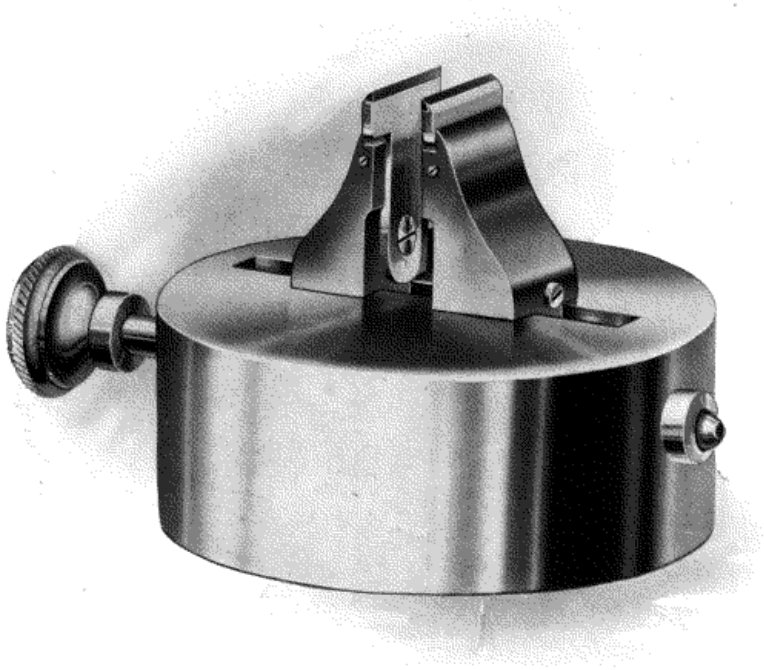
The balance should then be tested in order to make sure that it is entirely free

from magnetism. The poising operation is next in order, but before proceeding with the description of this the necessary tools will first be considered.

TOOLS

The tools necessary for poising are: a poising tool, a set of balance screw undercutters, a pair of boxwood tweezers and several balance screw drivers. The most satisfactory poising tool, and the one we recommend, is a straight edge (parallel jaw) tool, similar in design to the one shown.

There are a great many different kinds of poising tools on the market and we would strongly advise against getting the lowest priced ones, owing to the fact that they are constructed entirely of steel and readily become magnetized. Such a tool, when magnetized, acts as a magnet and imparts magnetism to the staff and balance thus laying the foundation for future trouble.

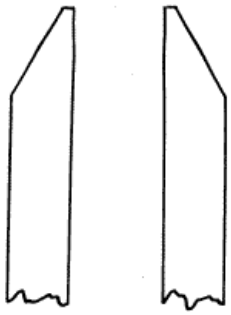


Parallel Jaw Poising Tool

The better class of the lower priced tools are made of brass or nickel, and, having steel in the jaws only, are not so liable to the above mentioned trouble.

Before using this tool the jaws should be carefully examined to see that they are perfectly straight, smooth, and in the same plane, which plane should be parallel to the base of the tool. The surface of the jaws upon which the pivots rest

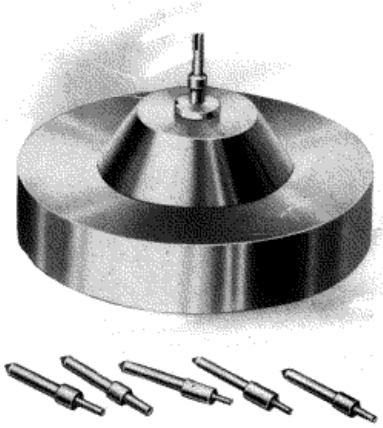
should not be more than four thousandths of an inch in width and should be perfectly flat as shown.



Proper Shape of Jaws

There should be no lines, however fine, running *crosswise* of the jaws, and if any can be seen by the aid of a strong eye-glass they should be removed. To do this the jaws should be rubbed lengthwise on a hard, flat, fine-grained oilstone, being very careful to see that both of them rest evenly upon it and that the stone itself is resting firmly on a perfectly flat surface. After smoothing the jaws in this way their edges will be found to be somewhat sharp. This sharpness may be removed by rubbing the edges of the jaws lengthwise with a rather large burnishing file, which will leave them slightly rounded.

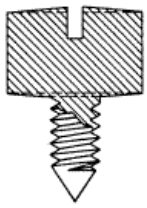
There are, on the market, tools similar to those described, having ruby or agate jaws. This style is recommended to those who wish the most accurate and satisfactory work as there is no danger of the jaws wearing rough or uneven no matter how much the tool is used, and the danger from magnetism is entirely avoided.



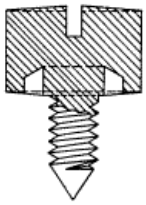
Balance Screw Undercutters

Enlarged View of Undercutter

The set of balance screw undercutters consists of several sizes of hollow cutters which are designed to remove stock from the lower side of a balance screw head in order to lessen the weight of the screw without changing its appearance.

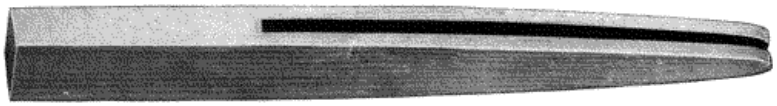


Balance Screw Before Undercutting



Balance Screw After Undercutting

A small stand or base in which the cutter may be firmly fastened while in use usually accompanies a set of these tools.



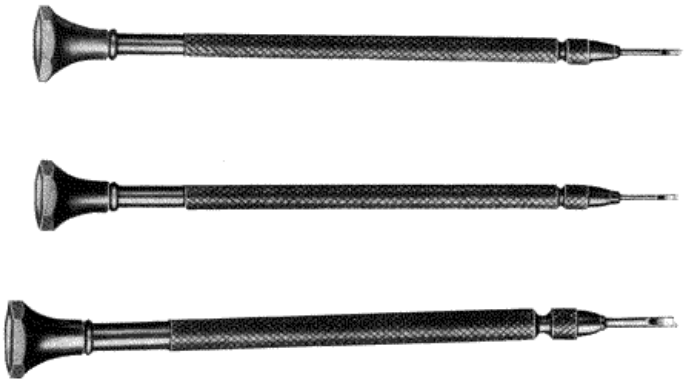
Boxwood Tweezers

The boxwood tweezers are for the purpose of holding the balance firmly without danger of marring or knocking it out of true while removing and replacing the screws.

Small parallel pliers, similar to those shown in the sketch, the jaws of which have been lined with card-board, are sometimes used in place of the boxwood tweezers.

Parallel Pliers; Jaws Lined with Cardboard

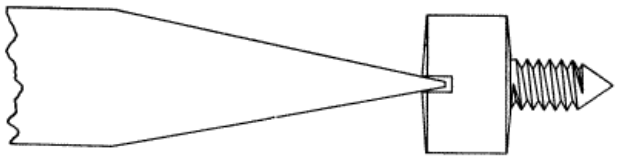
The balance screw drivers usually come in sets having several widths of blades, suitable for the various diameters of balance screws.



Balance Screw Drivers

Before using these screw drivers see that the blades are of proper shape for the purpose for which they are to be used.

A blade of proper shape should be tapered in such a way that the end of it does not quite reach the bottom of the screw slot but wedges at the top as shown in the cut.



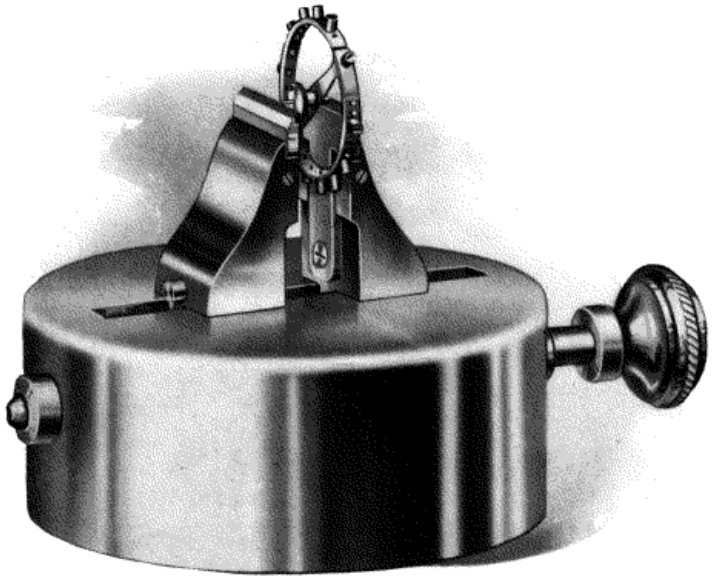
Screw Driver Blade in Position in Screw Slot

This shape of blade when pressed into the screw slot slightly will wedge enough so that when the screw is removed from the balance it will not fall off the end of the screwdriver, but will stay in place and may be transferred to the undercutting tool without danger of loss.

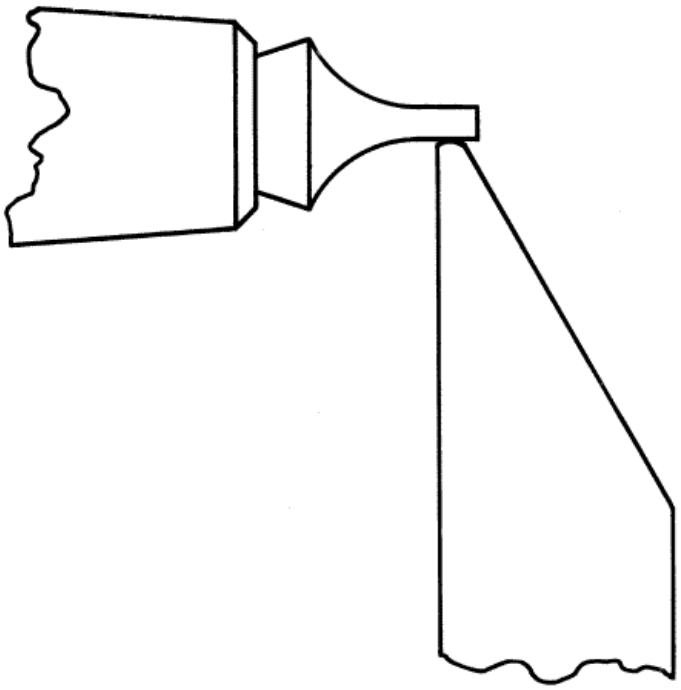
MANIPULATION

A level place to set the poising tool should be selected. As a rule the work-bench is level, but this should be proved

so by means of a carpenter's level. After the tool has been leveled both of its jaws and both pivots of the staff should be carefully cleaned with a small piece of pith in order to make sure that they are perfectly dry and clean. The jaws should then be adjusted so that they are the right distance apart for the balance that is to be worked upon. This distance should always be such that the ends of the pivots rest about in the middle of the jaws as shown in the illustration.



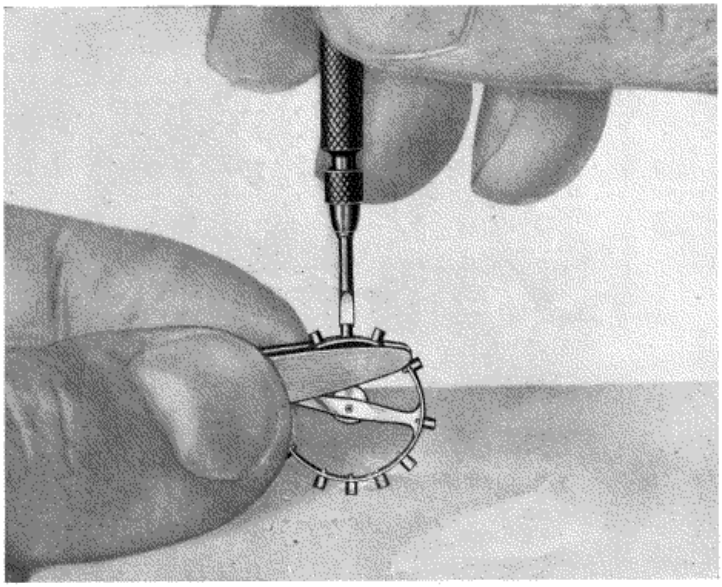
Balance in Position on Poising Tool



Proper Position of Pivot on Jaw of Tool

When first placed in position as shown in the sketch, the balance will usually start to rotate. This movement may be hastened by tapping the base of the tool or the bench near it with the tweezers. When the balance finally comes to rest the screw that is heaviest will be at the lowest point on the balance rim. Observing carefully the exact location of the screw which is to be worked upon, remove the balance from the tool and place it between the jaws of

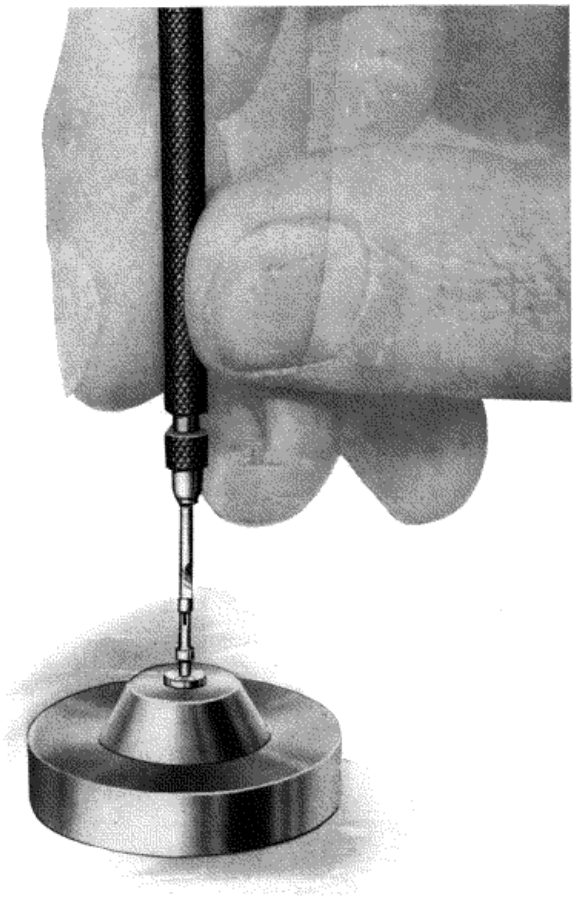
the boxwood tweezers in such a position that the heavy screw is in front.



Balance Held in Tweezers; Removing Screw

Holding the balance firmly in the boxwood tweezers with one hand carefully remove the heavy screw, using for the purpose the screwdriver having a suitable blade. Transfer the screw to the correct sized undercutting tool which has previously been selected and fastened in its stand. Turn the screw carefully until a

small amount of stock has been removed, then replace the screw in the balance.



Undercutting Balance Screw

BE VERY CAREFUL TO REPLACE THE SCREW IN THE SAME HOLE FROM WHICH IT WAS TAKEN.

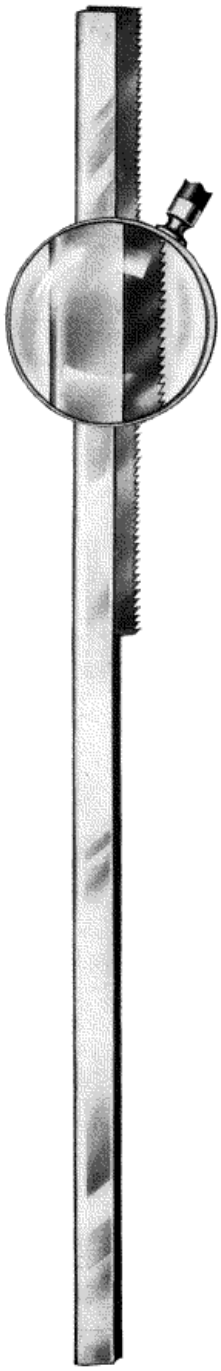
Continue this operation until the balance will not rotate even though the base of the poising tool be tapped repeatedly. The balance screws after having been undercut should not be screwed in place too tightly for if this is done the thin wall of the screw head may be broken down and thus give the balance an unfinished appearance.

Should the balance rotate but very little, even with repeated tapping, it is of course necessary to remove only a small amount of stock. This is done by cutting the screw slot deeper, using a thin, fine toothed saw for the purpose. These saws when obtained from the dealers are about 6 inches long by ½ inch wide and between eight and ten thousandths of an inch in thickness and have teeth on both edges.

As this size is rather unwieldly the saw is usually split lengthwise then broken in two, making four smaller saws having

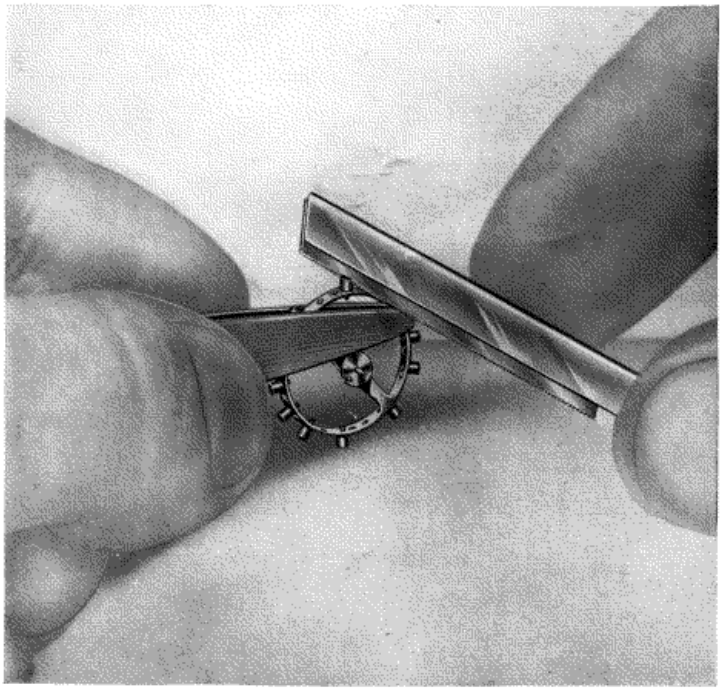
Elgin Service Bureau Bulletin

Thin Wide Saw



Saw in Metal Back

teeth on one edge only. For convenience in using, one of these small saws should be mounted. A very satisfactory mounting can easily be made from a strip of tin about 6 inches long and ⅜ inch wide bent double. The saw may then be put in one end of the slot so formed and the mounting clamped up in a vise which insures the edges coming together perfectly straight, thus keeping the saw straight.



Poising by Saw Method

This backing not only makes a very satisfactory handle but prevents the saw from buckling while in use.

When using the saw the heaviest screw is first found as before. The balance is then grasped firmly in the boxwood tweezers and the heavy screw turned if necessary until the slot is at right angles to the edge of the balance rim.

After the slot has been deepened slightly by means of the saw, be very careful to see that the screw is turned back into its original position before again testing the balance for poise.

In conclusion we would say that while the operation of poising is a very delicate one, skill in it can soon be obtained by application and experience. THE SERVICE BUREAU will gladly answer inquiries from readers who desire any additional information on this subject.

Elgin Service Bureau Bulletin

BULLETINS treating of the following subjects have been issued by THE SERVICE BUREAU:

Balance Truing.
Main Springs.
Cleaning and Oiling.
Balance Poising.

The Balance Truing Bulletin has been revised, several useful points having been added. Should you desire a copy of it or of the others we will be pleased to supply them upon application.

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ELGIN, ILLINOIS