Master WATCHMAKING

SHOP TRAINING JOB GUIDES

LESSON 1

Fundamental Principles, Equipment, Casing

—

Sections 1 - 40

CHICAGO SCHOOL OF WATCHMAKING

2330 N. Milwaukee Ave. • Chicago 47, Illinois

this page intentionally left blank

MASTER WATCHMAKING

A Modern, Complete, Practical Course

CHICAGO SCHOOL OF WATCHMAKING

Founded 1908 by Thomas B. Sweazey

Lesson 1

Sections 1 to 40

Lesson 1. — Fundamental Principles, Equipment, Casing Watches

Section 1

IN Watchmaking as in any vocation, your degree of success will come according to your love for the work and the amount of time and labor you are willing to put into it.

To the man who likes things mechanical and takes pride in doing his work just a little bit better than the other fellow, there is a fascination in Watchmaking difficult to describe to the uninitiated, and an opportunity for financial returns which few outsiders appreciate.

No matter how long he has followed this trade, there is always the greatest satisfaction to such a man in seeing a fine timepiece again functioning properly, the result of his own skill in taking it, a broken or abused movement, utterly useless, and restoring it to its original condition.

However, such skill can be attained only by conscientious effort, wisely directed, and an irrepressible determination to "make good".

The success of my resident school has been due largely to my having been able to direct each student, to see that he followed the instructions exactly, mastering each step or problem before being allowed to advance to another, and worked diligently all the time he was in attendance.

If you are willing to give the same amount of conscientious effort that you would be compelled to give were you in a first class resident school, I see no reason why you cannot make the same degree of progress.

Sec. 2 — Method of Studying the Lessons

My endeavor has been to make this course so simple that a student with no experience in this line, one who has never seen the inside workings of a watch, may follow with ease every step from taking the movement out of the case to the matching of the escapement in a modern timepiece. Not only will he understand it but if he performs each operation until he has really mastered it, he will be surprised at the progress he makes and the ease with which he is able to do work that would now seem utterly beyond him.

The mere act of reading these lessons as you would a work of fiction will help you very little in attaining a mastery of Watchmaking. They should be studied by taking one problem at a time, never leaving this one until it is thoroughly understood and mastered.

The first step should be to *read carefully the entire lesson* endeavoring of course to understand every portion of it. If any part should not be entirely clear, start again at the beginning and read until you come to the first point that seems the least particle confusing. Such confusion is generally caused by misunderstanding some previous paragraph, and in order to clear this up it will be necessary for you to go back to the beginning and over the entire preceding paragraphs of that particular subject.

This rule should be followed with all your lessons. If necessary study them over and over. The same method should also be followed in doing the practical side of the lessons. Whatever you may be doing, fitting mainsprings, cleaning, jeweling, turning, assembling — if at any point you see where you can improve it, start again and when you come to that certain part, make it better. This should be your constant aim, to always improve the quality of your work.

In this practical work don't be satisfied when you have merely succeeded in doing the work once. Do it until you are expert in that particular thing. If you are putting a mainspring in a barrel do it over and over until you can almost do it with your eyes shut. In this way you not only get ability to do good work but you acquire speed as well.

One of the advantages of our method of studying this fascinating subject is that you are not held back by some other student. You are in a class by yourself and your progress is determined entirely by the way you apply yourself to the work. One thing I want you to guard against. Right at first there is a tendency to rush your work — in other words trying to get it out quickly without really keeping up to the standard that I want. Just remember that to make a success you must first master each step in every job and then your speed will come with practice. *The man who aims at perfect work soon surpasses the man who merely works to get his job done.*

Sec. 3 — Watch Repairing

The average man associates the word Watch with the combination of the watch movement and the case in which it is carried. These two are separated into two classes by those who are engaged professionally in this line, and the work of making and repairing them differs greatly, the man who works on watch cases being known as a casemaker while the workman who specializes on watch movements is known as a watchmaker.

By the term watchmaker throughout the jewelry trade, is meant one who repairs rather than one who actually manufactures watch movements. In the present day, watch factory methods have reduced the making of watches to a point where the factory worker generally specializes on one operation, working on some certain part, and it may be not even knowing what office that part performs in the completed watch.

Such a worker might be an expert in his one specialty on one make of watches — in fact he is a "factory expert" — but as a watchmaker in the true sense of the word he needs much further training. The factory man even in most advanced work, works only on one make of watch and that in the latest model while the Master Watchmaker must be able to repair any make of watch, Swiss or American, regardless of age or model.

In our lessons, Watchmaker refers to the repairer of watch movements. However, the man who really wishes to qualify as an expert must be able to calculate and make some of the parts, and thoroughly understand the relations and actions of the different mechanisms that go to make up the complete watch.

Sec. 4 — First — Master the Larger Sizes

In these instructions we will divide the work into two general groups, POCKET WATCHES and WRIST WATCHES, and all our preliminary work will be upon the pocket watches. The mechanism of these two groups is of the same order, the parts of wrist watches necessarily being smaller and more delicate than are those of the larger pocket watches.

Do not attempt to work upon wrist or bracelet watches until you have thoroughly mastered the pocket size watches. I know that after you are able to do the work of the first few lessons on large watches there is a great temptation to try your hand upon the small sizes, but if you will hold off until you have acquired the proper skill in handling small parts, you should then have no difficulty in repairing the small size watches for which the experts get such big prices.

Sec. 5 — Table or Bench

The repairing of watches is a clean occupation so that it is not necessary for the prospective Watchmaker to don overalls or go out to the garage to practice his chosen profession.

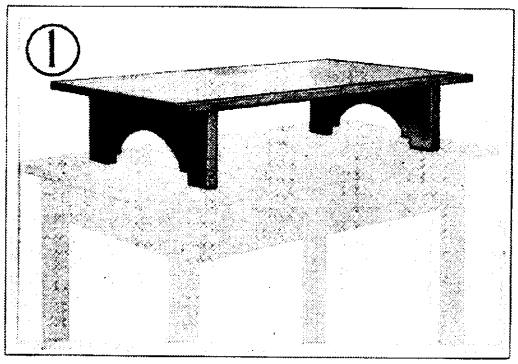
It is essential that you have a bench or table of some kind on which to work. The kitchen, library or dining table is from 30 to 31 inches high and for fine work is too low for a comfortable position. It is most important that you have a working surface of the correct height from the floor if you are to do your work without tiring. With the top of your bench at the right height and a chair or stool to match, it is possible to work for long periods without fatigue.

Sec. 6 — Watchmakers Auxiliary Home Bench

In our resident school, especially among the night students, I found a demand for some kind of a portable bench for home work. Owing to the fact that many of our students were staying with private families where there was not much room to spare, it was necessary that it occupy as little floor space as possible without sacrificing the size of its working surface.

This idea of an auxiliary bench to be used in connection with a table occurred to me and the model shown in figure 1 was thus developed. This has proven most convenient for the beginner who does not wish to invest in a regular watchmakers bench. By using it on top of a dining room table, a library or kitchen table it is possible to have a real practical bench of the correct height, strong and durable yet light

enough to be lifted easily on and off any convenient table.



There are two supports which bring the surface to just the right height to make the most comfortable working position and these supports are protected by felt pads so there is no danger of marring the finish on any piece of furniture with which it is used. Its solid top is finished with a groove near the front edge as are the most expensive watchmaker's benches. It is large enough to mount a watchmaker's lathe with motor, yet easily stored in a small closet when not in use.

All in all this Auxiliary Home Bench makes an ideal accessory for Watchmakers and is recommended not only to our students in their home work but also to the Master Watchmaker who wishes to have a portable bench which is accessible at all times for any extra work he may wish to do at home.

Sec. 7 — The Master Bench

For those who wish a Master Watchmaker Bench, I would recommend the model shown in figure 2. Here is a bench that is an ornament to any home or store, beautifully finished, with ample storage space — one that will last for a life time and serve you well.

This flat top bench has eight drawers and a compartment with door in lower right hand corner. Underneath the long center drawer can be seen the "apron slide", A in figure 2. This is a frame on which should be tacked a canvas, muslin or oil cloth bottom. The purpose of this apron is to catch anything which may slip off the bench or from the hands while seated at the bench.

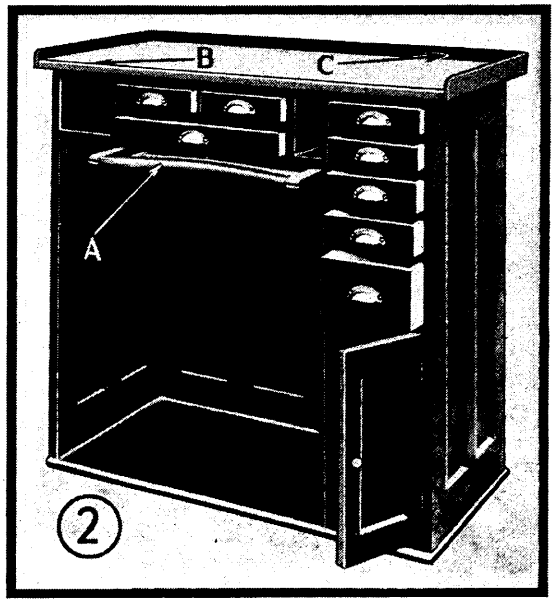
About ⅜ of an inch from the front edge of the top at B is a groove running the entire length of the bench. This groove catches many small pieces that might otherwise roll off. The other three sides of the top are protected by solid guard rails as shown at C.

This bench also can be furnished with drawers all the way down on the right side which some watchmakers prefer to the cupboard-like arrangement shown here.

Sec. 8 — Working Surface

The top of a bench does not present the best kind of a surface to work upon. It is much easier to see and work against a white background avoiding as much as possible any glare. Some Watchmakers use a piece of glass with white paper underneath but this is not always satisfactory as the hard surface of the glass is liable to damage certain parts of the watch if they are dropped upon it and there is more or less direct reflection of light, causing glare, unless it is ground glass. Others use a sheet of paper such as linen surfaced writing paper. This however, is soiled or torn easily and liable to rub into a sort of lint which has a tendency to stick to the watch parts.

I have found a much better working surface to be a flat piece of fairly heavy white celluloid with a matte or dull surface. It is not necessary that this cover a large portion of the bench. A piece 8 inches long and 5 inches wide is large



enough and placed directly in front of you when seated at the bench and with the front edge flush with the back edge of the groove will be found most satisfactory. Test by trial the best location for you to work upon and then tack to the bench. Should the celluloid become soiled it can be cleaned easily with soap and water.

Do not lay any heated objects upon the celluloid and be careful not to get a flame too close.

Sec. 9 — Keep Your Bench In Order

A standard bench is provided with drawers in which to keep your tools and these should be placed and arranged so that you will know where each tool is and can reach it with the least effort. It is a good idea to have the drawers partitioned into various sized compartments.

In place of partitions you can use different sizes of pasteboard boxes. If boxes are used, see that you have enough to completely fill the drawer so that they cannot shift around. In the upper center drawers place your most used tools such as tweezers, screw drivers, bench keys, calipers, gauges, etc.

With the exception of tweezers, screw drivers, loupes or other tools which you are constantly using it is well to get in the habit of replacing each one in its proper place as soon as you are through with it. Not only does a profusion of tools scattered over the top of your bench make a bad impression upon your customers but it tends to slow you up as well. Train yourself to be systematic in all your work. Have a place for everything and then see that everything is in its place. When you leave your bench after a day's work see that all the small tools are cleared away and then when you start work the next day, take out these tools only as you need them.

Sec. 10 — Proper Light

Whatever you use, bench or table, try to have it located near a well lighted window. It is better to have a good natural light, North preferred, than to depend upon any artificial light.

If you find it necessary to use artificial light do not use it too strong. A 40 or 60 watt frosted light is strong enough and will not dazzle and tire the eyes as a stronger one will.

This should be so situated that the light will shine directly on the work but not into the eyes. Where electric current is available this can be arranged by means of an ordinary desk or bench lamp with shade.

Sec. 11 — Height of Seat

Nearly all beginners use too high a seat while working. With a stool or chair too high the body must assume a stooped position which proves tiresome within a comparatively short time.

The standard height of the watchmaker's bench is 38 inches and for the average man an ordinary straight back chair with a seat seventeen or eighteen inches from the floor proves very satisfactory when used with such a bench. At first this may seem a trifle low but after one gets used to it, he can work much longer without fatigue than with a higher one.

While working at the bench the apron should be drawn out until it touches the body and the elbows may rest upon the frame work of the apron slide. This allows the body to assume an easy position and brings the work in just about the right location to be examined and observed.

In the more advanced work when using the lathe, extra height should be added to the chair or stool to make it about 22 inches from the floor. This may be in the form of a pad five inches thick.

Many workmen at the bench use an ordinary four legged stool of a height best suited to their own individual needs.

Sec. 12 — Pocket Watches

The first watches seem to have been made about the year 1500. About 1587, Watchmaking as an industry was introduced into Geneva, Switzerland by Ch. Cusin although a few watches had been made in Switzerland previous to that date. Enamel dials were invented in 1635 by Paul Viet, a Frenchman. The balance spring was invented in 1658.

Until 1687 watches had been made with only an hour hand but at this time the minute hand was introduced. However, the minute hand had been used in clocks as early as 1610.

About 1700, jewels as bearing for the pivots came into use. The compensating balance was first introduced in 1749.

About 1780 the second hand came into use.

The earlier watches were all hand made, each watch with its case presenting an individual problem.

Sec. 13 — Sizes of American Watches

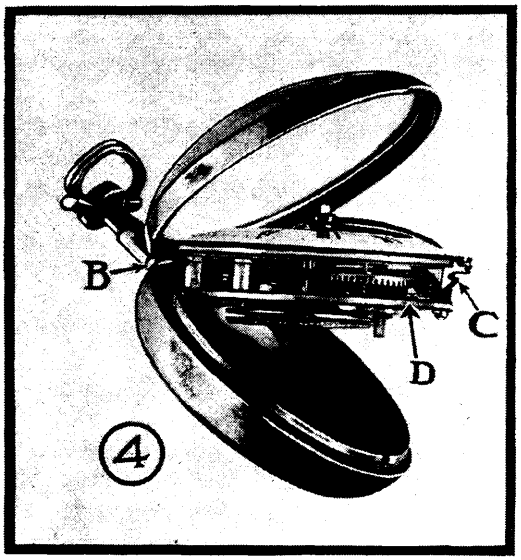
In 1849 Aaron L. Dennison an American Watchmaker began to build machinery for manufacturing watches on the interchangeable system.

In order to do this successfully it was necessary to have certain standard sizes and some system for determining these sizes. Mr. Dennison has been credited with having originated

the method for sizing that has become a standard for American manufacturers of watches. His system was based upon the English inch and thirtieths of an inch.

The first watch made by Mr. Dennison and his associates of the American Horologe Company was 18 size and this size was determined by taking one inch and adding 6|30 of an inch for "fall", then each additional 1|30 of an inch formed a size. Thus the 18 size watch would measure one inch, plus 6|30, plus 18|30 which equals one and 24|30 inches the full diameter of the watch measuring on the pillar plate.

This so called allowance for "fall" was borrowed from the English. The English Watch Movements were usually hinged to the cases as shown in the Old English Verge in figure 4, and



the top plate, indicated by the arrow D was made enough smaller in diameter to permit the movement to "fall" or drop into its position in the case without striking.

In the American sizes from 16 size down to naught (0) size, only 5|30 was added for fall. Thus a 16 size movement measures one inch, plus 5|30 (fall) plus 16|30 (for size) equals 1 21|30 inches. 12 size measures 1 inch, plus 5|30 plus 12|30 equals 1 17|30 inches etc.

Thus was begun the making of watches to standard sizes, and as a natural sequence the making of parts that were of standard sizes and interchangeable in watches of the same make and like models.

This first factory was started in Boston and in 1854 was moved to Waltham, Mass.

Some idea of the wonderful strides that have been made, can be obtained when we learn that in 1854 this factory was employing ninety hands and making about five watches a day.

Today by means of improved methods and automatic machinery some of which almost seems human in its work, one of the leading factories has a capacity of over 4500 watches a day, while employing over 4000 people.

Sec. 14 — Swiss Watches

The Swiss manufacturers lagged behind the American in their adoption of automatic machinery and the making of interchangeable parts. It has been but a comparatively few years since it was no uncommon thing to find in the same Swiss watch, train bridge screws of different sizes — even different pitch of thread.

It was customary in taking apart these older Swiss movements to have a *"screw stand"*, consisting of a round plate drilled with a series of holes into which the workman placed the screws in the order in which he removed them so that when he assembled his watch, the screws could be replaced in their proper holes without confusion.

In the modern Swiss watches as made by the leading factories this fault has disappeared and the factory material is now on an interchangeable basis, making it possible to get material and parts for these watches as well as for American.

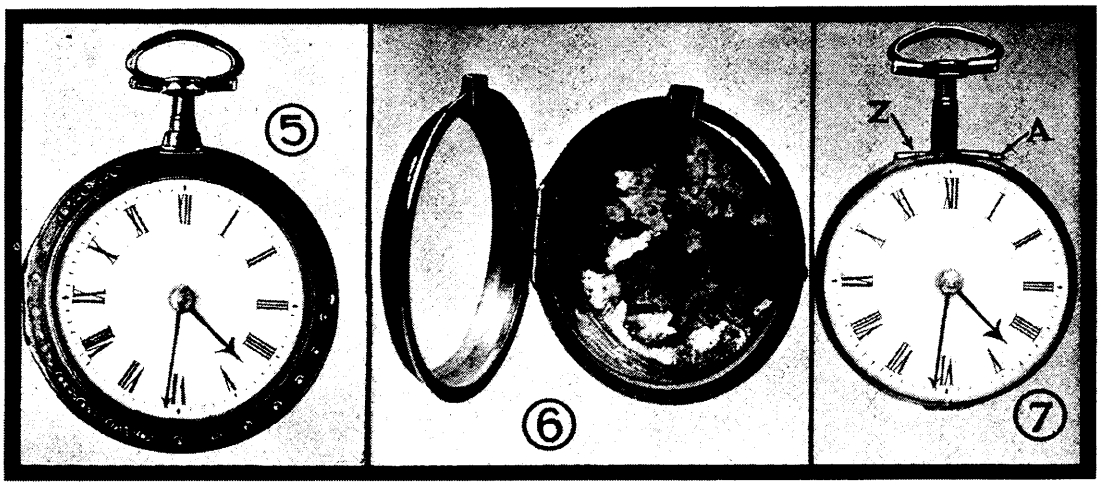
As the interchangeable feature of Watchmaking came into its own, the manufacture of cases came to be independent of the Watch factory, so that today the manufacturing of cases is an entirely different industry from that of manufacturing watch movements.

Sec. 15 — Casing of Pocket Watches

The older pocket watches were cased in double cases consisting of an inner and outer case. In figure 5 is shown an old English Verge movement in such a pair of cases.

The outer case closes with a snap fit and is opened to the position shown at figure 6 as we would a modern snap case. The inner case containing the movement fits into this outside part and can be lifted out as in figure 7.

The movement is hinged or jointed to this inner case by the same pin which connects the two parts of the inner case. At Z in figure 7 is shown this joint with its pin protruding from the other end at A. At B in figure 4 is shown the joint when this case is opened.



At C in figure 4 is shown the catch which holds the movement in the case and this catch must be pressed in order to lift the movement to the position shown in figure 4. To take the movement entirely out of the case it is necessary to push the pin from the joint at A in figure 7, this being the same joint shown at B in figure 4.

Sec. 16 — Case Screws

In the American system of casing movements, the movement was not jointed to the case but held in place by means of case screws.

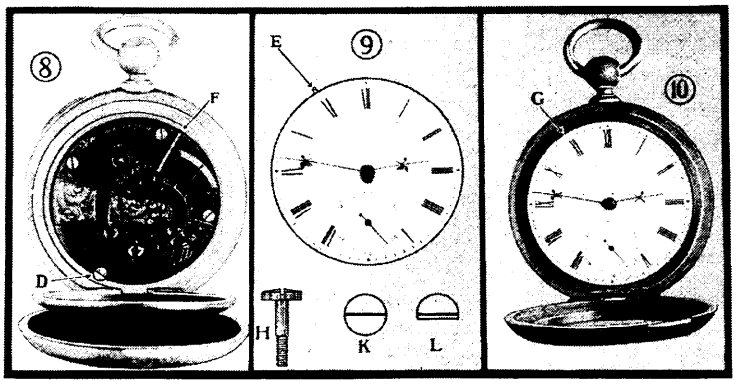
These case screws at first were merely short screws similar to pillar screws and screwed into the top plate so close to the outside edge that the heads projected far enough outside the plate to catch on the case and thus hold the movement in place. At D in figure 8 is shown such a case screw.

and directly under the point of the arrow F in figure 8.

This pin also served another important purpose. By means of it the movement was always placed in the case in a fixed position so that the figure 12 on the dial was in exact line with the center of the pendant as shown in figure 10.

Sec. 17 — Half Head and Full Head Case Screws

Next the case screws were made long enough to extend through the top plate and threaded into the lower plate. These screws were made with half heads, so that by turning the screw half way round, the movement was released and could be taken out of the case. These half head screws however, being of tempered steel, had the effect of a milling cutter and in some instances by much use, the screw would cut through the softer metal of the case making it necessary to put a washer under the head of the



In the lower plate, that is on the dial side of the movement, was placed a pin, E in figure 9. This pin fitted into a hole drilled in the case directly under the point of the arrow G in figure 10. In this way the movement would be held in the case at two opposite points, the case screw at D and the pin which would be on the dial side

screw in order to hold the movement in the case.

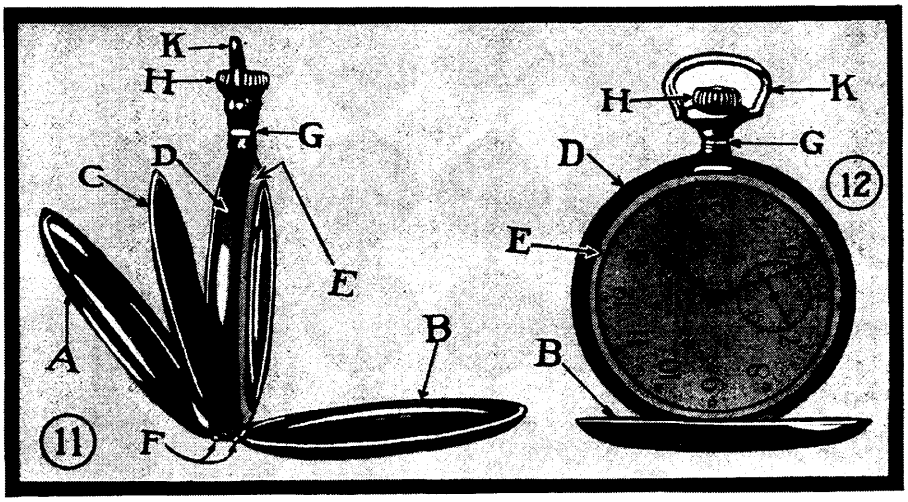
This cutting of the case by the half head case screws has been overcome by using full head screws instead, and with this style it is best to take the screw entirely out before removing the movement from the case.

By half head is meant a screw in which nearly half the head is cut away. Full head screws are those in which the heads are left full round as the screw at D figure 8.

At H in figure 9 is a drawing of a full head case screw. At K is shown a full head screw as it appears from above and at L a half head.

Sec. 18 — Modern Casing

Formerly the retail dealer in American watches was accustomed to buy separate movements and cases and then do his own "casing" by which is meant the fitting of the watch movement to the watch case. In American watches this "casing" was not at all difficult on account of the precision with which both the movements and the cases were made. Thus it would require very little skill to fit any standard American



made 16 size open face movement into a 16 size open face case made by some other American manufacturer — sometimes in pendant set movements a slight alteration in the stem or adjustment of the sleeve. In lever set movements it might be necessary to file a slot in which the lever could slide.

The Swiss movements, cased in American or Imported cases, presented a more difficult problem on account of their lack of being standardized to the extent that the American products were.

Now nearly all American and Swiss movements are being cased by the manufacturer or importer, coming to the retail dealer ready to be delivered to his customers so that the watchmaker has less of this work to do than formerly. However, it will be necessary for you to do some casing in any store but by understanding the relationship of certain parts which will be explained to you, this work should offer very little difficulty.

Sec. 19 — The Hunting Case

Formerly the Hunting Case was popular in both men's and ladies' watches, but today the favorite in all sizes is the Open Face. By Hunting Case we mean that kind of a case with two lids or backs as shown in figure 11, one of which, on the dial side, can be opened by pressing on the crown at H.

The different parts that make up a Hunting Case are as follows: the two backs A and B in figure 11, B on the dial side in the language of the casemaker known as the "front back" and A as the "back back". Generally this is shortened to "front" and "back".

C is the "cap".
D is the "center".
E in which the watch glass or crystal is fitted is the "Bezel".

The two "backs" are hinged to the "center" by what are known in the trade as "joints" as shown at F.

The "cap" also is connected to the "center" by means of a "joint".

The "bezel" is snapped on the "center".

G is the "pendant".
H is the "crown".
K is the "bow".

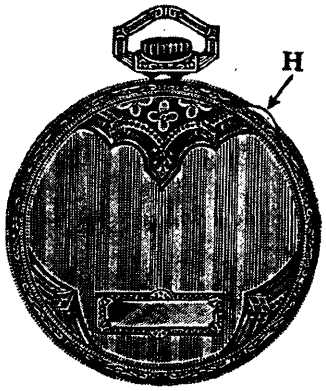
The "stem" by means of which the watch is wound is attached to the "crown", generally being screwed into that part so that the "crown" and "stem" act as one solid unit.

In figure 12 is shown a dial view of the Hunting Case with front opened. In this photograph the letters represent the same parts as in figure

11. Thus the arrow D indicates the center, B the front, K the bow, H the crown, G the pendant, and E the bezel.

Sec. 20 — Open Face Cases

The Hunting Case is rapidly becoming a thing of the past, the open face case now being the



13

only style of pocket watch that is carried by modern retail jewelers. However, like other older time-pieces there will be some Hunting Cased watches brought to the watch repairers for a long time to come.

Like everything else there is a constant evolution in the styles of watch cases. Some of these changes are brought about in a comparatively short time as when the ladies' bracelet watch was introduced. Others come much more slowly as the change from the Hunting style to the Open Face. Of late years there has been a tendency toward pocket watches of more distinctive shapes and designs as compared to the round shapes that have been standard for so many years. Manufacturers have recognized this tendency and created a variety of new and interesting patterns. Some of the popular shapes are the Pentagon or five sided, the Octagon or eight sided, the Decagon or ten sided, the square and cushioned shaped cases, all of these in open face models.

Sec. 21 — Assembling "Snap" Cases

In Open Face cases the bezels and backs are assembled either by having them threaded and then screwed into place or by having such a close fit that it is possible to snap the parts together. This latter style is known as a "Snap Case".

In some snap cases the back and bezel are jointed to the center while in others they are entirely free.

When the back and bezel are jointed to the center, the case would then be much like the Hunting Case shown in figures 11 and 12, if the cap and bezel were removed and the front was cut out to take a watch glass or crystal.

When the back and bezel of a snap case are attached to the center by joints, they of course always will occupy the same position when snapped together, but where the bezel and back come off entirely it is necessary to have some means of replacing them as they were originally, especially on engraved cases in order that the engraving may be in the position intended by the manufacturer or engraver.

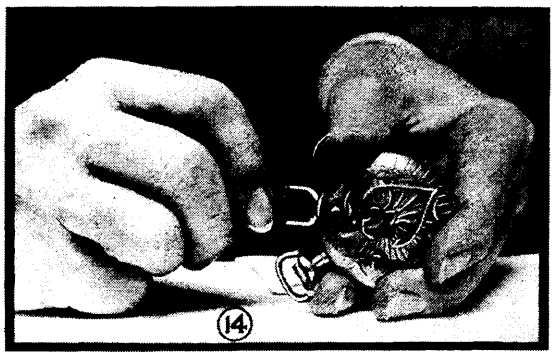
Sec. 22 — Position of the Lip

In this style of the regular round case there is generally a lip for the case opener to rest against or if not a lip, a small cut out place to facilitate the entering of a case opener or other wedge shaped object.

In replacing a back and the same of course applies to the bezel, this lip or cut out should be a little to the right side of the pendant as shown at H in figure 13.

As stated before this lip is for the purpose of inserting a thin blade, such as a case opener, in order to pry open the case.

In figure 14 is shown the manner of holding a case when opening it with a case opener.



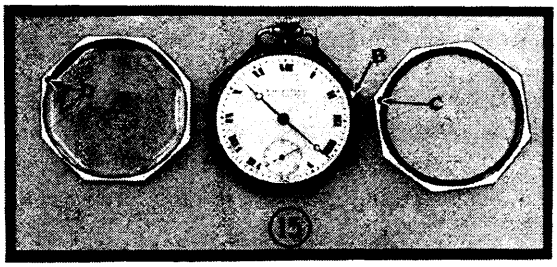
14

The case opener which is thin at the edge is inserted between the center and back and by means of a twisting motion pries open the case. Care must be used in order that the edge of the case opener does not come in contact with the movement caused by using too much pressure or that it doesn't slip across and mar the case.

Sec. 23 — Assembling Fancy Shaped Cases

The Fancy Shaped Cases come under the class of "snap cases" and are generally pro-

vided with a key or pin on the center which fits into a "key seat" or opening on the bezel or back.



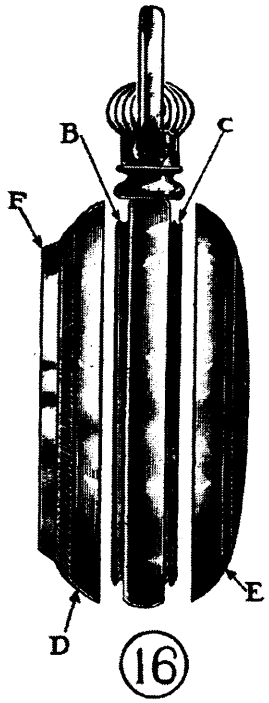
In figure 15 is shown a movement in an octagon shaped case with the bezel and back removed from the center. At B is shown the key on the dial side and at C is shown the key seat on the bezel.

In replacing the bezel it is necessary that the key seat be exactly over the key.

On the other side of the center there is a similar key which fits into the key seat on the back shown at D.

Sec. 24 — Screw Bezel and Screw Back Cases

The screw bezel and screw back case is one of the most common styles used in open face pocket watches.



In figure 16 I have purposely used a cut of an old style heavy screw bezel and back case in order that you may see more easily the method of assembling it.

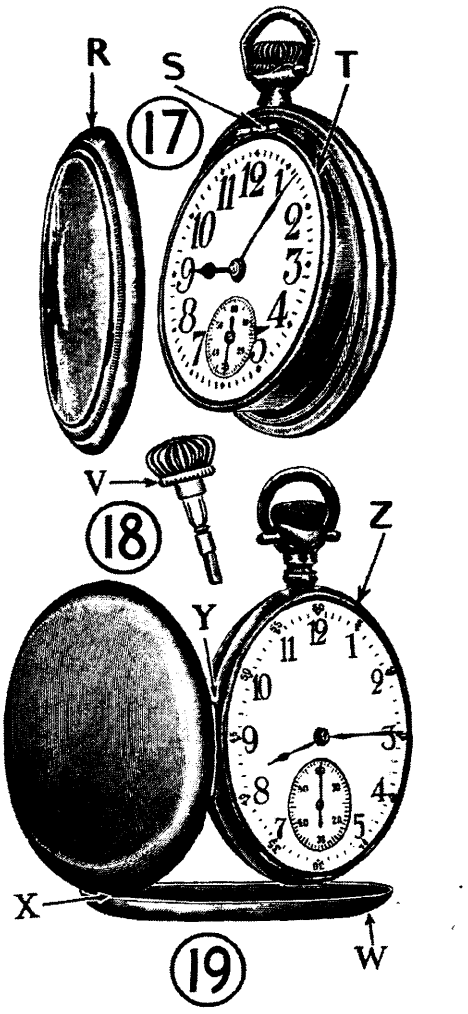
As you can see from the drawing the "center" is threaded on each side at B and C. In assembling the case the back E is screwed up tightly on thread C and the bezel D, into which the glass F is snapped, is screwed on B. Each of these is a right hand thread.

The screw bezel and back case is generally abbreviated by the manufacturers and jobbers as S. B. and S. B.

Sec. 25 — Swing Ring Cases

Figure 17 shows a swing ring case. In this the back is solid — in other words the back and center are all in one piece while the bezel R is a Screw Bezel.

The ring T into which the watch movement is fitted is jointed to the case at the point S and in taking out or replacing the movement it is necessary to swing the ring out much further than is shown here to get at the case screws and to do this it is necessary to first pull the stem out to the setting position. At the lower edge of the ring you will find a groove or lip in which to place the edge of your case opener. This is necessary as the swing ring fits closely and the edge being flush with the case is hard to start otherwise.



Even then there may be a slight sticking as it is opened due to the stem holding in the movement. If so, you may be compelled to twist the stem back and forth by means of the crown, at the same time pulling out on the swing ring.

In figure 18 is shown a dust proof assembly of Crown, Stem and Sleeve, which is used in many Swing Ring Cases.

At V is a nut which screws down on the *outside* of the pendant of the case. Inside this nut is a leather washer which together with the

solid back makes this style case practically dust proof.

In making any adjustments in the position of the sleeve or to remove the stem and sleeve it is first necessary to unscrew the crown from the stem and then the nut V from the pendant.

Figure 19 shows a case in three parts in which the bezel W is jointed to the back at the point X. The movement holding ring Z to which is attached the pendant, is jointed to the side of the back at Y which permits the movement to be easily fitted. This is a snap case.

Sec. 26 — Practical Elementary Training

When a watch comes to you for repairs it is already cased as a general rule, so that your first step in making the necessary alterations or replacements will be to take the movement out of the case.

It is necessary that you understand the various types of cases that have been shown in this lesson because in your work as a Watchmaker you will be called upon to take movements out and recase them in all these styles.

Another necessary step is to have the proper tools for each problem that comes up and then practice until you are really competent to use them in a professional way. It hardly pays to attempt to do this work with poor tools.

The real expert would be greatly handicapped in attempting to do the quality of work expected of him if compelled to use inferior tools, and the beginner is often discouraged without realizing how much easier it would be to do his work provided he had the right equipment. For that reason I have selected just the ones that I have found to be best suited for each particular class of work and advise you to provide yourself with these sets. Get them in perfect order — do not attempt to do your work with second hand tools of whose condition you are not yet competent to judge.

Sec. 27 — Your First Job

In your elementary work it is best to have as your first practice watch, one that is not too valuable and also one that is fairly large, in order that the parts may be as strong as possible. By this I mean a standard grade of watch, not the cheap clock watches that are found on the market.

Although the 18 size watch is rather out of date as far as being sold in the modern retail jewelry store, there are still many of this size in use and they no doubt will be brought in for repairs for a long time to come.

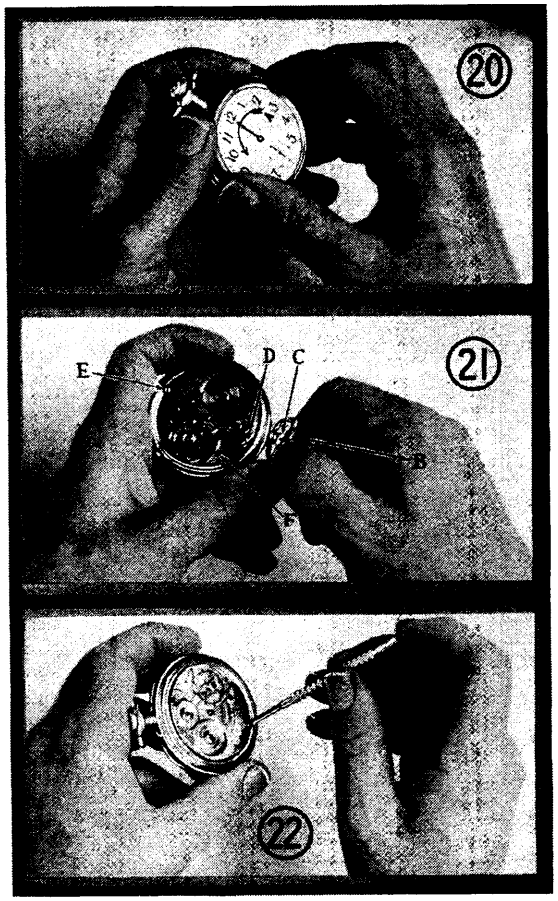
It should not be difficult to secure one of these larger style movements, and owing to its size this is a nice model for you to use in your first problem of taking out and replacing a movement in its case.

However, if you do not have access to such a large watch, a 16 size or 12 size will do, but I would advise you not to use smaller than 12 size on the first few lessons.

If it is pendant set, the same watch may be used in several of the lessons that follow, but if possible it is better to vary the make of watch on which you practice, so that you may become acquainted with the models made by the different factories.

Sec. 28 — Remove Bezel and Back

Starting at the beginning the first step will be to remove the movement from the case, and in order to do this, take off the bezel and back. In unscrewing a bezel hold it in the position shown in figure 20, twisting the bezel to the



left in the direction of the arrow A. Turn the watch over and do the same thing to the back. Our watch then will appear as shown in fig. 21.

If instead of a S. B. and S. B. your first job

should be upon a jointed case then of course you merely open front and back with your case opener.

In all probability this watch will have a pendant set movement, but whether pendant or lever set, in order to take it out of the case it will be necessary to pull out the stem to a pendant set position by grasping the crown as shown in figure 21 and pulling straight out in the direction of arrow B.

Sec. 29 — Cases Without Sleeves

In some of the older style cases for *lever set* movements where there is no sleeve, you will find a screw in the pendant of the case at a point indicated by the arrow C figure 21 which fits in a slot in the stem, thus holding the stem in proper position. In such a style case it is necessary to back this screw out far enough to allow the stem to be withdrawn from the case by means of the crown and then it is an easy matter to slip the movement out.

Sec. 30 — Using a Screw Driver

At this point it is well to test your ability to manipulate a watch screw driver.

The head of the screw driver turns freely on the shank so that by placing the first finger on this head and holding the shank between the thumb and second finger you can turn the shank and of course the blade with it, by merely rolling it between the thumb and finger. See figure 22.

At times where the screw is difficult to start some prefer putting the head of the screw driver in the palm of the hand and using the first and second fingers on one side and the thumb on the other to secure a little more leverage in turning.

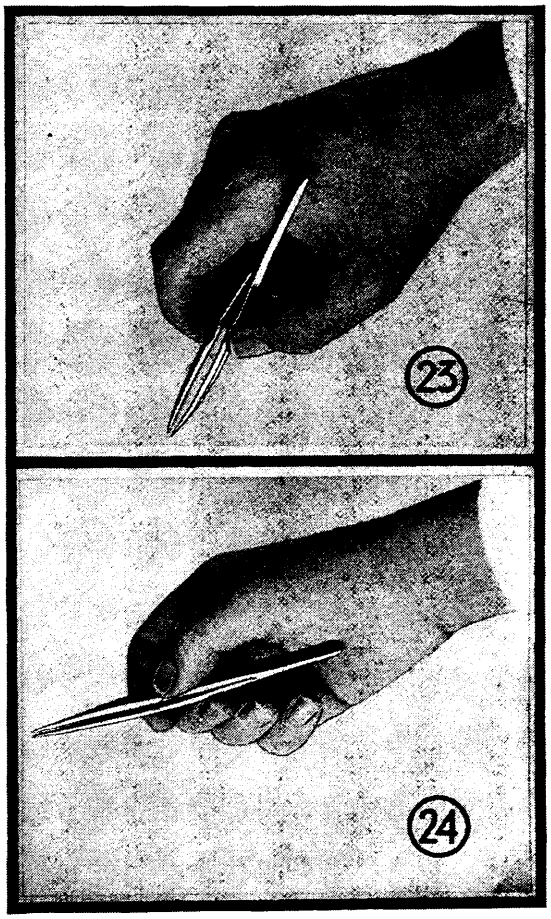
Sec. 31 — Selecting Proper Size of Screw Driver

In selecting a screw driver for any particular screw try to have the blade as near as possible the same width as the diameter of the screw head in order to prevent twisting the point of the blade or marring the head of the screw, also where a screw is in a recessed plate never have the screw driver any larger than the head of the screw, otherwise you will mar the plate.

Sec. 32 — Use Tweezers When Handling Watch Parts

Use the proper size screw driver and turn each screw D and E figure 21 until it is entirely free. Then with your tweezers lift each case screw out and place in your material tray.

The most common and natural way of holding the tweezers when manipulating any small object is as shown in figure 23. Here you can see the tweezers are held in much the same way that a pencil is held in writing. One side rests upon the second finger while the pressure necessary to hold an object is applied by means of the thumb and first finger.



Sometimes where more force is necessary as in pulling at some part that has become stuck, the tweezers are held inside the hand as shown in figure 24, the pressure being applied by means of the first and second fingers on one side and the thumb on the other. It is also more convenient at times, to handle the tweezers this way in holding small objects than as first described. Practice each method and you will soon find yourself using the one that is best adapted for the work you are doing.

Nearly all beginners use too much pressure on the tweezers. Use only enough to maintain the necessary grip when picking up or placing any watch parts or material. By using unnecessary pressure there is always danger of snapping the piece out of the tweezers.

At first it will seem awkward to handle small objects in this manner but with practice it will come easier until finally you will have no trouble in manipulating the smallest parts with tweezers.

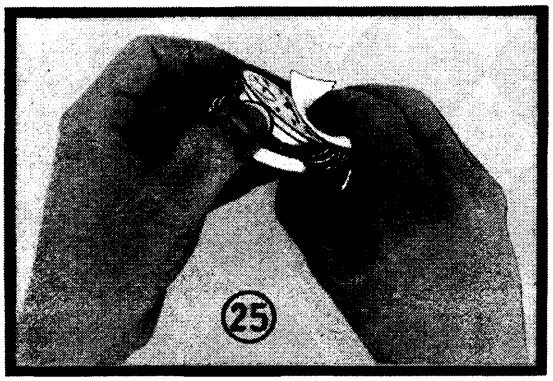
Sec. 33 — Taking Movement From Case

Having removed the case screws, a slight pressure on the movement usually will cause it to slip from the case into the hand held ready to catch it.

If the movement sticks slightly it may be forced from the case using the thumb nail of the right hand as shown in figure 25. By bending the thumb at the first joint in order to bring the nail in contact with the movement, rather than the ball of the thumb you avoid getting unsightly finger marks on the watch plate.

Sec. 34 — Do Not Get Fingermarks On Movement

Here let me warn you against getting finger marks on either plate or dial of a movement. When you press the movement out of the case, grasp it by the *edge*. Whenever you pick up a movement, pick it up by the *edge*.



In taking the movement out of the case, it is well to place a piece of watch paper between the fingers and the dial as shown in figure 25.

Sec. 35 — Use a Material Tray and Movement Cover

At the beginning of your work get into the habit of placing the small parts in some kind of a material tray or cup which you should have placed in a convenient position on your bench. When you remove the case screws place them immediately in your material tray.

While working upon the case, having removed the movement, should you allow the movement to set uncovered upon your bench it woud be liable to accumulate some dust and there is a risk of something falling upon it and breaking some delicate part. Therefore as soon as you take the movement out of the case it is well to set it in a material tray or on a piece of watch paper and cover it with the movement cover. In this way it is protected from any stray dust that may be in the air.

Sec. 36 — Polish the Case

Whenever you clean or repair a watch it is also necessary to thoroughly clean the case so that no dirt remaining may come in contact with the movement. In the lesson on cleaning watches I will give you in detail the best methods for cleaning the case but at this time it is not necessary for you to attempt such a thorough cleaning of the watch case on which you are working.

However it is well to wipe off all dirt or oil that may be on the watch case and then after being sure that it is dry, polish with a double polishing cloth.

This cloth has two surfaces, the inside or red cloth being for polishing and the outside cloth to protect the hands from this red color.

In using this polishing cloth see that the watch case is dry but if badly tarnished a slight moistening by blowing on the tarnished part will aid in restoring the original finish.

Of course in using this cloth to polish the case it is necessary to have replaced the back and bezel or in a jointed case to have closed the back and front.

Sec. 37 — Using the Polishing Cloth

Then by opening the polishing cloth as you would a book, placing the case between the two red sides, gripping the outside cloth in the hands and rubbing vigorously, you can restore the polished finish to a large degree.

This cloth can be used for polishing other objects in gold or silver such as jewelry, silverware, table ware and trophies. The red color is harmless and can be washed. If any powder remains on the surface of the object cleaned it can be removed by using the outside cloth. This will also give an additional polish.

Sec. 38 — Replace Movement in Case

After polishing your case remove the bezel and back, see that the crown is in the setting position then replace your movement in the case by starting the stem in the winding arbor and allowing the balance of the movement to slip easily into the case. In doing this keep the dial

side uppermost so there will be less danger of the movement falling out.

After you have the movement in its proper position, hold it in the left hand if you are right handed, with the nail of the first finger pressed against the dial side while gripping the case with the thumb and second and third finger, as shown in figure 26. Holding it in this position

turn the hand over so that the dial side of the watch is down. With your tweezers in your right hand pick up one of the case screws and place in position. Then with a screw driver turn this screw down until it is just holding the movement in place. Do the same with the other case screw.

Sec. 39 — See That Movement Is Centered

Before you screw the case screws clear down, press the crown into the winding position so that you will be sure to have the movement centered properly in the case. If you do not do this you are liable to have it slightly to one side with the stem going in at an angle which will make it bind somewhat while winding. Having the stem in the winding position before setting the case screws, turn the crown back and forth to see that the stem turns easily. If it does then set your case screws down in place. Case screws however, are not set as tightly as other screws in the movement. If too tight the heads are easily broken off by a jar that might not injure the movement. However do not make this an excuse for having the case screws turned into place too lightly. Turn down tight but not as far as it is possible to turn them.

Now examine dial and back of movement for finger marks, thereby gauging your ability to handle a movement without leaving such traces of an amateur. Replace the bezel and back on the case. Again try the winding and setting by means of the crown, wipe off any further finger marks on back or glass and credit yourself with having finished your first step in your progress toward becoming a Master Watchmaker.

Sec. 40 — Practice for Speed

The mere act of going once over the work described in each of the Master Lessons that are given you or the completing of the step by step methods shown in the Master Work Sheets does not make for finished skill in Watchmaking. If you are to be a Master Watchmaker you must have speed as well as ability and you must practice every problem described until you can do the work in the time specified on the Master Work Sheet. Some are able to acquire this speed with only a few hours practice while others must go over the work many times before being able to make the grade.

However you should realize that only by such effort can you attain the goal and that these problems once mastered are the real steps toward your success.

A watch is a machine; when it is right it will perform properly and not before. The man who works upon this machine should never slight any part, but should always strive to do his very best. Remember that you can never do your work too well.

First then, master the *How* of doing each proposition before attempting to acquire speed. After you are able to do your work as it should be done, practice each step over and over, never letting down on the quality. You will be surprised how easily the work comes after the first few problems if you will follow these simple directions and always strive to make each following job the best you have ever done.

TABLE OF CONTENTS: Unit WI - Lesson 1

JOB SHEETS

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W1-J1

CASING WATCHES: Open Face Case

TOOLS, EQUIPMENT AND SUPPLIES:

Assembly tweezers - Case opener - Screwdrivers

PROCEDURE	REFERENCE
A. HOW TO REMOVE MOVEMENT FROM AN OPEN FACE CASE	Les. 1
1. Remove bezel.	Sec. 28
2. Remove back.	
3. Pull out crown into setting position.	
4. Remove case screws	Sec. 30, 31, 32
5. Remove movement from case.	Sec. 33, 34, 35
B. HOW TO REPLACE MOVEMENT IN AN OPEN FACE CASE	
1. Replace movement in case.	Sec. 38
2. Push stem into winding position, replace case screws.	Sec. 39
3. Replace back and bezel.	

INFORMATION:

Markings generally used for Karat Gold - Gold Filled - Rolled Gold Plate - Silver and Stainless metals used in watch cases. "Karat" is a measure of fineness - 24 karat is fine gold. One karat equals 1/24, thus 14 karat gold is 14/24 fine gold and the balance of 10/24 is alloy. The usual alloy metals are silver, copper, zinc and nickel.

A. KARAT GOLD (abbreviations 10K, 14K, etc.)
Cases stamped 10 Karat (10K), 14 Karat (14K), 18 Karat (18K) are sometimes spoken of as solid gold cases. Colors of gold can be yellow, red or pink, green and white.

a. Red Gold (Pink gold)
Gold alloyed with copper.

b. White Gold
Gold alloyed with a white metal - usually nickel or paladium in sufficient quantity to efface the yellow color.

c. Green Gold
Gold alloy containing a relatively high proportion of silver.

B. GOLD FILLED (abbreviation G.F.)
This term refers to articles made of base metal, upon one or more sides or surfaces of which a shell of Karat Gold is affixed. The term "Gold Filled" is used when the karat gold covering the article is 1/20 or more of the total weight. For example: 1/10 - 14 gold filled.

C. ROLLED GOLD PLATE (abbreviation R.G.P.)
Same as gold filled, except for thinner platings. In both cases the gold must be of at least 10 Karat fineness and the fractional karat gold content must be shown. For example: 1/30 10K R.G.P.

D. GOLD ELECTROPLATE
Usually made by electrolytically depositing fine gold on base metal.

E. SILVER
Sterling silver contains 925 parts fine silver with 75 parts some other metal, usually copper. U.S.A. Coin silver is 900 parts silver, 100 parts copper.

F. NICKEL SILVER - GERMAN SILVER - SILVERINE - SILVEROID - ETC.
So called because of some color resemblance to the precious white metal, not because of any silver content.

G. STAINLESS METAL
Generally used for backs of watch cases using R.G.P. bezel or for water-resistant cases.

CASING WATCHES: Two-piece Wrist Watch Case

INTRODUCTORY INFORMATION

The most common case used for mens and ladies wrist watches. It is generally spoken of as a dress watch.

TOOLS, EQUIPMENT AND SUPPLIES

Case opener or bench knife

PROCEDURE

A. HOW TO REMOVE MOVEMENT FROM A TWO-PIECE WRIST WATCH CASE

1. Hold case with back up, crown toward you.

2. On the right end of the back of the case locate either a lip or groove. Pry upward at this point with case opener. Back of case containing the movement will snap free of the bezel.

3. The movement generally fits snugly into the back of the case and may be removed by jiggling the crown. If this does not free the movement it may be necessary to pry carefully upward on the protruding edge of the pillar plate with case opener or blade of bench knife. Care should be used so as not to damage train wheels, balance wheel or barrel which may have little clearance when movement is lifted from the back.

B. HOW TO REPLACE MOVEMENT IN A TWO-PIECE WRIST WATCH CASE

1. Set back of case on a block or similar elevation with stem slot to the right and edge of case back even with the edge of the block. (This is to prevent crown from resting on the block)

2. Place movement in the case back aligning stem with stem slot.
   NOTE:
   If crown is one of the various types of dust proof crowns, pull stem into setting position. Some movements are fitted with a dust guard. This is a small tube through which the stem passes, attached to a tissue thin flexible metal flange between the case and the movement. Another type of dust guard is notched. This type fits over a lip in the case.

3. Snap movement and back into bezel.

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

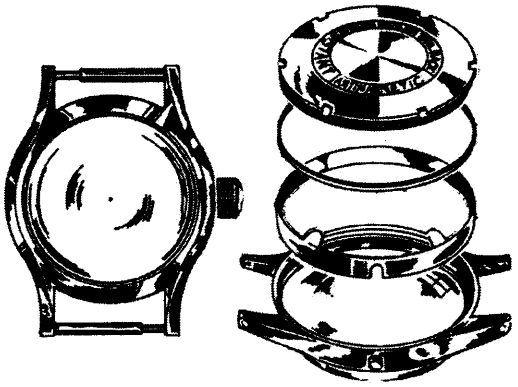
JOB SHEET

W1-J3

CASING WATCHES: Water-proof, Water-tight, Water-resistant cases.

INTRODUCTORY INFORMATION

Backs on this type case have various indentations such as a knurl, slot, flat, hole, etc. A key or case wrench is applied to unscrew the back. Case wrenches for individual models are not always available. In general, a good universal type of case wrench is desirable as it may be adjusted to fit practically all of this type case. Hold the case in a case vise for safe handling. Damaged gaskets should be replaced with new ones.



TOOLS, EQUIPMENT AND SUPPLIES

Assembly tweezers - Case wrench - Case vise - Screwdrivers

PROCEDURE

A. HOW TO REMOVE A MOVEMENT FROM A SCREW BACK WATER-PROOF, WATER-TIGHT OR WATER-RESISTANT CASE

1. Place case in case vise.
2. Select case wrench to fit the knurling or indentations on back.
3. Unscrew back counter-clockwise.
4. Remove lead or rubber gasket. (Some remain on back)
5. Release the stem and crown by turning set lever screw (detent screw) about $1\frac{1}{2}$ turns in a counter-clockwise direction - Les. 2, Sec. 61.
6. Remove the case from case vise.
7. Pull stem and crown from the case. If stem does not come out, unscrew set lever screw a bit more.
8. Lift out movement retainer ring. (This ring may be gripping the movement so firmly that the movement comes out with the ring)
9. Lift out movement.

(Over)

PROCEDURE Continued

B. HOW TO REPLACE MOVEMENT IN A SCREW BACK WATER-PROOF, WATER-TIGHT OR WATER-RESISTANT CASE

Note: Check the relation of hands to each other and the dial. Les. 11, Sec.278.

1. Place movement in the case with stem opening in movement aligned with stem opening in the case.

2. Place stem in position.

3. Tighten set lever screw to lock stem in position. Test by pulling stem into setting position and setting the hands.

4. Replace movement retainer ring.

5. Replace gasket. (Use new one if necessary)

6. Clamp case in case vise.

7. Place back on case.

8. Tighten back with case wrench.

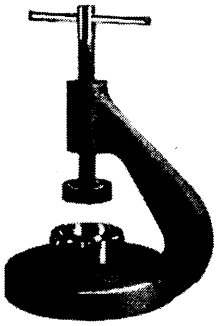
UNIT	WI
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET
W1-J4

CASING WATCH: Benrus Waterproof -
Information by Benrus Watch Co.



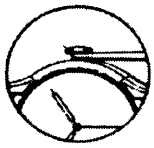
TOOLS, EQUIPMENT AND SUPPLIES

Opening and closing fixture

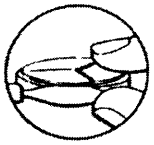
PROCEDURE

A. HOW TO OPEN A BENRUS WATER-PROOF WATCH

1. Detach bracelet.
2. Remove the crown by first pulling into setting position. Put tweezers between crown and case and pull until crown and part of stem comes off (this is a two-piece stem).

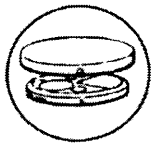


3. Select the proper plastic opening fixture and top pad for the case you want to open. Place same in staker. (To fit top pad on threaded spindle, use screw driver through the hole in the base of staker and loosen screw on the bottom of threaded spindle inside of pad). Put watch in fixture, crystal up, and turn handle until back drops out. Make sure case sleeve is in the cutout provided in fixture.



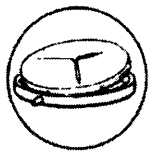
4. With extreme care, lift the crystal off the back. To prevent any injury to crystal, use a sharp knife for this purpose.

5. Now, gently remove the metal reflector on top of dial. Be careful not to bend it.

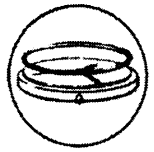


6. Push part of stem remaining in movement into winding position. Remove the movement from the back by turning it upside down.

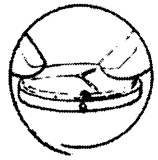
B. HOW TO CLOSE A BENRUS WATER-PROOF WATCH



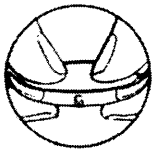
1. Replace opening fixture with red closing fixture. The same top pad is used to open and close the case.
2. Place movement into back by fitting the short stem into case sleeve.



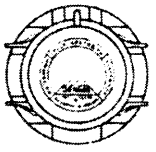
3. Gently place reflector ring on the shoulder surrounding the dial.



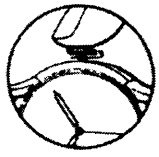
4. Place crystal over the shoulder surrounding the dial (make sure crystal is not chipped or damaged around the edge. This will cause leakage).



5. Push the back assembly into the bezel.



6. Put watch in red closing fixture, back up, turn handle until back is flush with bottom of bezel all the way around (if back does not go in straight, take watch out again and separate bezel and back assembly and start over again).



7. Insert the crown with a slow twirling motion until the tooth of the stem engages the concealed part of the stem in movement.

57 2200

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W1-J5

CASING WATCHES: Hunting case

TOOLS, EQUIPMENT AND SUPPLIES

Assembly tweezers - Case opener - Screwdrivers

PROCEDURE	REFERENCE
A. HOW TO REMOVE MOVEMENT FROM A HUNTING CASE	Les. 1 - Sec. 19
1. Open "back" with case opener.	
2. Open "cap" with case opener.	
3. Remove case screws.	Sec. 30, 31, 32
4. Press crown in, this will open "front back"	
5. Remove bezel(handle carefully, the glass is very thin).	Sec. 22
6. Pull crown out to setting position.	
7. Remove movement from case.	

B. HOW TO REPLACE MOVEMENT IN A HUNTING CASE

1. Replace movement in case by inserting end of stem in winding arbor and let movement slide into its proper position. (Make certain stem is in setting position)
2. Press crown into winding position.
3. Replace case screws.
4. Test winding to see that stem turns freely.
5. Close "cap" and "back".
6. Replace bezel.
   NOTE: Place bezel in seat on hinged side and with thumb on each side of bezel apply pressure while gradually sliding thumbs upward toward pendant.

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W1-J6

CASING WATCHES: Swing ring case

TOOLS, EQUIPMENT AND SUPPLIES

Assembly tweezers - Case opener - Screwdrivers

PROCEDURE	REFERENCE
A. HOW TO REMOVE A MOVEMENT FROM A SWING RING CASE	Les. 1, Sec. 25
1. Remove bezel. (Screw type)	Fig. 17
2. Pull crown into setting position.	
3. Lift ring and movement with case opener.	Fig. 17
4. Remove case screws.	Sec. 30, 31, 32
5. Remove movement from ring.	

B. HOW TO REPLACE MOVEMENT IN SWING RING CASE

1. Insert movement in ring (make certain winding arbor square is centered in hole of ring).
2. Replace case screws.
3. Swing movement and ring into back of case with stem and crown in setting position, turn crown to assure square of stem engages with square of arbor.
4. Test winding to see that stem turns freely.
5. Replace bezel.

HAMILTON SERVICE BULLETIN 201

ESSENTIAL INFORMATION

ON OPENING, CLOSING, AND OTHER
CASE SERVICE OPERATIONS ON THE

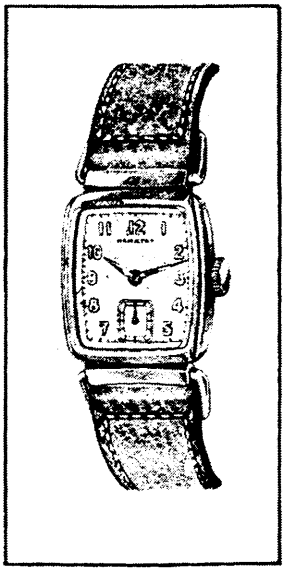
BRANDON*

A

MODEL

Grade 980—17 Jewels
10K NATURAL GOLD FILLED
18K Applied Gold Numerals on Silver Dial
* Case Construction Patent Pending

BRANDON—A HAMILTON MODEL



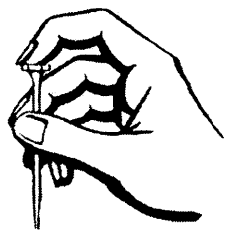
Description

The Brandon is another Hamilton first . . . a watch that is engineered for protection as well as performance. It is unique in design, construction and styling; it is simple and foolproof to service or repair; and requires no special tools or fixtures to open or close the case.

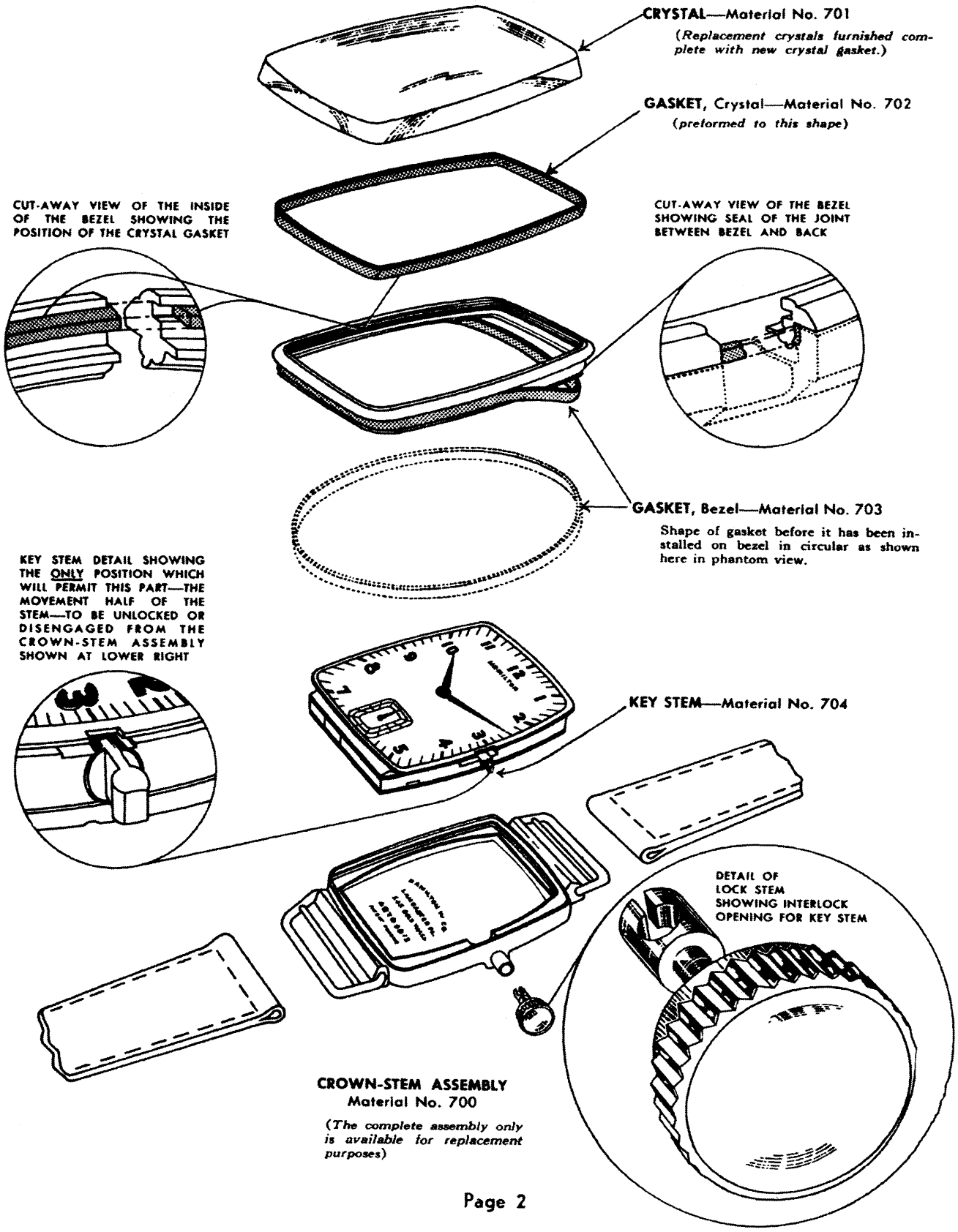
The Brandon is unlike any other watch case designed to give maximum protection to the movement from dust and moisture. It is a styled watch—that is, it isn't the traditional round shape. It is of simple two-piece construction; it is made of gold-filled stock; it is fitted with a tempered *glass* crystal instead of the unstable plastic usually used; and, since the bezel and back fit with telescopic friction, it can be opened with only a conventional blade-type case opener.

The Brandon was engineered, developed, and styled by the Hamilton Watch Company for professional men, sportsmen, and all others who require the performance of a fine watch and the ultimate in the protection of that performance. An "exploded" view as well as cross-sectional views of the Brandon Case is provided on pages two and three to illustrate its construction. Instructions for opening and closing the case, case-service operations, and ordering of replacement parts are covered on page four of this bulletin to assist watchmakers servicing the model.

(Over)

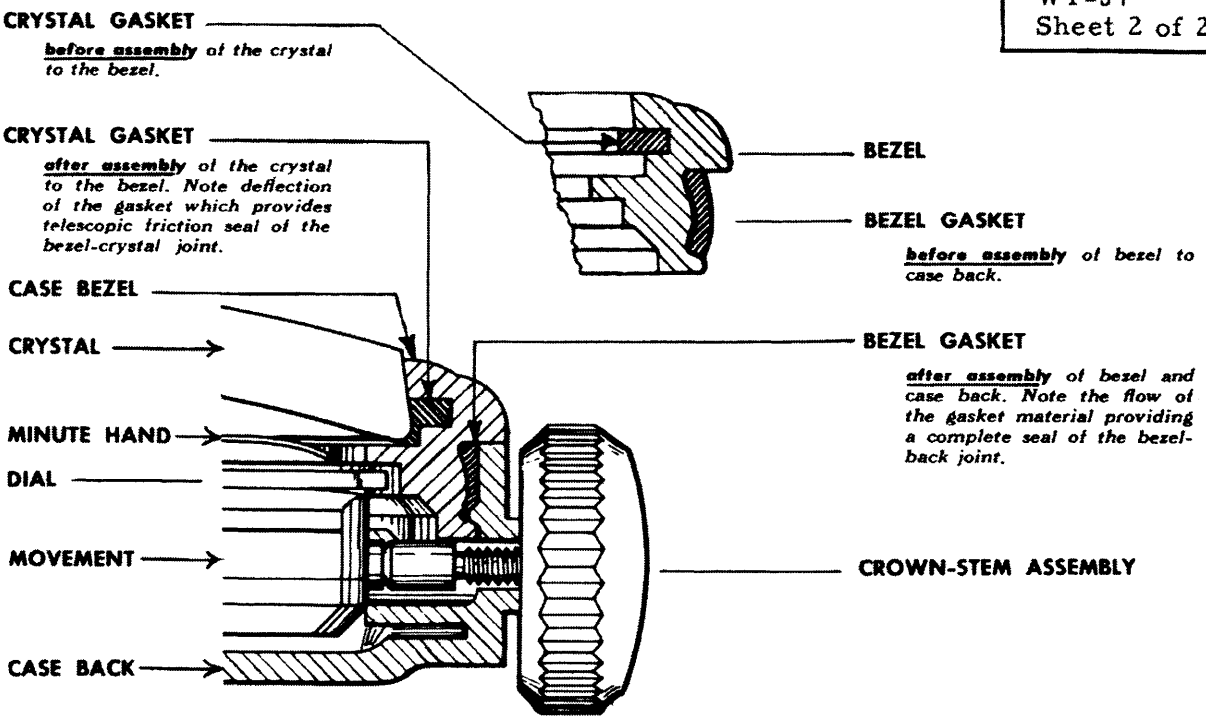


EXPLODED VIEW OF CASE ASSEMBLY

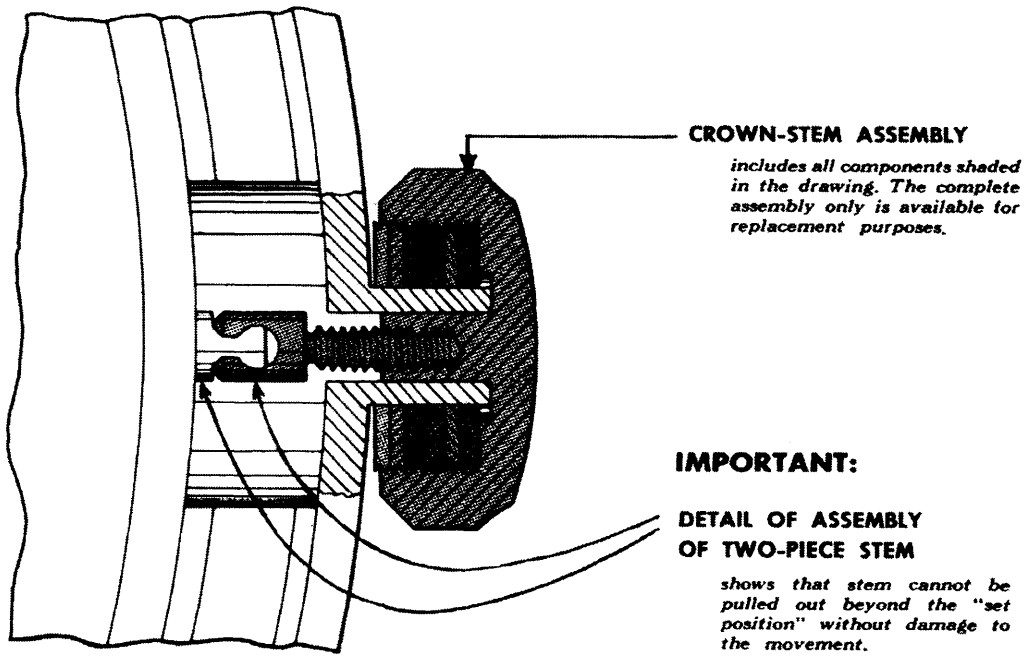


CROSS SECTION DETAIL OF CASE ASSEMBLY

JOB SHEET
W1-J7
Sheet 2 of 2



CROSS SECTION DETAIL OF CROWN-STEM ASSEMBLY



How to open the Brandon case

Hold the watch in a dial-up position. Insert a case opener under the slight lip on the bezel at 6 o'clock, and gently pry open as in opening a conventional watch case. Because the case bezel and case back fit together with telescopic friction on the sides as well as on the ends, the bezel does not snap free from the back when the case opener is inserted under the case lip. It will be necessary to lift the bezel free from the case back.

How to remove the movement from the case

Do not attempt to pull the crown out—beyond the set position. The crown-stem construction on the Brandon is of an interlocking type—not the claw type usually employed—so it can *not* be pulled out without damage to the stem until the movement is removed from the case back.

Do this to remove movement from case: with the bezel removed, turn the crown until the interlocking key joint of the (two-piece) stem (to right of 3 o'clock on the dial) is parallel to the top and bottom of the case; then simply invert the case over the (tissue-covered) palm of the hand and the movement will drop out. Should the movement tend to stick, return the case to "dial-up" position, check the alignment of the interlocking joint of the two-piece stem and re-invert the case. If the movement then does not come out of the case, return to the dial-up position and carefully insert a case opener between the movement and case at 6 o'clock to loosen it. The movement can then be lifted free of the case.

How to replace the movement in the case

Turn the crown so that the Lock Stem—the part containing the female interlocking slot in the crown half of the stem (between 3 o'clock and the case edge) is parallel to the top and bottom of the case. Turn the Key Stem—movement half of the stem—so that it will key or interlock with the Lock Stem or crown half of the stem. Then insert the movement in the case in the usual manner and replace the bezel. The easiest way to replace the bezel is to begin the reseating of it at either the 12 or 6 o'clock end and work towards the opposite end. Be careful not to dislodge or distort the bezel gasket. When the bezel is properly seated, the bezel and the back should be firmly pressed together to insure a tight fit.

How to replace a broken crystal

With the bezel held between the index finger and thumb of each hand—bezel inside towards you—exert a firm even pressure with both thumbs until crystal is released. If crystal is cracked or broken, use care to prevent cutting thumbs. *If the crystal is broken a new, genuine Hamilton crystal and crystal gasket must be fitted to restore the original protective qualities of the case.* These components are available only at the Hamilton factory. Replacement crystals are supplied complete with gaskets. With the new crystal gasket properly seated, a new crystal is installed by simply positioning it in the bezel opening from the front and seating it by applying firm, even pressure with the thumbs.

How to replace a broken stem

Stem breakage occurring in the Lock Stem—the crown half of the stem—requires a new Crown-Stem assembly, Material No. 700. Breakage in the Key Stem—the movement half of the stem—requires a new part, Material No. 704, which is replaced in the conventional manner.

Where and how to order crystals, gaskets, stems, and crowns

Genuine Hamilton replacement Crystals, Gaskets, Key Stems, and Crown-Stem Assemblies for the Brandon are available only at the Hamilton factory. It is of primary importance that only genuine replacement parts be used, otherwise the original protective qualities of the case can not be assured. Address all orders for replacements to the CASE-ORDER Department. And please use both part name and material number on orders for replacement parts.

BRANDON, REPLACEMENT PARTS

Available Only at the Hamilton Factory

Part Name	Material No.
Crown-Stem Assembly	700
Crystal	701
Gasket, crystal, grey plastic	702
Gasket, bezel, black Neoprene	703
Key-Stem (Movement Half of Stem)	704

CLEANING CASE: Pendant Type

INTRODUCTORY INFORMATION

A customer judges a watch by appearance as well as performance. Therefore, every effort should be made to give the watch case the best appearance that is possible.

TOOLS, EQUIPMENT AND SUPPLIES

Soap (laundry) - Stiff brush - Ethyl Alcohol (solvent #1)

PROCEDURE

HOW TO CLEAN A PENDANT TYPE CASE

1. Wash case thoroughly with soap and water using a stiff brush.
2. Rinse with warm water.
3. Dry bezel and crystal with soft cloth. (Crystals other than glass are damaged in alcohol)
4. Dip remaining parts of case in alcohol, flush alcohol through stem and sleeve. If a hunting case, flush thoroughly in back of lift springs to remove all traces of water.
5. Dry with soft cloth.
6. Warm over heat until all trace of alcohol is removed.
   NOTE: If crystal is loose, cement edges with crystal cement, see Lesson 3.

CLEANING CASE: Two-piece Wrist Watch Type

TOOLS, EQUIPMENT AND SUPPLIES

Soap (laundry) - Stiff brush

PROCEDURE

HOW TO CLEAN A TWO-PIECE WRIST WATCH CASE

1. Wash case thoroughly with soap and water using a stiff brush.
2. Rinse with warm water.
3. Dry with soft cloth.

NOTE: If crystal is loose, cement edges with crystal cement, see Lesson 3

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET
W1-J10

POLISHING CASES: Karat Gold (10k, 14k, etc.), Silver case (Sterling - Coin), Nickel Silver case (German Silver, Nickeloid, etc.), Platinum.

TOOLS, EQUIPMENT AND SUPPLIES

Polishing motor - Polishing head - Tripoli buff - Rouge Buff - Tripoli - Rouge

PROCEDURE

HOW TO POLISH A CASE

1. Remove all foreign matter. (Wash if necessary)
2. If crystal is other than glass it should be removed. (See lesson #3 for replacement)
3. Polish with tripoli.
4. Wash thoroughly in soap and water to remove all traces of tripoli.
5. Wipe dry with soft cloth.
6. Polish with rouge.
7. Wash thoroughly in soap and water to remove all traces of rouge.
8. Dry with soft cloth.
9. Seal crystal with crystal cement, see lesson #3.

NOTES:

Remove leather straps when polishing. Cord bands, such as silk or nylon, can be left on and washed with case. Metal or expansion bands should not be polished with tripoli but do not have to be removed from case. It is important that all expansion type bands be dipped in alcohol after washing in water and dries with soft cloth and warm over heat to remove alcohol.

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W1-J11

Mido MULTIFORT Superautomatic Powerwind

CASING WATCHES: Mido Multifort Powerwind

Information by Mido Watch Company of America, Inc.

TOOLS, EQUIPMENT AND SUPPLIES

Case wrench - Case vise - Screwdrivers - Tweezers - Pegwood

PRODEDURE

A. HOW TO REMOVE MIDO MULTIFORT POWERWIND FROM CASE

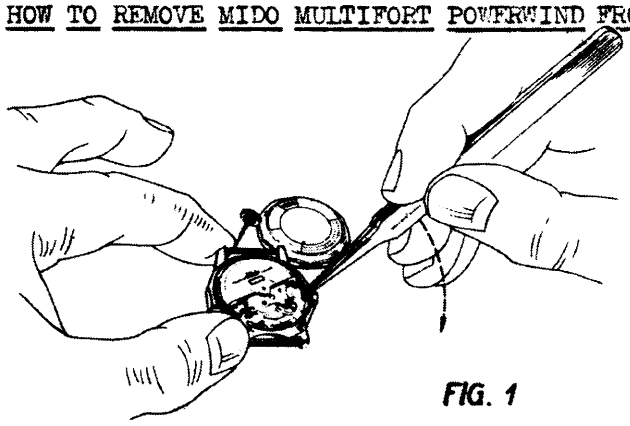


FIG. 1

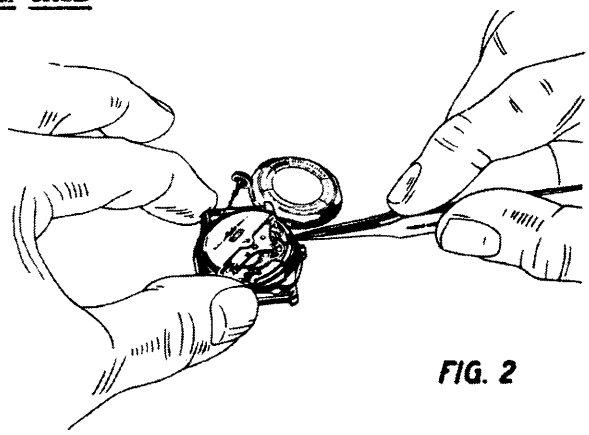


FIG. 2

1. Unscrew back of case with proper wrench.
2. Pull out stem in handsetting position, loosen detent screw and remove stem.
3. Insert tweezer into stem hole of the movement (Fig. 1), lift movement (Fig. 2), now loose, out of the case.

B. HOW TO REPLACE MIDO MULTIFORT POWERWIND IN CASE

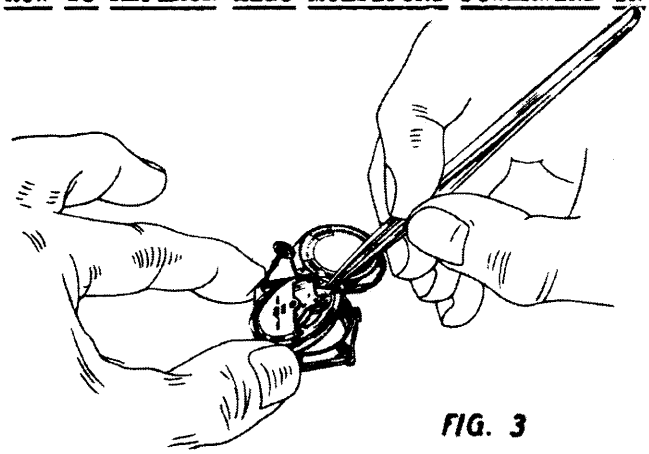


FIG. 3

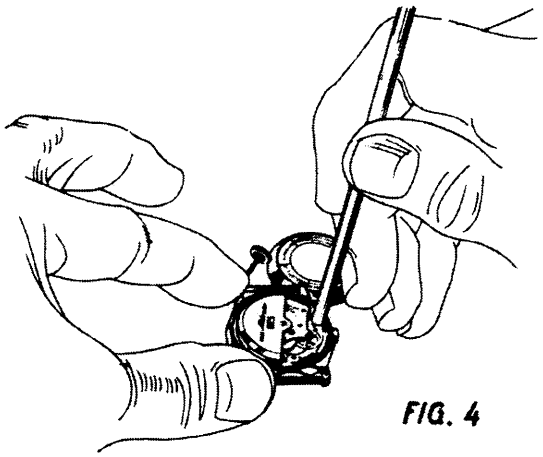


FIG. 4

1. Hold and insert movement into the case oposite stem hole (Fig. 3) under the bent ring of the case.
2. Push movement strongly down into the case (Fig. 4), with a wooden stick on the barrel bridge.
3. Insert stem, screw on tightly detent, close the case, and check air- and waterproofness with the MIDO SUPERWATERTEST machine.

UNIT	W1
LESSON	1

Master Watchmaking

CHICAGO SCHOOL OF WATCHMAKING

JOB SHEET

W1-J12

CASING WATCHES: Open Face Case with Swiss Type Setting Mechanism

INTRODUCTORY INFORMATION

There are some models of Swiss and American watches that have a stem which is part of the movement. In order to remove this type of movement from the case it is necessary that the stem be removed. The stem is locked into the movement by a set lever and screw (detent and detent screw). The reference is lesson 9, section 233.

TOOLS, EQUIPMENT AND SUPPLIES

Assembly tweezers - Case opener - Screwdrivers

PROCEDURE

	REFERENCE
A. HOW TO REMOVE MOVEMENT FROM AN OPEN FACE CASE	
1. Remove back of watch case.	Sec. 24, 28
2. If snap case, open with case opener.	Sec. 20, 21, 22
3. Remove stem.	Les. 9 - Sec. 233
4. Remove bezel.	
5. Remove case screws.	Sec. 16, 17, 29, 30, 31, 32
6. Remove movement from case.	Sec. 33, 34

B. HOW TO REPLACE MOVEMENT IN AN OPEN FACE CASE

1. Replace movement in case aligning stem opening in movement with stem opening in pendant.
2. Insert stem.
3. Tighten set lever screw.
4. Test stem by pulling into set position and turning.
5. Replace case screws and again test stem to see that it is not binding.
6. Replace bezel and back.