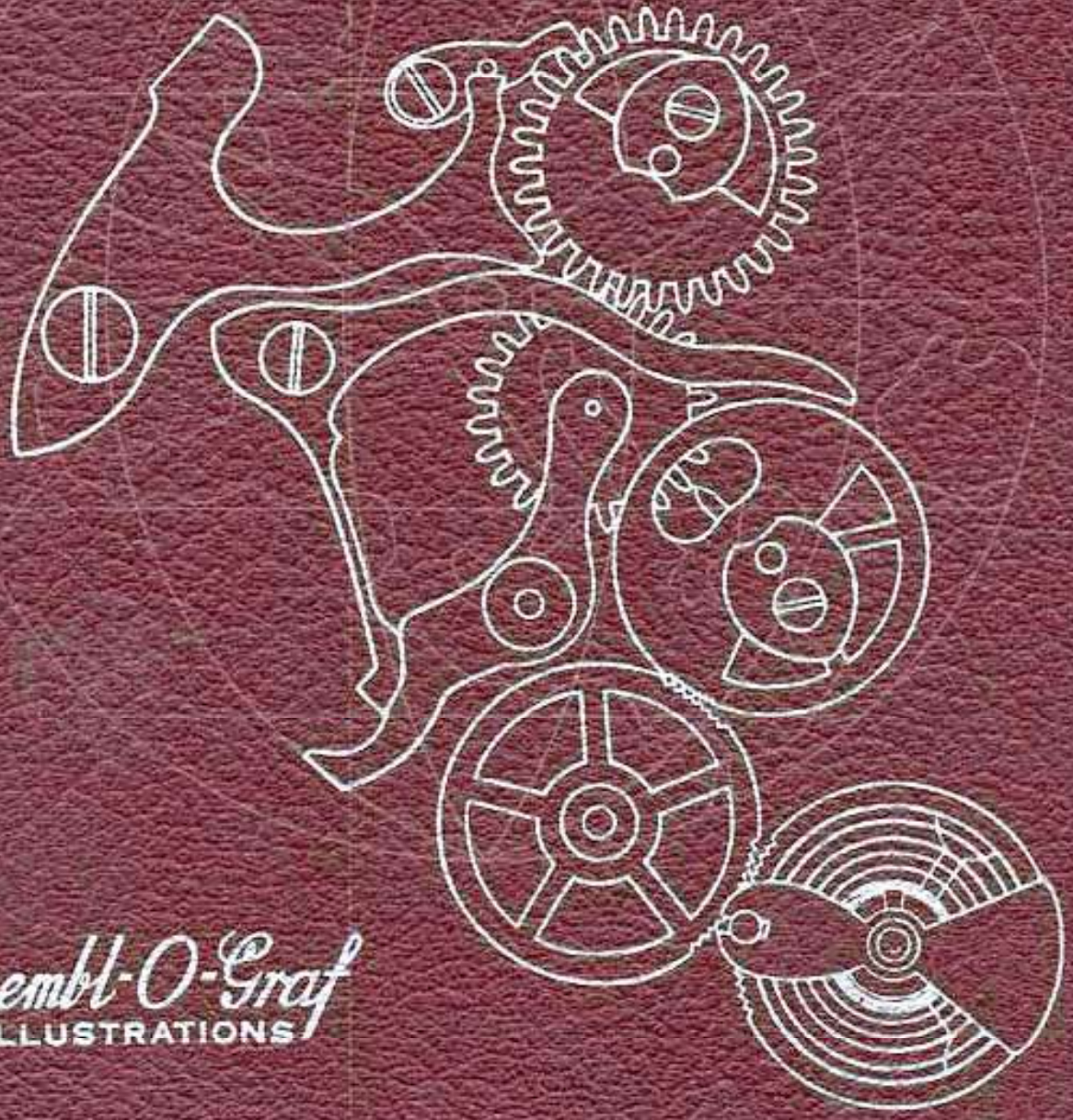
WORLD'S ONLY
FULLY ILLUSTRATED

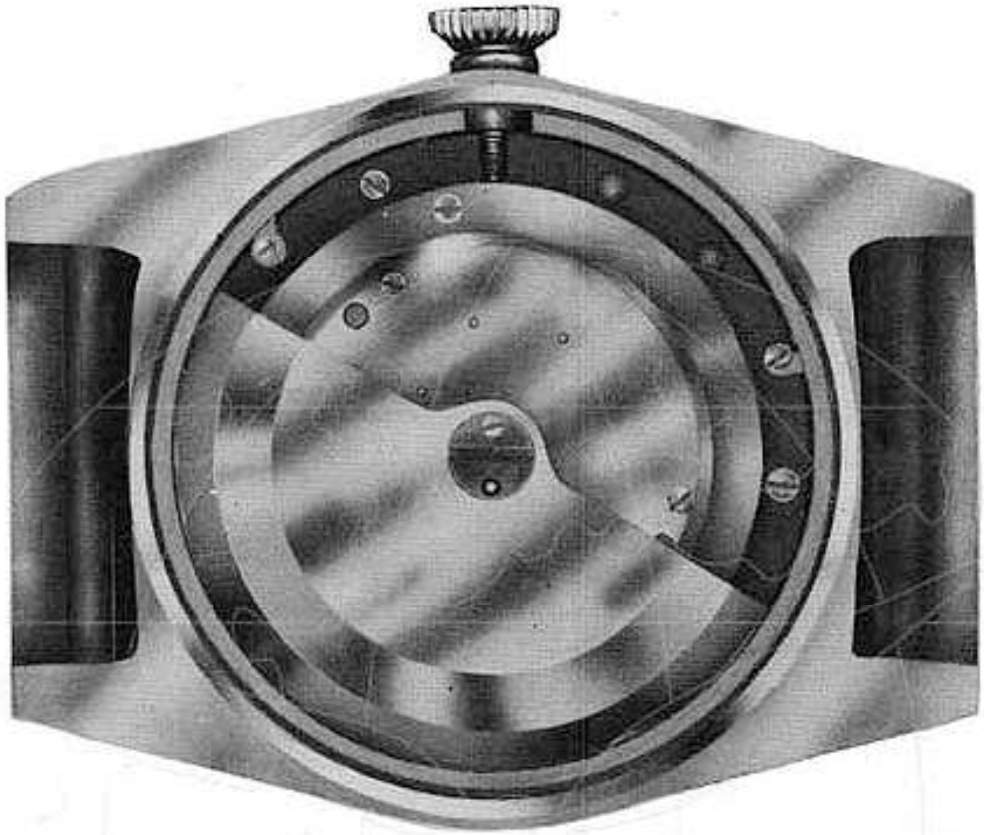
CHRONOGRAPH WATCH COURSE

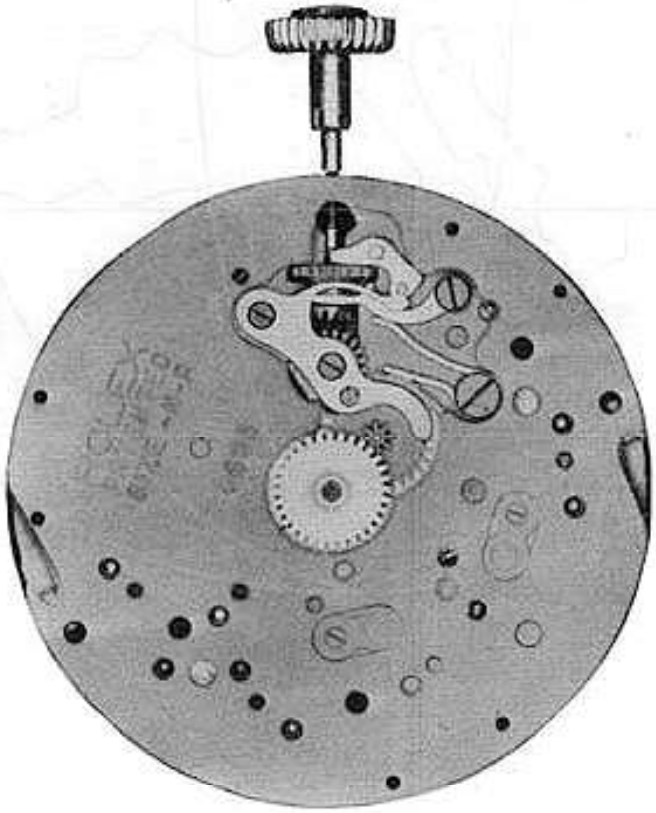
VOLUME 19



Esembl-O-Graf
ILLUSTRATIONS

IDENTIFICATION OF CHRONOGRAPH





ROLEX

OYSTER

PERPETUAL

CHRONOMETER


Esembl-O-Graf

ESEMBL-O-GRAF

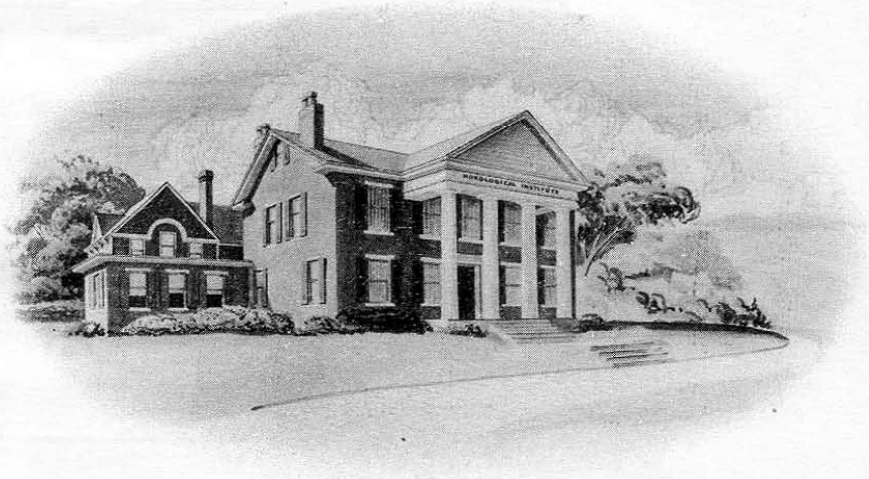
THE WORLD'S FIRST FULLY

ILLUSTRATED TEXT BOOK

ON

CHRONOGRAPH REPAIRING

AND ADJUSTING



BY

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PITTSBURGH, PENNSYLVANIA

INSTRUCTIONS
For use of book

DISASSEMBLY OF THE CHRONOGRAPH MECHANISM:

1. Study the isometric drawing at top of page 1-A. The isometric drawing was made for the following purposes:

   A. It helps to identify the part to be removed.
   B. This drawing aids in pointing out certain locations on the part that are mentioned in the oiling procedure.
   C. The text refers to certain points on the part. These points are shown in the isometric drawing. This should aid you in finding the exact location on the part that is described in the text.
   D. It helps you to know the shape of the part in case a new part has to be made.

2. At the bottom of the page 1-A is a photograph of a chronograph. In this photograph is the same part painted in black. The part is in its exact location that this part occupies in the watch. Find this location in the watch.

3. Read the disassembly procedure and the hazards in disassembly on page 1 in this book.

4. Remove this part in the same procedure as described in the text.

5. A very important item in disassembling a chronograph is keeping the screws in order, much time will be lost in putting the chronograph together if screws are mixed up. This means you have to hunt for each screw, sometimes trying three or four screws before finding the correct one. It cannot be stressed too strongly that care should be taken so that screws are not mixed up. The system that we advise for beginners, is to replace each individual screw after each part is removed. This naturally eliminates the hazard of mixing up the screws and will save you much time in the end. Do this at least until you become so thoroughly familiar with the chronograph that you no longer feel it is necessary.

6. Continue to follow this procedure throughout the book and disassemble each part until the last part of the chronograph is removed.

ASSEMBLY OF THE CHRONOGRAPH MECHANISM:

7. When you are ready to assemble the chronograph mechanism, study the isometric drawing on the last part in this book. This drawing should aid you in identifying the part to be assembled.

8. At the bottom of this page is a photograph of a chronograph. In this photograph is the same part painted in black. The part is in its exact location that this part occupies in the watch.

9. Read the assembly procedure and the hazards in assembling for the last part in this book. (Continued on next page)

INSTRUCTIONS
(Continued)

10. Replace the part in its exact location as shown in photograph, using the procedure as described in the text.

11. After you find the correct location for this part in the watch, read the oiling procedure for this part. The oiling procedure for this part is located underneath the isometric drawing. It is best to read the oiling procedure before you put each part in place as there are certain parts that must be oiled immediately as it may prove difficult to oil them later.

12. Replace the screw that holds this part in place. Of course, the screws should be kept in order as we advised above, but if the screws are not in order or the watch was received with screws mixed up, you will find a screw drawn for each part that requires a screw at the bottom of the text page.

13. After replacing this part, replace the next part, etc., until the last part is replaced, which will be part No. 1. Each part should be replaced using the same procedure as described in the text.

(Naturally, the assembly of the chronograph is exactly the reverse of the disassembly)

14. After disassembling and assembling the chronograph mechanism, start on page 1 and read the function of this part. After reading the function of this part, continue to read the function of each part throughout the book. Study each part, one at a time. This text should help you to understand more fully the purpose of each part in the chronograph mechanism.

15. Now put movement in its case with dial on, then replace hands.

16. Study the text on functional results in this book, and check the chronograph mechanism as described in this text.

NOMENCLATURE OF PART FOR CHRONOGRAPH MECHANISM

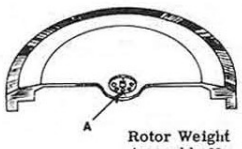
17. After you have become familiar with the chronograph mechanism, you can disassemble and assemble the chronograph by using the nomenclature of parts as a guide. This makes it possible for you to use a procedure without going through each page in the book.

18. ADJUSTMENT OF ECCENTRIC STUDS:

Read the text on adjustment of eccentric studs, this text should be read in reference to the eccentric stud picture. Now adjust each eccentric stud one at a time in the watch, as described in the text. Use the picture to show you the position of these studs.

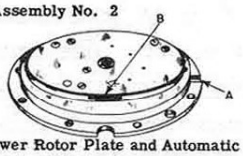
19. On each page in this book the part number and the page number are the same. This makes it convenient for the reader and eliminates any confusion.

NOMENCLATURE OF PARTS FOR ROLEX SELF WINDER

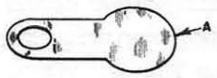


Rotor Weight
Assembly No. 1

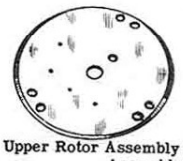
Assembly No. 2



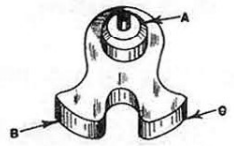
Lower Rotor Plate and Automatic Winding Mechanism



Rotor Arbor Tension Spring
Assembly No. 3



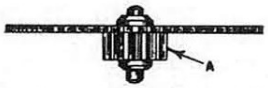
Upper Rotor Assembly Plate
Assembly No.4



Rotor Click Assembly No. 5

Rotor Click Spring
Assembly No. 6

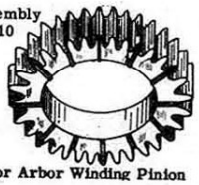
Small Rotor Drive Wheel
Assembly No.7



Large Rotor Drive Wheel
Assembly No. 8

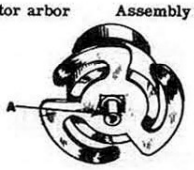
Medium Rotor Drive Wheel
Assembly No. 9

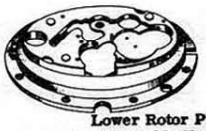
Assembly No. 10



Rotor Arbor Winding Pinion

Rotor arbor Assembly No. 11





Lower Rotor Plate
Assembly No. 12

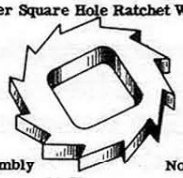
Assembly No. 13

Steel Ratchet Wheel Spacer

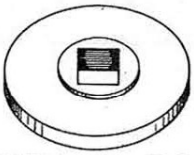
Small Ratchet Wheel Upper

Assembly No. 14

Upper Square Hole Ratchet Wheel

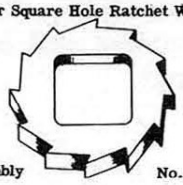


Assembly No. 15



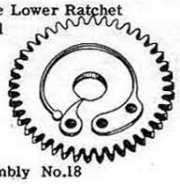
Brass Spacer Assembly No. 16

Lower Square Hole Ratchet Wheel



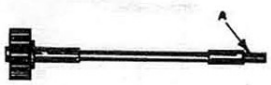
Assembly No. 17

Large Lower Ratchet Wheel



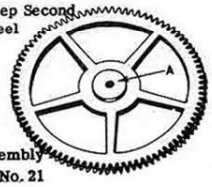
Assembly No.18

Sweep Second Pinion Tension Spring Assembly No. 19



Sweep Second Pinion
Assembly No.20

Sweep Second Wheel



Assembly No. 21

PART NO. 1

A. DISASSEMBLY PROCEDURE OF ROTOR WEIGHT:

The rotor weight is held in place by fillister head screw FS-1. The fillister head screw FS-1 is prevented from coming loose by beveled countersink screw BS-1. Remove the beveled countersink screw BS-1. Position of this screw is shown in the photograph. Now remove the fillister head screw and the rotor weight will be free on the rotor arbor and may be lifted from the movement.

REFERENCE: Rotor arbor is Assembly 11.

(The shape of screw for this part is shown at bottom of page.)

B. ASSEMBLY PROCEDURE OF ROTOR WEIGHT:

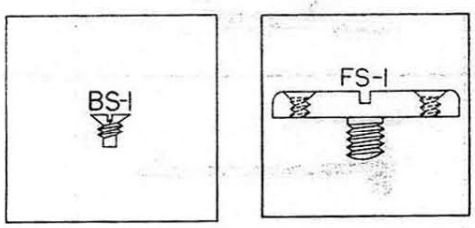
Place the square hole in the rotor weight over shoulder on rotor arbor. Now replace fillister head screw FS-1 and tighten screw to hold rotor weight to rotor arbor. Check to see that one of the threaded holes in fillister head screw is over one of the holes "A" in rotor weight. The fillister head screw may have to be loosened slightly until one of the holes in screw is in proper place. Now replace beveled countersink screw BS-1. Position of this screw is shown in photograph.

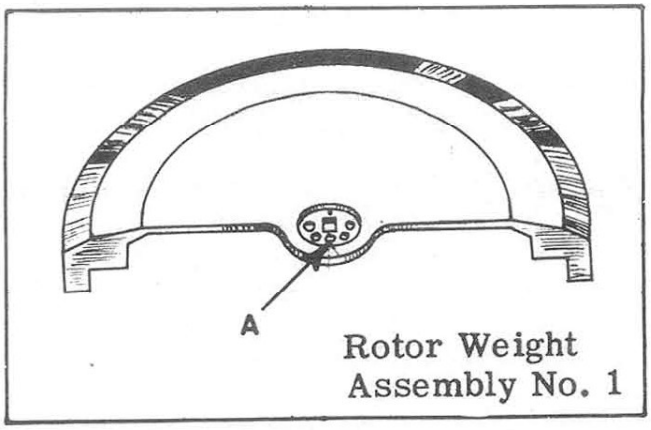
C. FUNCTION OF ROTOR WEIGHT:

The function of the rotor weight is to turn the rotor arbor as the watch is turned to various positions.

REMARKS:

The rotor weight should turn freely in either direction at all times. After replacing the rotor weight, it should be checked to see that it turns freely and does not touch the upper rotor assembly plate or the screw-heads that hold this plate in place. The rotor weight can continue to turn in either direction even if the mainspring is fully wound due to the construction of the barrel and mainspring. The mainspring and barrel construction is described on Page 21 in this text.

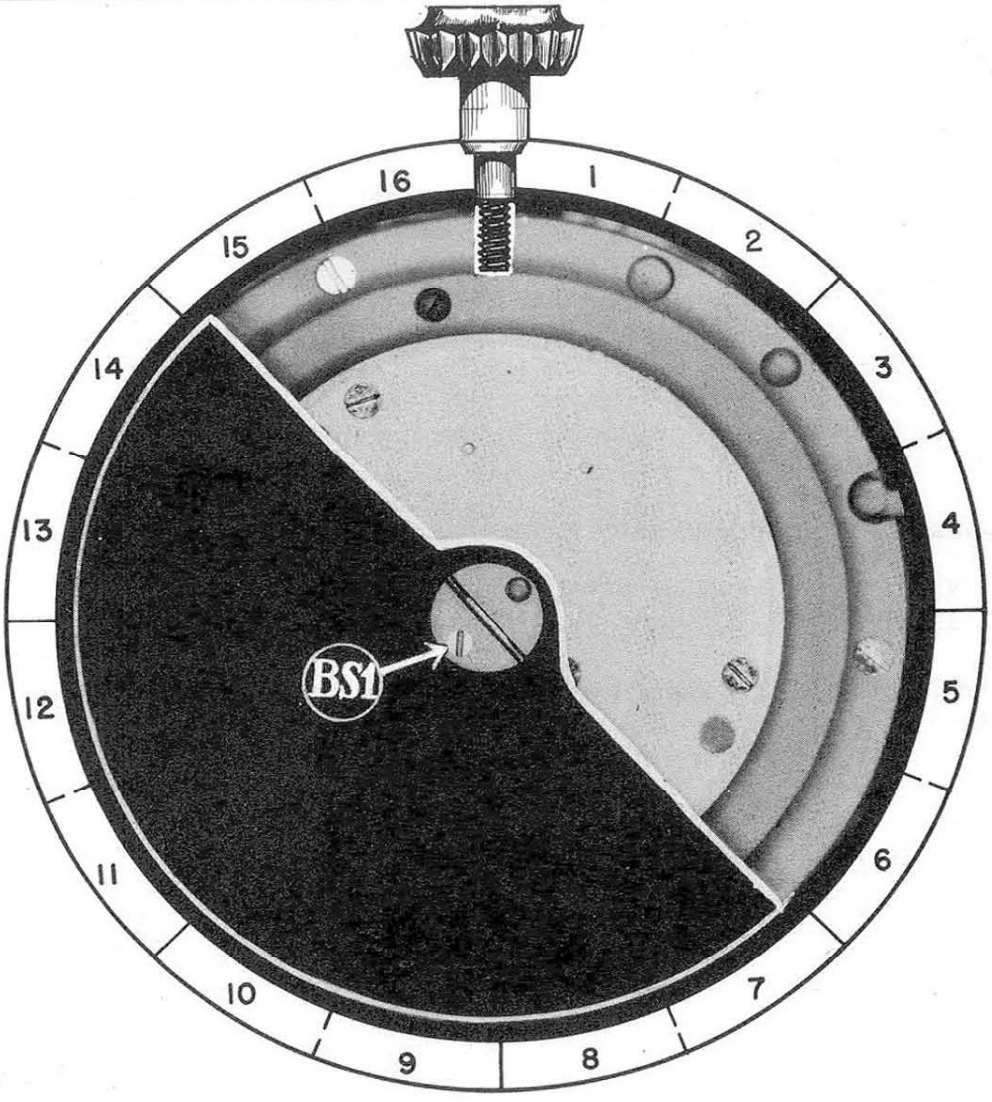




Rotor Weight
Assembly No. 1

OILING

The rotor weight should not be oiled.



1-A

PART NO. 2

A. DISASSEMBLY PROCEDURE OF LOWER ROTOR PLATE AND AUTOMATIC WINDING MECHANISM:

This plate and assembly is held in place by identical fillister head screws FS-2, FS-3, FS-4, and steady pins. The position of these screws are shown in the photograph. Remove these screws and loosen assembly plate from the watch plate by sliding a thin-blade screw-driver between the two plates. When assembly plate is free of the steady pins, it may be lifted from movement.

(The shape of screws for this part is shown at bottom of page.)

B. ASSEMBLY PROCEDURE OF LOWER ROTOR PLATE AND AUTOMATIC WINDING MECHANISM:

NOTICE NOTICE NOTICE

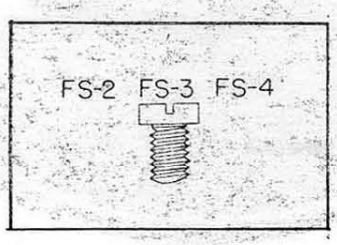
Before replacing the lower rotor plate and automatic winding mechanism, the balance assembly should be replaced and all necessary adjustments made. The watch should be rated at this time as the replacement of the assembly prevents further adjustment to the watch movement.

Place the rotor assembly on the train side of the watch with the slot "A" over the winding stem. Now place the proper holes in this assembly over the steady pins in plate. Before pressing assembly plate down, check to see that the large rotor drive wheel pinion leaves are engaged with the upper ratchet wheel teeth. This observation may be made through the cut-out portion "B" of the assembly. Now press rotor assembly down to proper place and replace fillister head screws FS-2, FS-3, and FS-4. These screws are identical.

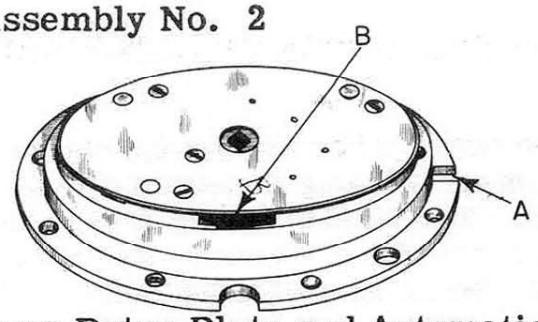
REFERENCE: Upper ratchet wheel is Assembly 14.

C. FUNCTION OF LOWER ROTOR PLATE AND AUTOMATIC WINDING MECHANISM:

The function of the rotor assembly is to automatically wind the watch as the rotor weight is turned.



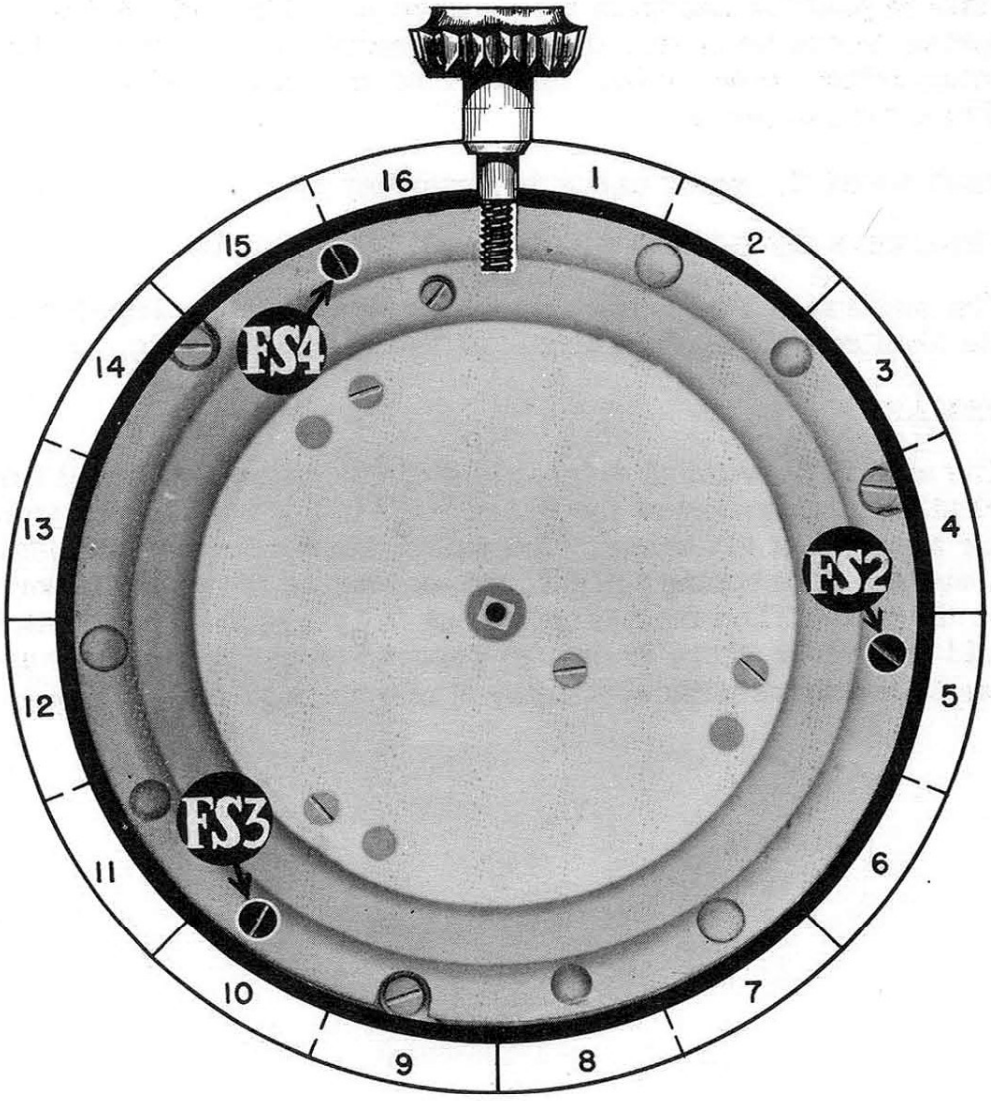
Assembly No. 2



Lower Rotor Plate and Automatic Winding Mechanism

OILING

This assembly is oiled when the upper rotor assembly plate is replaced.



PART NO. 3

A. DISASSEMBLY PROCEDURE OF ROTOR ARBOR TENSION SPRING:

To remove the rotor arbor tension spring, place the lower rotor plate and automatic winding mechanism in position shown in the photograph. The tension spring is held to the assembly by fillister head screw FS-5. Remove this screw and tension spring will be free on assembly and may be lifted out of place.

(The shape of screw for this part is shown at bottom of page.)

REFERENCE: Lower rotor plate and automatic winding mechanism is Assembly 2.

B. ASSEMBLY PROCEDURE OF ROTOR ARBOR TENSION SPRING:

Place the rotor arbor tension spring on the rotor assembly plate in position shown in the photograph. The end "A" of spring should be centered over the end of bottom pivot of the rotor arbor. Now replace fillister head screw FS-5 to hold this spring in place.

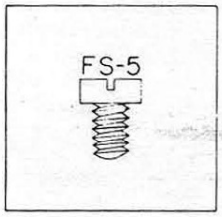
REFERENCE: Rotor arbor is Assembly 11.

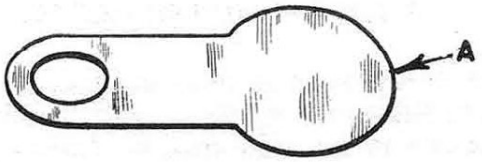
C. FUNCTION OF ROTOR ARBOR TENSION SPRING:

The function of this tension spring is to reduce the friction of the shoulder of the rotor arbor on the assembly plate.

REMARKS:

The automatic winding mechanism of the Rolex watch will fully wind the mainspring of the watch after being worn on the wrist for a period of six hours. The automatic winding mechanism keeps the mainspring fully wound as long as the watch is worn on the wrist. The mainspring being fully wound and the watch laid on a table, there is enough reserve power to run the watch for thirty hours without winding it manually or automatically.

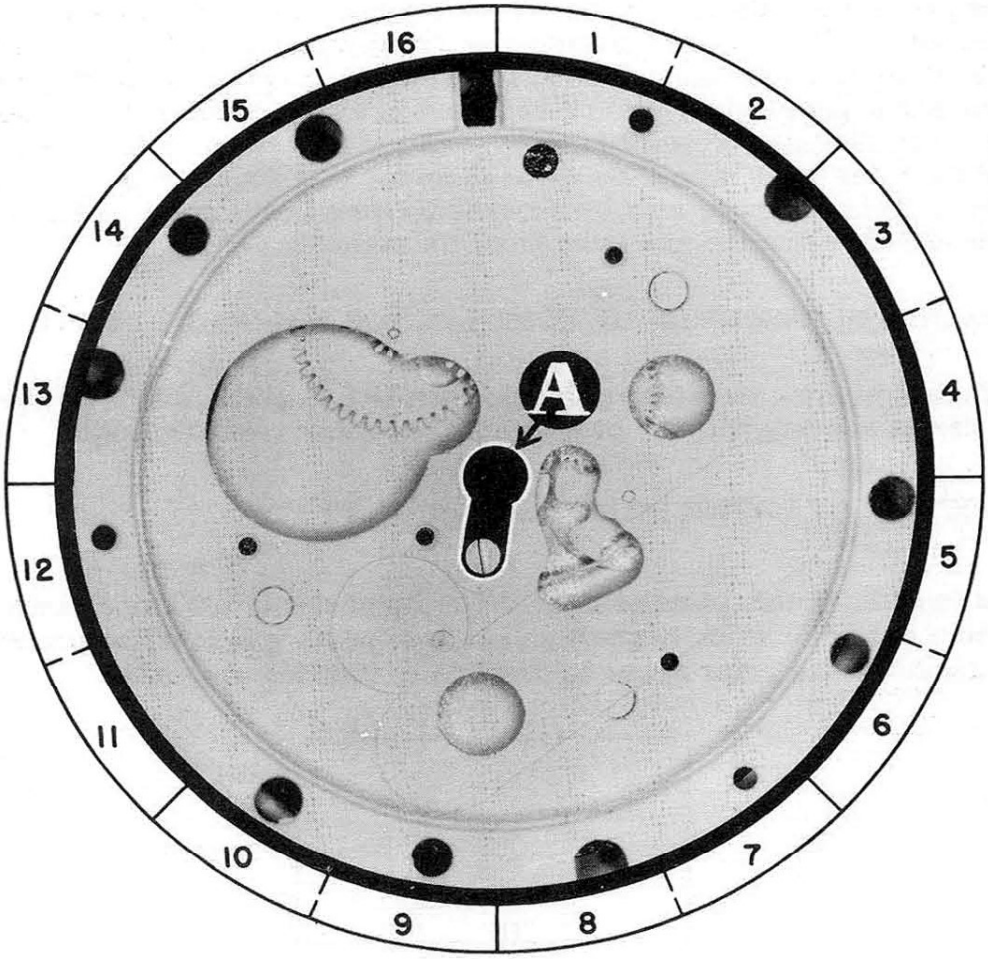




Rotor Arbor Tension Spring
Assembly No. 3

OILING

The rotor arbor tension spring should not be oiled.



PART NO. 4

A. DISASSEMBLY PROCEDURE OF UPPER ROTOR ASSEMBLY PLATE:

The upper rotor assembly plate is held in place by identical beveled countersink screws BS-2, BS-3, BS-4, BS-5. and steady pins. The position of these screws are shown in the photograph. Remove these screws and loosen plate from steady pins by placing a thin-blade screw-driver in slots provided between the upper rotor assembly plate and the lower rotor assembly plate and turning the screw-driver slightly. When assembly plate is free of steady pins, it may be lifted from the rotor assembly.

REFERENCE: Lower rotor plate is Assembly 12.

(The shape of screws for this part is shown at bottom of page.)

B. ASSEMBLY PROCEDURE OF UPPER ROTOR ASSEMBLY PLATE:

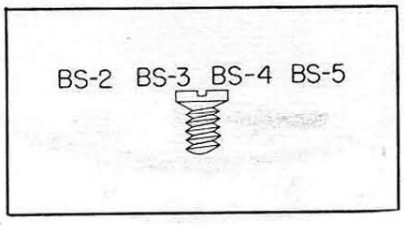
Place the rotor assembly plate in place with large hole in center of plate over the rotor arbor and the proper holes in plate over steady pins. Now press down lightly with finger. Meanwhile, turn the plate slightly, first one way, then the other, until the pivots of the rotor click, and the three rotor drive wheels come into the pivot holes in assembly plate. Now press the plate down until the steady pins are in proper holes in plate and replace beveled countersink screws BS-2, BS-3, BS-4, and BS-5 to hold the plate in place. The shape of these screws are identical and each screw does not have to be replaced in any particular place. After replacing the upper rotor assembly plate, the three rotor drive wheels and the rotor click should be checked to see that they have proper endshake. This endshake may be checked by turning the rotor assembly over and checking the endshake from the opposite side.

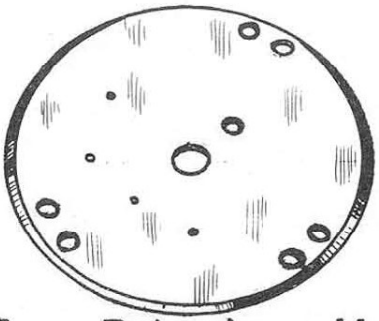
C. HAZARDS IN ASSEMBLY OF UPPER ROTOR ASSEMBLY PLATE:

Before tightening the screws to hold the plate in place, check to see that all pivots are entering the proper holes in rotor assembly plate.

D. FUNCTION OF UPPER ROTOR ASSEMBLY PLATE:

The function of this plate is to hold the top pivots of the rotor drive wheels and rotor click in position so these parts will function properly. It also holds the rotor arbor in position to function properly.

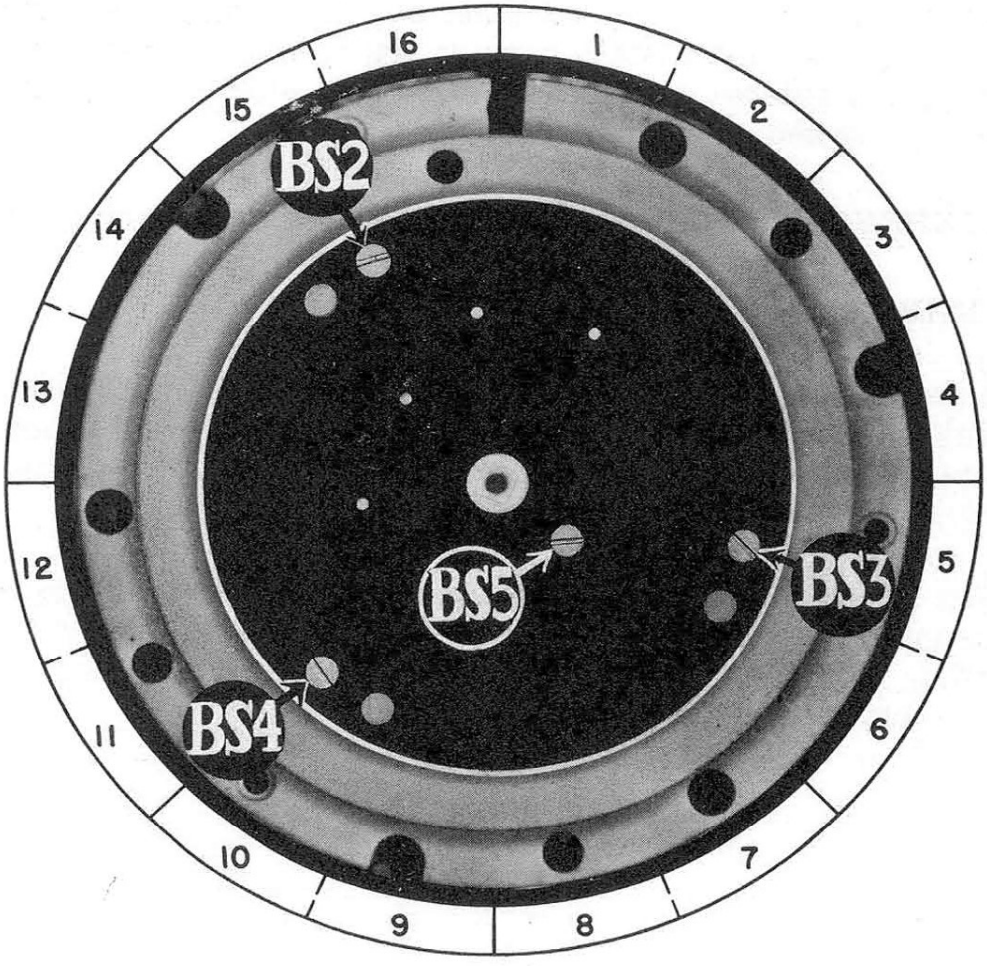




Upper Rotor Assembly Plate
Assembly No.4

The following points should be oiled:

1. Top and bottom pivots of rotor click.
2. Top and bottom pivots of the three rotor drive wheels.
3. Bottom pivot of rotor arbor and shoulder of arbor that contacts upper rotor assembly plate.



PART NO. 5

A. DISASSEMBLY PROCEDURE OF ROTOR CLICK:

To remove rotor click, simply lift it out of place.

B. ASSEMBLY PROCEDURE OF ROTOR CLICK:

The rotor click is placed in position shown in photograph with the long hub "A" of click down. The end "B" of click should engage with teeth on the small rotor drive wheel and the end "C" of click should contact the rotor click spring.

REFERENCE: Small rotor drive wheel is Assembly 7.
Rotor click spring is Assembly 6.

C. FUNCTION OF ROTOR CLICK:

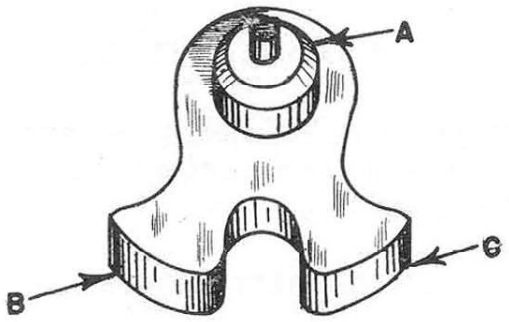
The function of the rotor click is to prevent the small rotor drive wheel from turning backwards. This holds the rotor arbor winding pinion stationary so the rotor arbor driving spring will ratchet over the teeth on this wheel as the rotor arbor is turned counter-clockwise.

REFERENCE: Rotor arbor winding pinion is Assembly 10.

REMARKS:

Special wrenches are needed to open the Rolex water-proof cases. These special wrenches are available in three popular sizes. When ordering these wrenches, be sure to indicate the size of wrench that you are going to need.

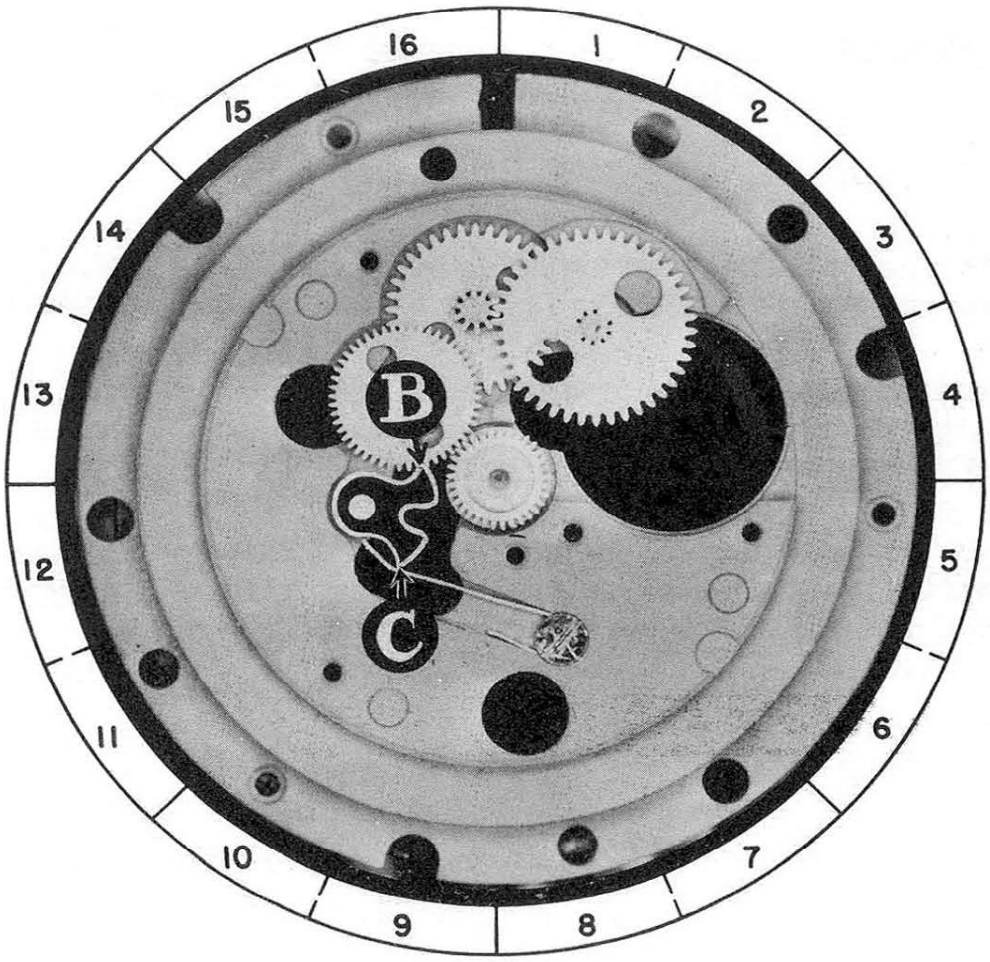
Rolex crystals have to be replaced by a special machine to guarantee the water-proof features of the case. We advise sending the case to the Rolex Watch Company when it is necessary to replace a crystal.



Rotor Click Assembly No. 5

OILING

The rotor click is oiled when the plate that holds this click in position is replaced.



PART NO. 6

A. DISASSEMBLY PROCEDURE OF ROTOR CLICK SPRING:

The rotor click spring is held in place by shouldered screw SS-1. Remove screw and click spring may be lifted from recess in plate with tweezers.

(The shape of screw for this part is shown at bottom of page.)

B. ASSEMBLY PROCEDURE OF ROTOR CLICK SPRING:

Place the rotor click spring in recess in plate in position shown in photograph. Now replace shouldered screw SS-1 to hold rotor click spring in place.

C. FUNCTION OF ROTOR CLICK SPRING:

The function of this spring is to hold the end "B" of rotor click in contact with teeth on small rotor drive wheel.

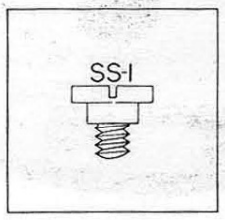
REFERENCE: Rotor click is Assembly 5.
Small rotor drive wheel is Assembly 7.

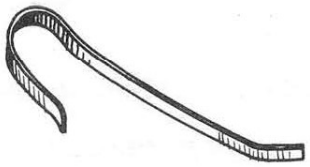
REMARKS:

The tension that any spring holds on a part should be no stronger than is necessary for the part to function properly.

For example: The rotor click spring holding too strong a tension on the rotor click will cause the small rotor drive wheel to be unnecessarily hard to turn.

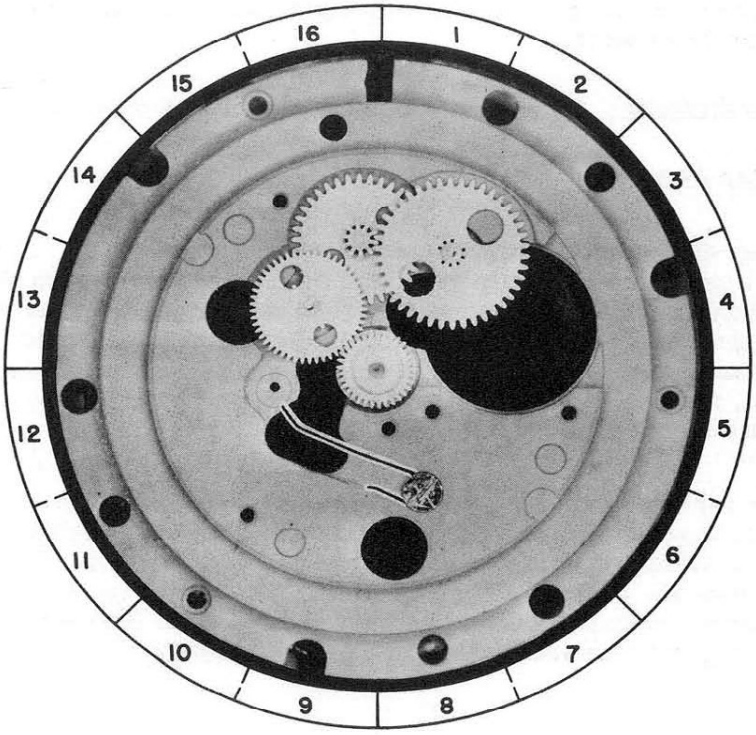
This spring is properly adjusted by the factory, but in case a spring must be made or it is necessary to adjust this spring, the above remarks should be taken into consideration.





Rotor Click Spring
Assembly No. 6

The rotor click spring is oiled at point of contact with rotor click.



PART NO. 7

A. DISASSEMBLY PROCEDURE OF SMALL ROTOR DRIVE WHEEL:

To remove small rotor drive wheel, simply lift it out of place.

B. ASSEMBLY PROCEDURE OF SMALL ROTOR DRIVE WHEEL:

This wheel is placed in movement in position shown in photograph. The pinion on this wheel should be placed down with the teeth in pinion meshing with teeth in medium rotor drive wheel.

REFERENCE: Medium rotor drive wheel is Assembly 9.

C. FUNCTION OF SMALL ROTOR DRIVE WHEEL:

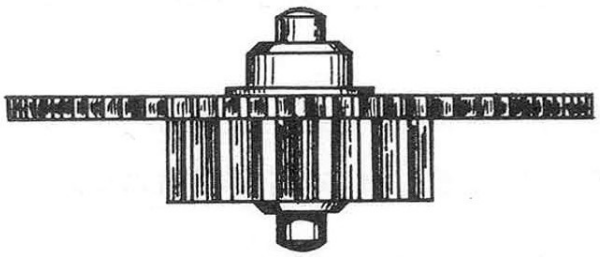
The function of the small rotor drive wheel is to transfer the power from the rotor arbor winding pinion to the medium rotor drive wheel.

REFERENCE: Rotor arbor winding pinion is Assembly 10.

REMARKS:

When disassembling the automatic winding mechanism, each part should be carefully examined as it is removed from the movement. Each part should be checked against the isometric drawings to see that the part is the correct shape and is not broken. Each part should also be checked for any pits of rust, roughness, or burrs, and for worn parts which may cause the part not to work properly.

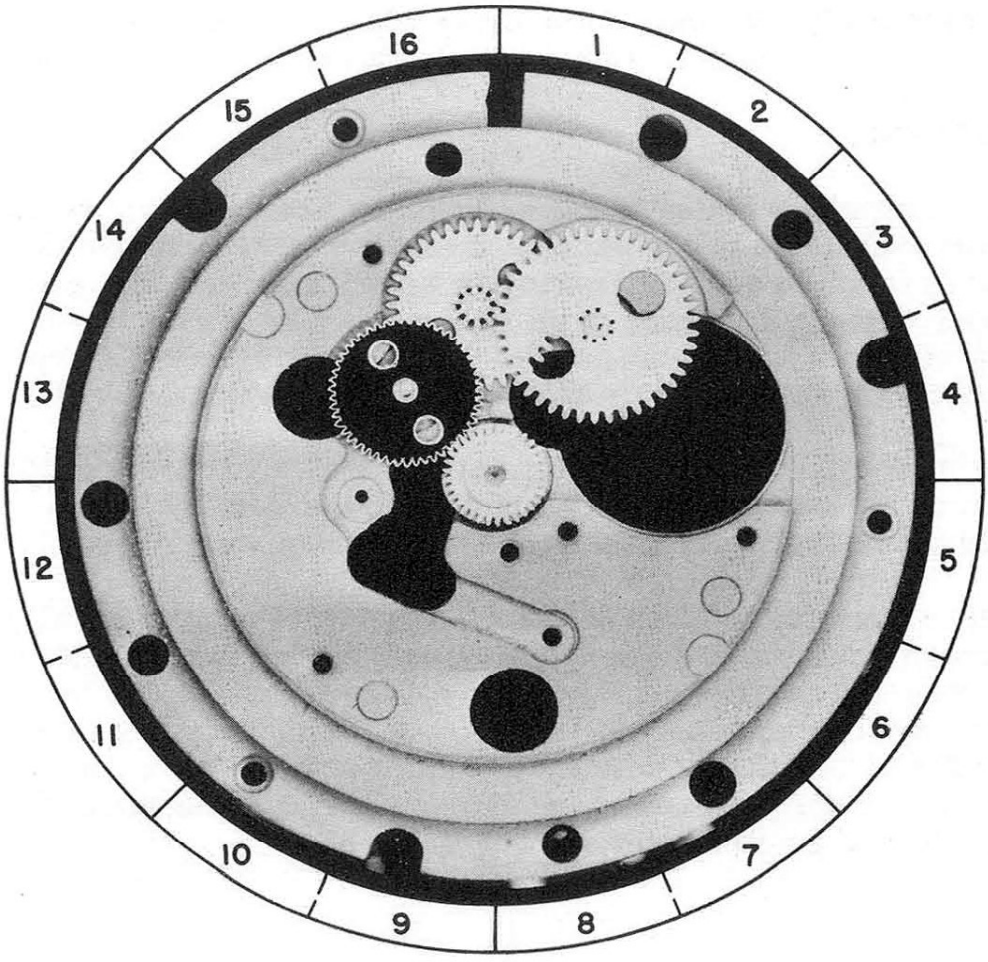
The replacement of a defective part may necessitate complete disassembly of the winding mechanism. Through a close examination of each part, you will soon become familiar with the parts of the mechanism. This will enable you to quickly recognize a defective part and repair it before replacing it in the automatic winding mechanism.



Small Rotor Drive Wheel
Assembly No.7

OILING

The pivots on the small rotor drive wheel are oiled when the plate that holds this wheel in position is replaced.



PART NO. 8

A. DISASSEMBLY PROCEDURE OF LARGE ROTOR DRIVE WHEEL:

To remove this wheel, simply lift it out of place.

B. ASSEMBLY PROCEDURE OF LARGE ROTOR DRIVE WHEEL:

This wheel is placed in movement in position shown in the photograph. The pinion "A" on the wheel should be placed down, with the pivot in proper hole in plate.

C. FUNCTION OF LARGE ROTOR DRIVE WHEEL:

The function of the large rotor drive wheel is to transfer the power from the medium rotor drive wheel to the small ratchet wheel (upper). This power is developed by the rotor weight.

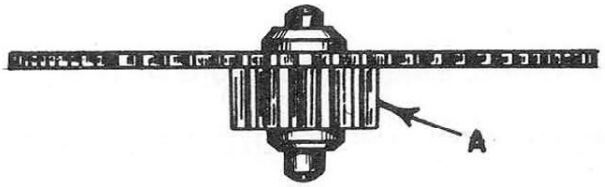
REFERENCE: Medium rotor drive wheel is Assembly 9.
Small ratchet wheel (upper) is Assembly 14.

REMARKS:

The automatic winding of the mainspring provides a more uniform oscillation of the balance throughout a 24 hour period than is found in ordinary manually wound watches. The mainspring being fully wound at all times provides a more even flow of power to the escapement which naturally enables the balance wheel to maintain this uniform oscillation.

The manually wound watch does not have this uniform oscillation, as the oscillation is greatest when the mainspring is fully wound and decreases as the mainspring runs down.

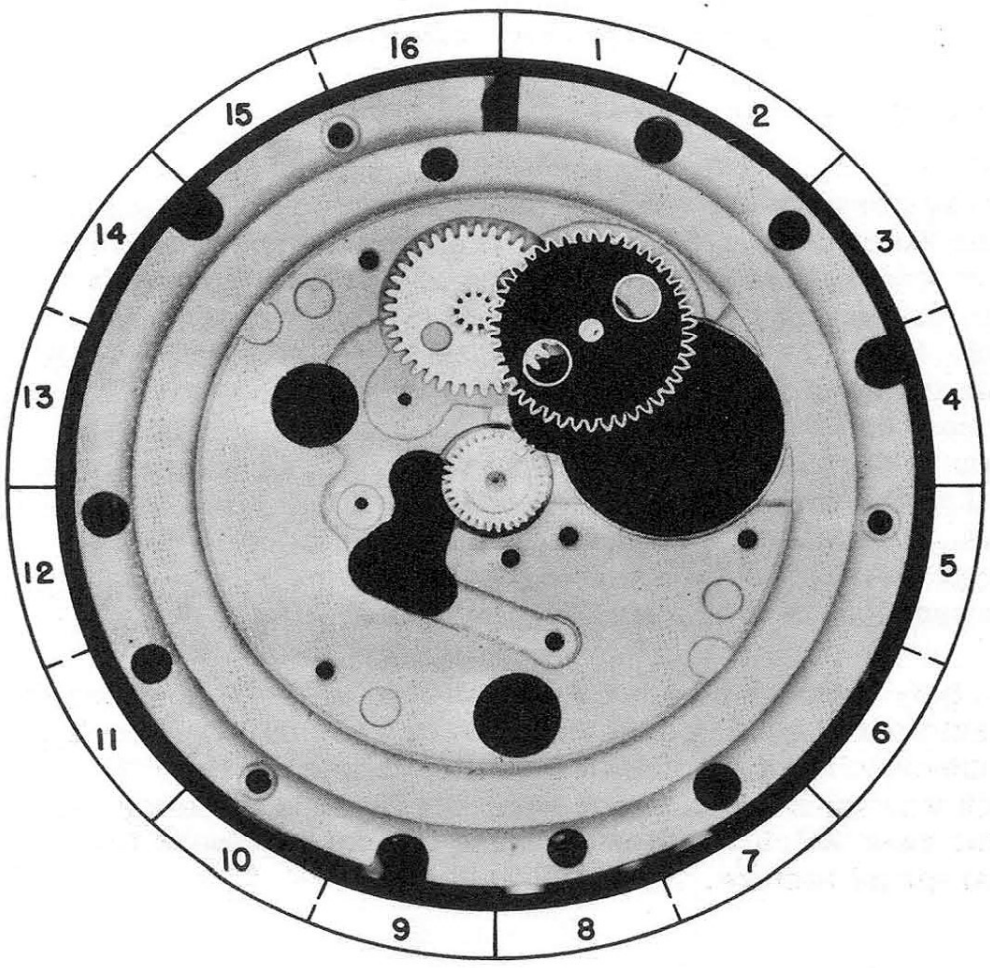
This uniform oscillation of the balance wheel usually results in more accurate timekeeping than is obtained from a watch in which the balance varies in the degree of oscillation over a twenty-four hour period. The Rolex Watch Company issues an official certificate with each Rolex perpetual chronometer, stating the daily variations of the rate during a fourteen day trial in five positions and in heat and cold.



Large Rotor Drive Wheel
Assembly No. 8

OILING

The pivots on the large rotor drive wheel are oiled when the plate that holds this wheel in position is replaced.



PART NO. 9

A. DISASSEMBLY PROCEDURE OF MEDIUM ROTOR DRIVE WHEEL:

To remove this wheel, simply lift it out of place.

B. ASSEMBLY PROCEDURE OF MEDIUM ROTOR DRIVE WHEEL:

Place this wheel in movement in position shown in the photograph. The pinion on this wheel should be up with the bottom pivot in proper hole in plate.

C. FUNCTION OF MEDIUM ROTOR DRIVE WHEEL:

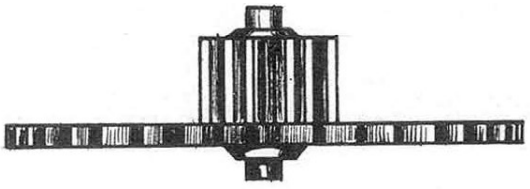
The function of this wheel is to transfer the power developed by the rotor weight from the small rotor drive wheel to the large rotor drive wheel.

REFERENCE: Small rotor drive wheel is Assembly 7.
Large rotor drive wheel is Assembly 8.

REMARKS:

The ordinary type of winding crown will not function properly on the Rolex watch. This watch requires a special type crown which, in addition to winding and setting the watch, must also screw tight to the case to make the case water-proof. When the crown is unscrewed from the case, a spring in the collar of the crown forces the crown into a position so the stem can be turned to wind or set the watch. When the crown is depressed to screw it to the case, the crown should not turn the winding stem. When fitting a new stem to the crown, it should be checked to see that the stem is short enough so that it does not prevent the crown from being screwed tight to the case.

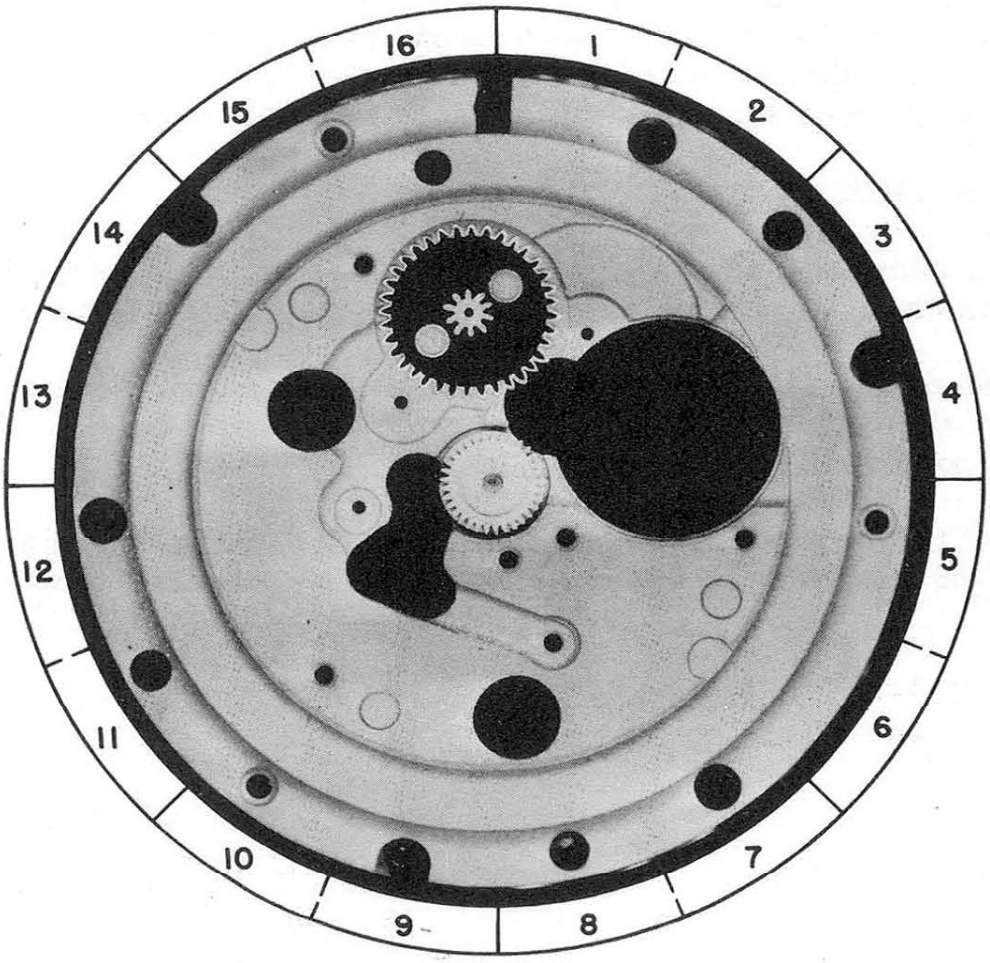
This type crown can be used on this type of movement due to the automatic winding keeping the watch wound. Ordinarily, the unscrewing of the crown from the case each time the watch was wound would soon wear the threads in the crown or the case which would soon cause the case to loose its water-proof feature.



Medium Rotor Drive Wheel
Assembly No. 9

OILING

The pivots on the medium rotor drive wheel are oiled when the plate that holds this wheel in position is replaced.



PART NO. 10

A. DISASSEMBLY PROCEDURE OF ROTOR ARBOR WINDING PINION:

To remove the rotor arbor winding pinion, simply lift it from the rotor arbor.

B. ASSEMBLY PROCEDURE OF ROTOR ARBOR WINDING PINION:

Place the rotor arbor winding pinion over the rotor arbor with the wolf teeth down. Check to see that winding pinion is not bending but pivots freely on rotor arbor.

C. FUNCTION OF ROTOR ARBOR WINDING PINION:

The function of the rotor arbor winding pinion is to turn the small rotor drive wheel when the rotor weight is turned clockwise. When the rotor weight is turned counter-clockwise, the rotor arbor turns with the rotor weight, but the winding pinion is prevented from turning by the rotor click which holds the small rotor drive wheel stationary.

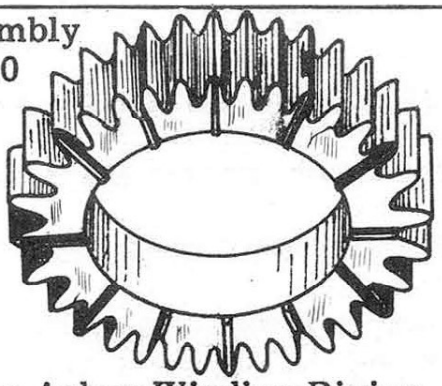
REMARKS:

The automatic winding mechanism winds the mainspring in a smooth, even manner with no shock to the watch at any time.

The rotor weight being free to turn in either direction at any time prevents shock to the watch that would be caused by the sudden stopping of the weight.

The rotor weight turns silently and without causing vibration to the watch due to the rotor weight being properly balanced.

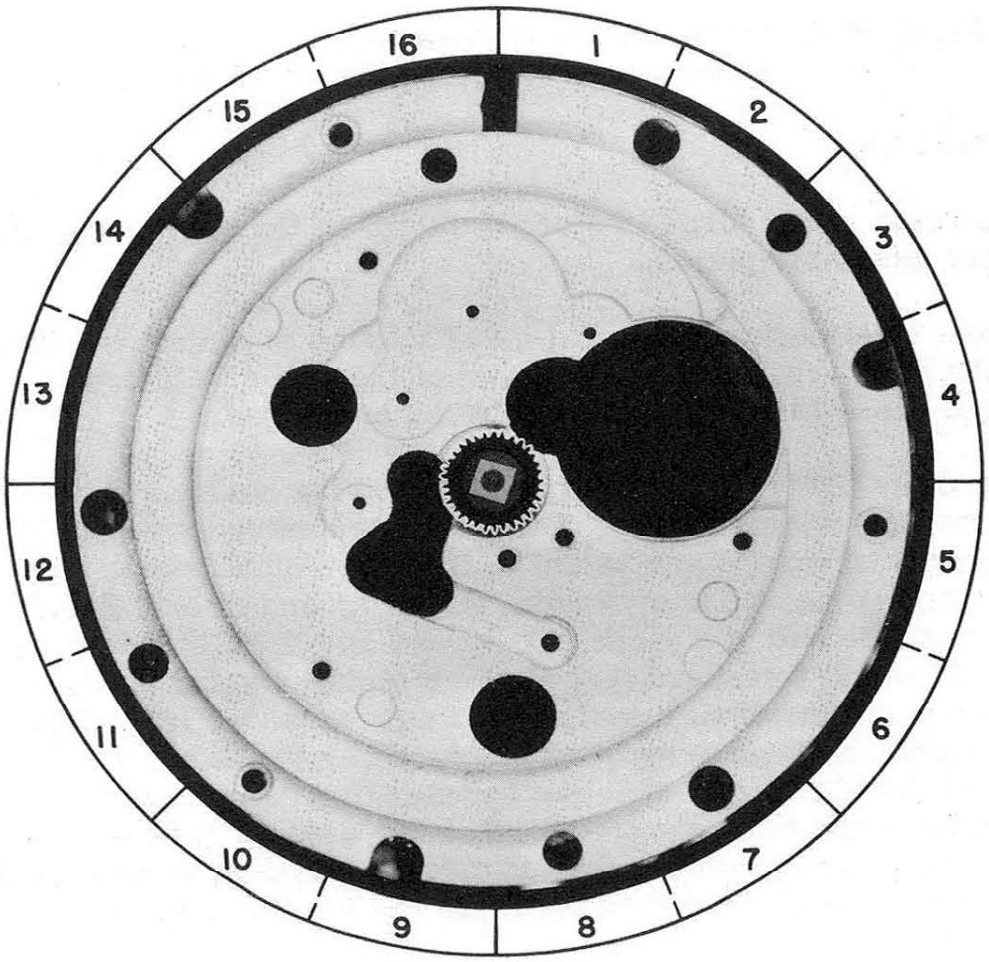
Assembly
No. 10



Rotor Arbor Winding Pinion

OILING

The teeth on the rotor arbor winding pinion that contacts spring on rotor arbor should be slightly moistened with oil.



PART NO. 11

A. DISASSEMBLY PROCEDURE OF ROTOR ARBOR:

To remove the rotor arbor, simply lift it out of place.

B. ASSEMBLY PROCEDURE OF ROTOR ARBOR:

Place the rotor arbor on lower rotor plate in position shown in photograph. The end "A" of rotor arbor with ratchet driving spring should be down.

C. FUNCTION OF ROTOR ARBOR:

The function of this arbor is to do two things:

1. It holds the rotor weight in position to function properly.

2. It turns the rotor arbor winding pinion when rotor weight is turned clockwise.

REFERENCE: Rotor weight is Assembly 1.
Rotor arbor winding pinion is Assembly 10.

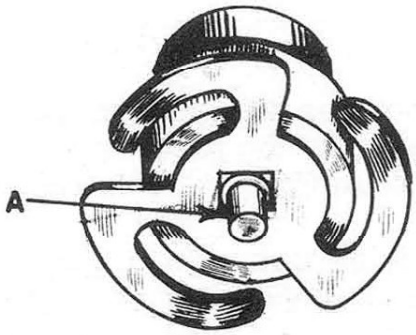
REMARKS:

The rotor arbor turns in steel bushings in the upper and lower assembly plates.

These steel bushings are not usually found in plates, but due to the comparatively heavy weight of the rotor weight, it would cause excessive wear to brass bushings.

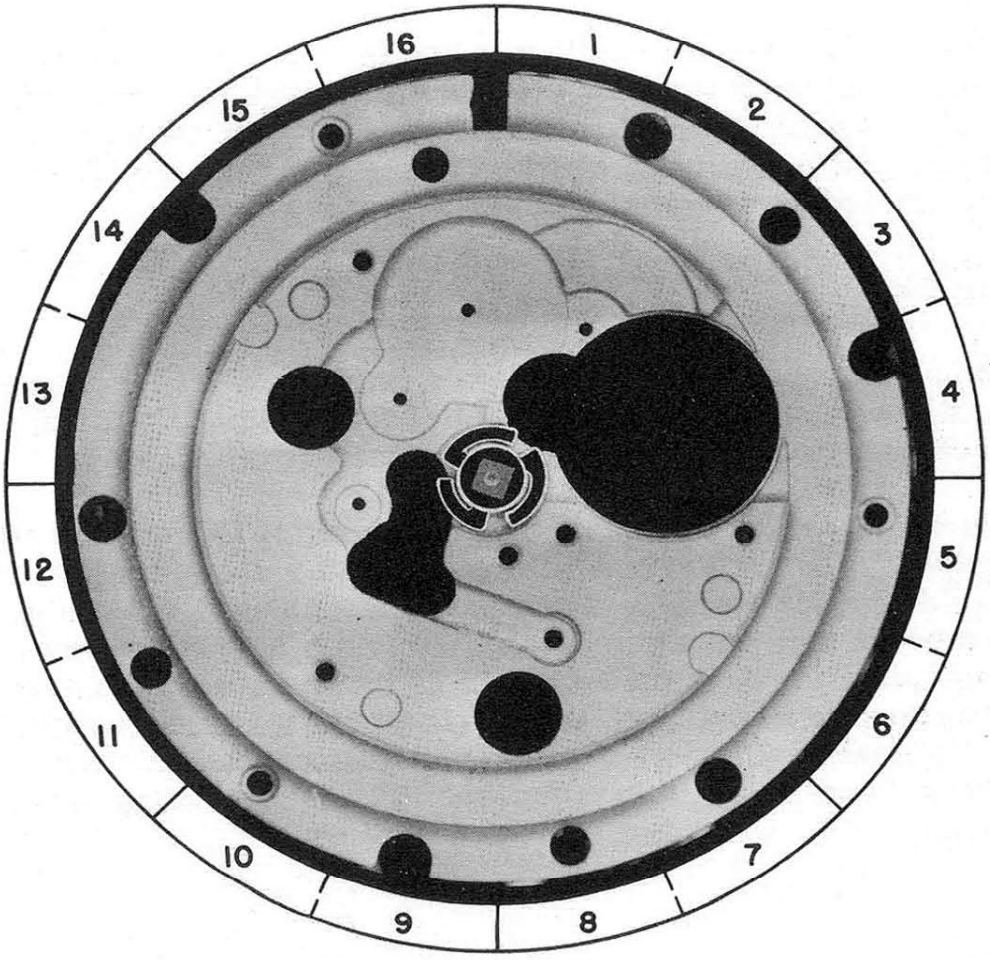
The three blades of the rotor arbor driving spring are arranged in step formation. These springs being arranged in step formation are equivalent to the rotor drive pinion having three times as many teeth. When the end of one blade reaches the end of a tooth, the second and third blades reach to 1/3 and 2/3 respectively of other teeth. Consequently, any one end of driving spring need not travel the full width of a tooth on the driving pinion before coming to a position to set the winding mechanism in operation. Due to the end of blade traveling only one third of the width of the tooth on the rotor drive pinion before it turns the pinion, a very small movement of rotor weight operates the winding mechanism.

Rotor arbor Assembly No. 11



OILING

The shoulder on rotor arbor that the rotor arbor winding pinion pivots on should be slightly moistened with oil.



PART NO. 12

LOWER ROTOR PLATE

The lower rotor plate shown in the photograph was removed from the watch movement as part of the lower rotor plate and automatic winding mechanism as Part No. 2 in this text.

The main purpose of showing this part at this place is to show the shape of the lower rotor plate after the automatic winding mechanism is removed from the lower rotor plate.

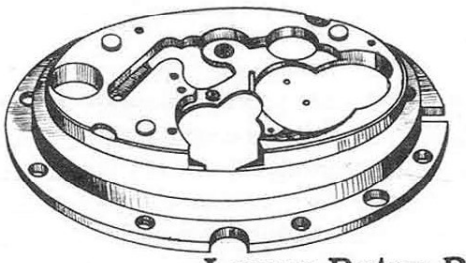
The automatic winding mechanism is assembled on this plate; the assembly is then placed on the watch as a unit. This unit completely covers the watch mechanism and prevents any adjustment to the watch after it is replaced. However, if it is necessary to make adjustments to the watch after it is completely assembled, this plate and assembly is removed as a unit and enables a repairman to quickly make adjustments without disassembly of the automatic winding mechanism.

When assembling the automatic winding mechanism on the rotor plate, it should be assembled with the same care that you would assemble a watch. The holes for the pivots should be carefully pegged out and it should be checked to see that the rotor drive wheels turn freely when not held by the rotor click.

REMARKS:

Some repairmen replace the lower rotor plate on the movement, and then assemble the rest of the automatic winding mechanism while the plate is on the watch.

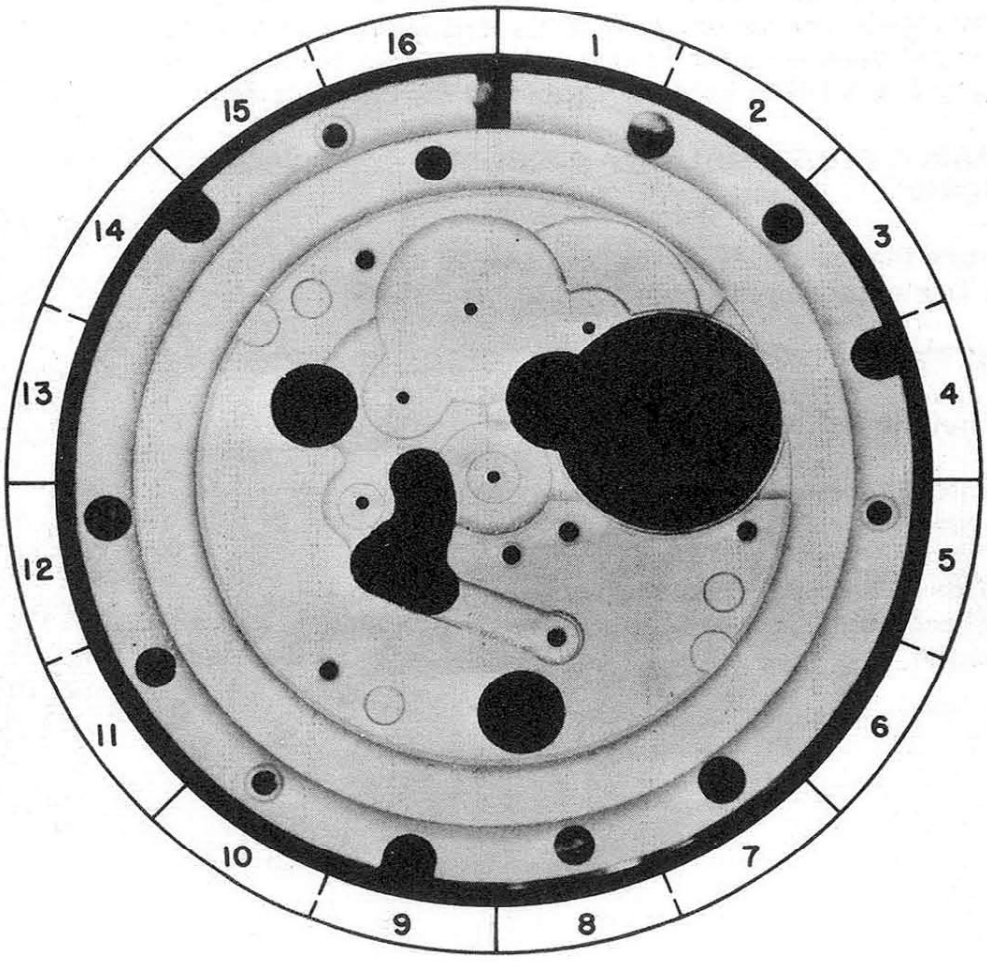
The disadvantage in this method of assembly is that it is impossible to check the endshake of the rotor drive wheels and the rotor click after these parts are assembled. This is due to the fact that you cannot get to the under side of the lower rotor plate to check the endshake of these wheels. Another disadvantage in the method described above in assembly of the automatic winding mechanism is that you will be working with the watch rather than just the automatic winding mechanism.



Lower Rotor Plate
Assembly No. 12

OILING

The lower rotor plate should not be oiled.



PART NO. 13

A. DISASSEMBLY PROCEDURE OF STEEL RATCHET WHEEL SPACER:

Caution: Before removing this part, be sure to let the power down on the mainspring and remove the balance assembly from the watch. The mainspring power is let down as you would let down the power in an ordinary watch. If the mainspring power is not let down at this time, it may result in loss or damage to parts of this mechanism.

This steel ratchet wheel spacer is held to the barrel arbor by fillister head screw FS-6. Remove screw and spacer may be lifted from shoulder on the barrel arbor.

(The shape of screw for this part is shown at bottom of page.)

B. ASSEMBLY PROCEDURE OF STEEL RATCHET WHEEL SPACER:

Place the steel ratchet wheel spacer in recess in upper ratchet wheel with the two slots in spacer up as shown in the photograph. The square hole in the spacer should fit over the small square on the barrel. Now replace fillister head screw FS-6 to hold the spacer to the barrel arbor.

C. HAZARDS IN ASSEMBLY OF STEEL RATCHET WHEEL SPACER:

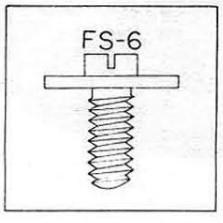
Be sure the spacer is on the shoulder of the barrel arbor before tightening screw.

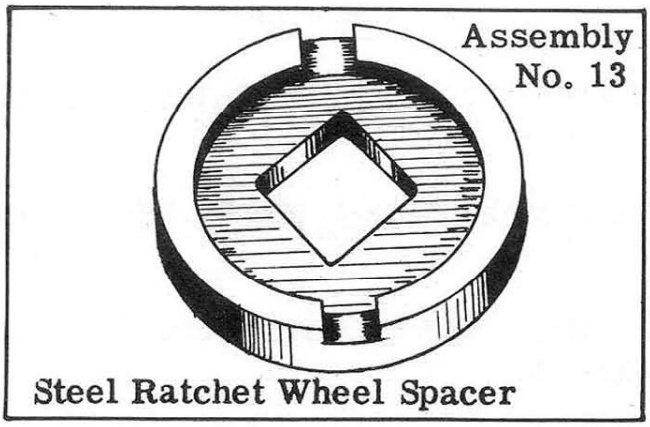
D. FUNCTION OF STEEL RATCHET WHEEL SPACER:

The function of this spacer is to do two things:

1. It holds the ratchet wheels and spacer on the barrel arbor.

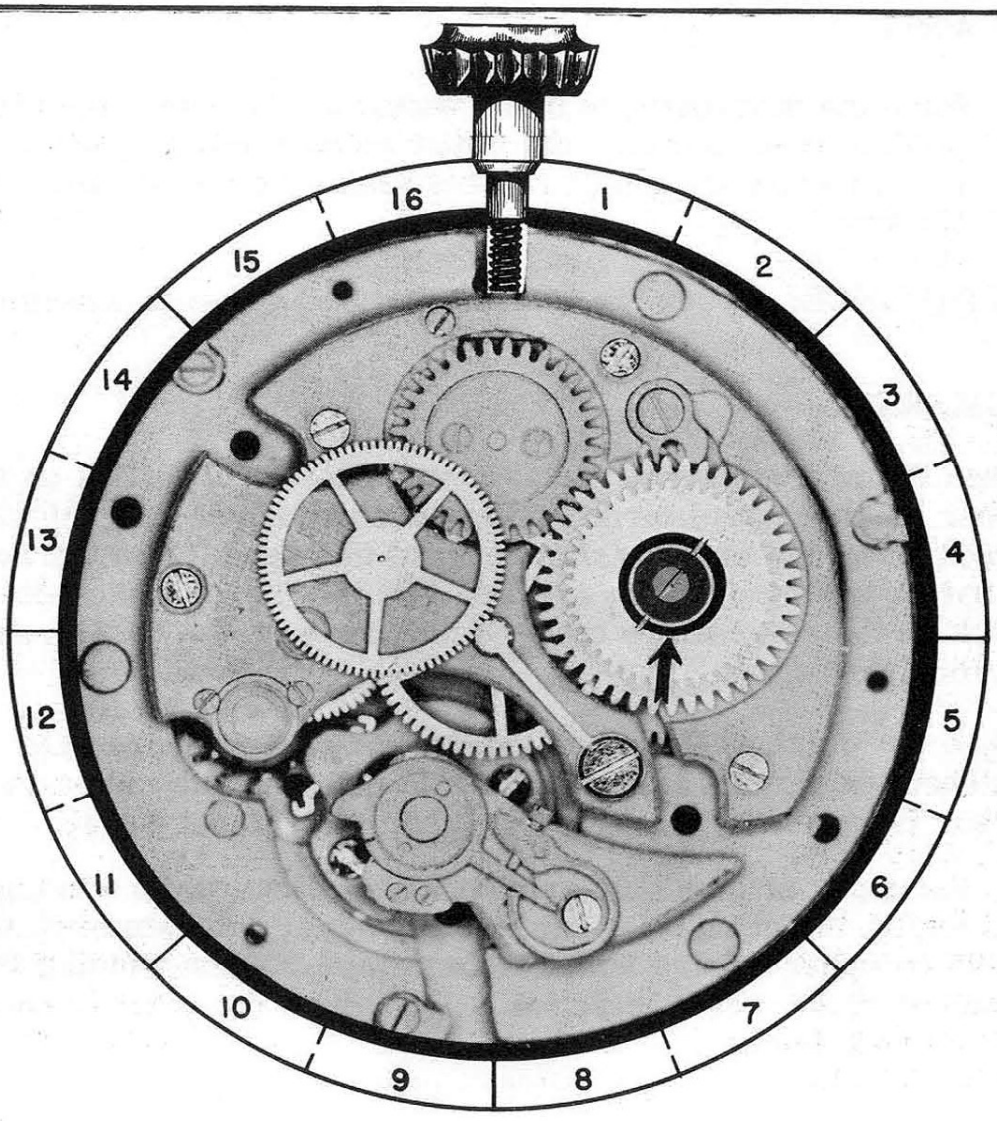
2. This spacer provides proper spacing for the ratcher wheels and brass spacer to work with the proper end-shake.





OILING

The steel ratchet wheel spacer should not be oiled.



PART NO. 14

A. DISASSEMBLY PROCEDURE OF SMALL RATCHET WHEEL (UPPER):

To remove this ratchet wheel, simply lift it from the barrel arbor.

B. Explanation of the Assembly Procedure of this part is explained on Page 15.

C. FUNCTION OF SMALL RATCHET WHEEL (UPPER):

The function of this wheel is to do two things:

1. When this wheel is turned by the automatic winding, the ratchet on this wheel turns the upper square hole ratchet wheel.

2. When the movement is being wound by the stem, the click on this wheel permits the upper square hole ratchet wheel to turn while the small ratchet wheel (upper) is held stationary.

REFERENCE: Upper square hole ratchet wheel is Assembly 15.

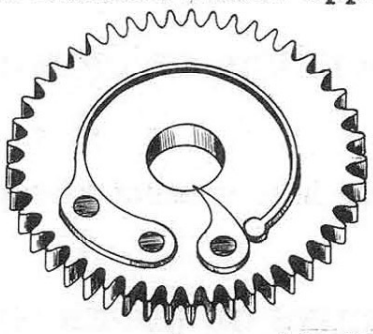
REMARKS:

When the mainspring is wound automatically, the click on the upper ratchet wheel turns the upper square hole ratchet wheel which turns the barrel arbor to wind the watch. The barrel arbor is prevented from unwinding at this time by the rotor click on the rotor drive train which prevents the train from turning backward.

When the watch is wound manually, the upper square hole ratchet wheel must turn with the barrel arbor as the barrel arbor is turned by the lower square hole ratchet wheel.

As the upper square hole ratchet wheel turns while winding manually, the click on upper ratchet wheel ratchets over the teeth on upper square hole ratchet wheel. When winding is completed, the recoiling click will prevent the barrel arbor from unwinding.

Small Ratchet Wheel Upper

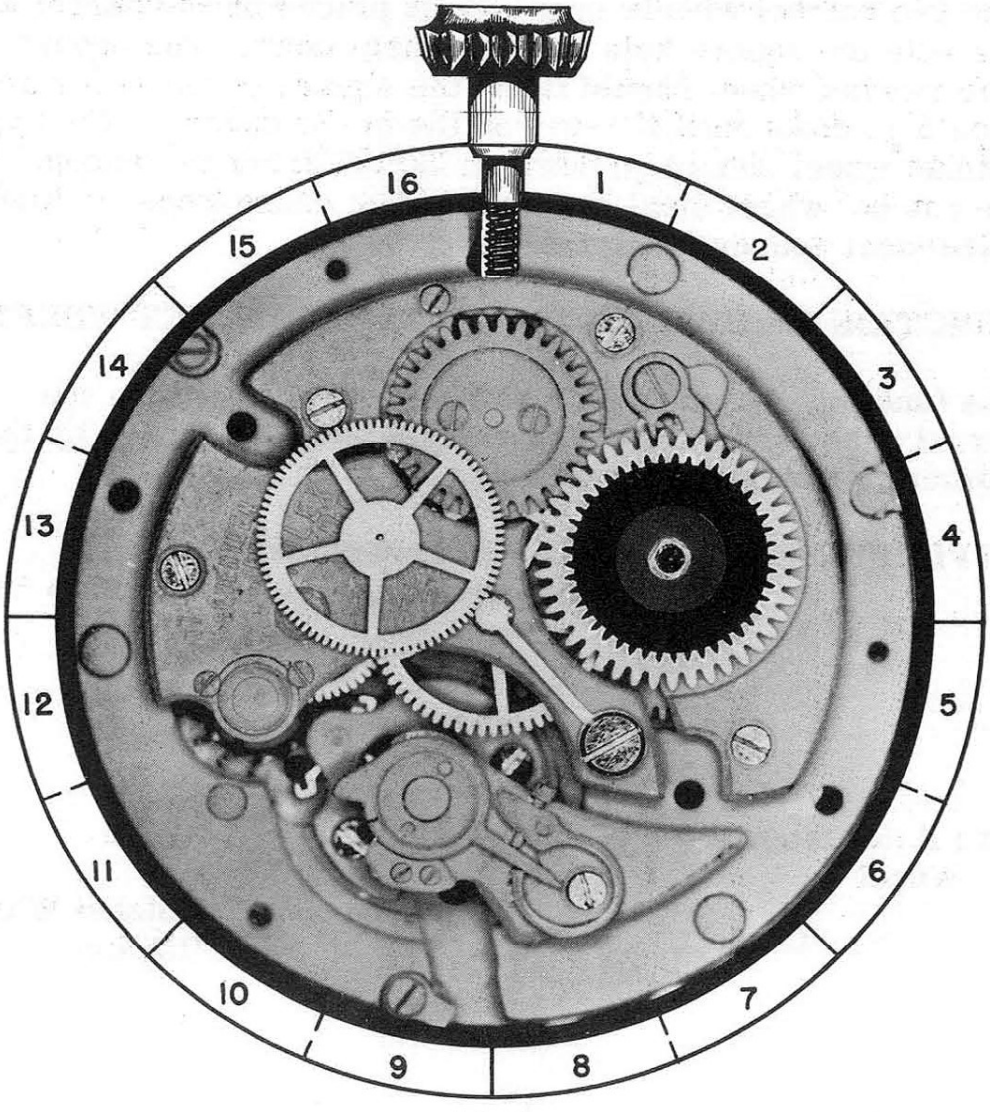


Assembly No. 14

OILING

The following points of ratchet wheel should be slightly moistened with oil:

1. The click spring at point of contact with the click.
2. The surface of ratchet wheel that contacts barrel arbor.



14-A

PART NO. 15

A. DISASSEMBLY PROCEDURE OF UPPER SQUARE HOLE RATCHET WHEEL:

To remove the square hole ratchet wheel, simply lift it from the barrel arbor.

B. ASSEMBLY PROCEDURE OF UPPER SQUARE HOLE RATCHET WHEEL:

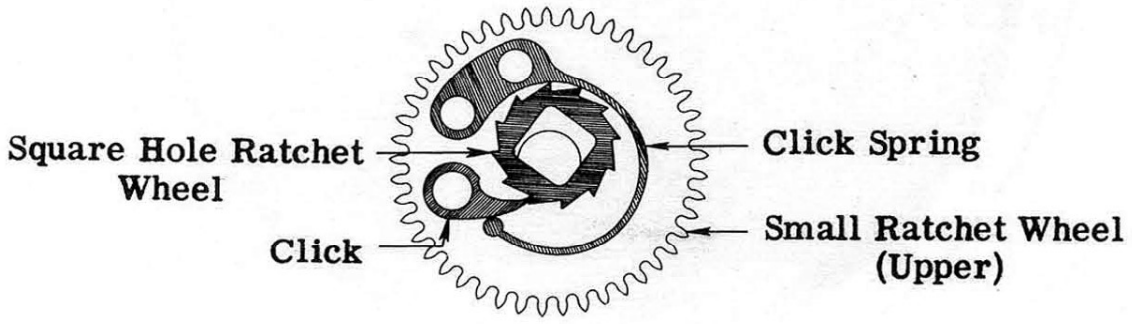
To replace the upper square hole ratchet wheel, place the small ratchet wheel (Part No. 14) on bench with the ratchet click and spring up. Now place the square hole ratchet on this wheel as shown in drawing at bottom of this page.

The two ratchet wheels may now be placed on the barrel arbor with the square hole ratchet wheel down. The square hole ratchet wheel should fit on the square of the arbor and should go down until it rests on the brass spacer. The upper ratchet wheel should go down on barrel arbor far enough so the ratchet wheel steel spacer will not cause wheel to bind when steel spacer is replaced.

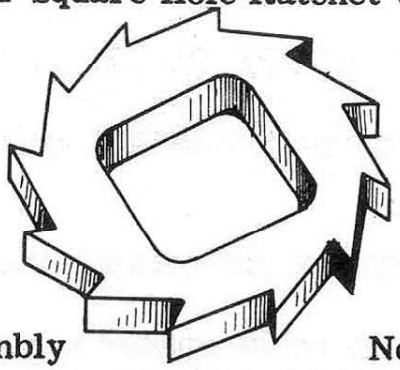
C. FUNCTION OF UPPER SQUARE HOLE RATCHET WHEEL:

The function of square hole ratcher wheel is to turn the barrel arbor when the small ratchet wheel is turned by the automatic winding mechanism.

REFERENCE: Brass spacer is Assembly 16.
Steel ratchet wheel spacer is Assembly 13.



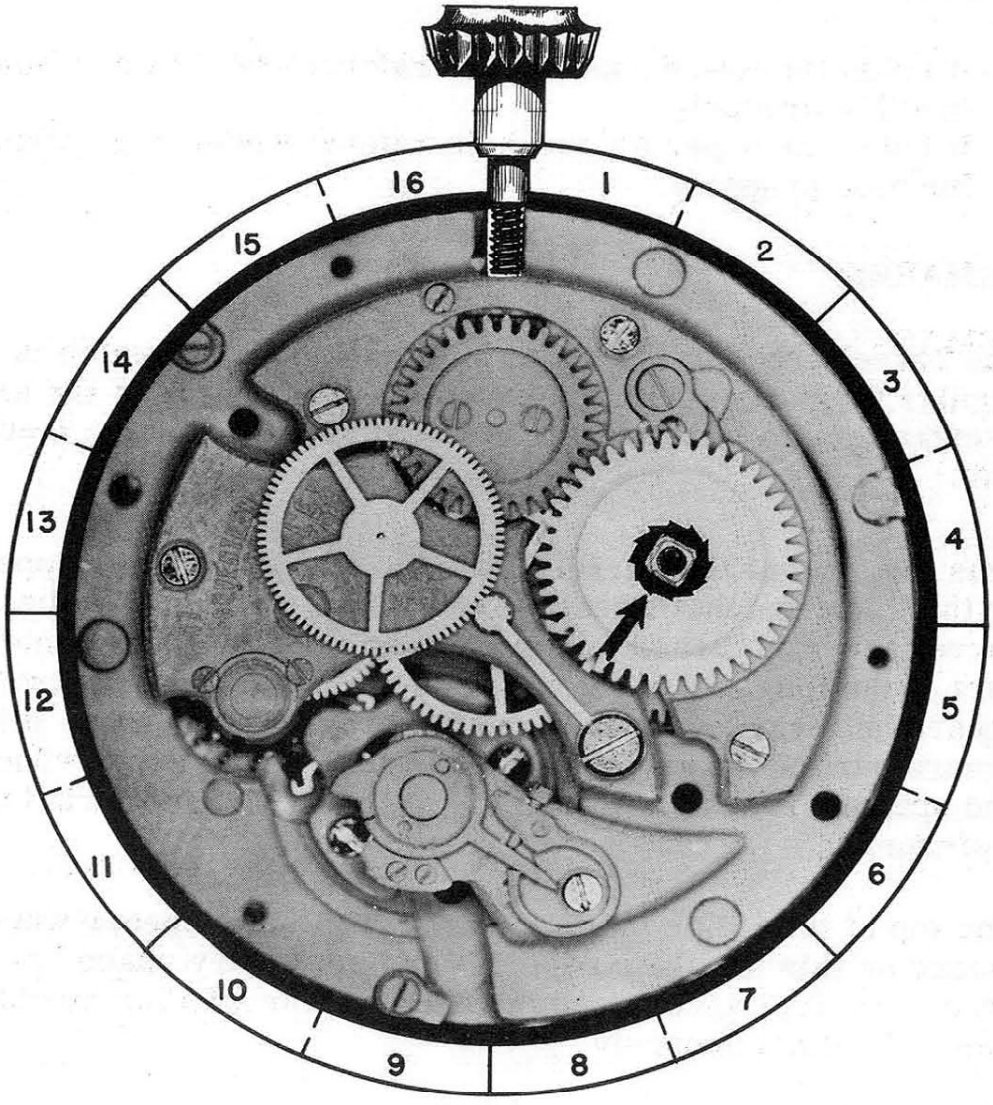
Upper Square Hole Ratchet Wheel



Assembly No. 15

OILING

The teeth on the upper square hole ratchet wheel should be slightly moistened with oil where they contact the click.



PART NO. 16

A. DISASSEMBLY PROCEDURE OF BRASS SPACER:

To remove the brass spacer, simply lift it from the barrel arbor.

B. ASSEMBLY PROCEDURE OF BRASS SPACER:

The square hole in the brass spacer is placed on the barrel arbor. The spacer should go down on barrel arbor until it rests on the square hole ratchet wheel. Either side of the spacer may be placed down.

C. FUNCTION OF BRASS SPACER:

The function of the spacer is to do two things:

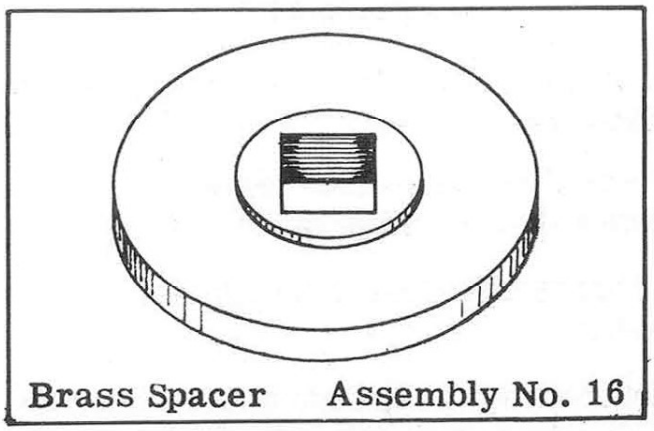
1. It holds the lower square hole ratchet wheel in position to function properly.
2. It holds the upper square hole ratchet wheel in position to function properly.

REMARKS:

The barrel arbor in the Rolex automatic winding watch is a regular type arbor with the exception that the top of the arbor is extra long to receive part of the automatic winding mechanism.

This long end of the barrel arbor is cut so either the upper or the lower ratchet wheels may remain stationary while the barrel arbor is turned to wind the mainspring. The center part of the long end of the arbor is cut square and the two square hole ratchet wheels and the brass spacer fit on this square part of the arbor. These square hole ratchet wheels and spacer always turn when the arbor is turned to wind the mainspring.

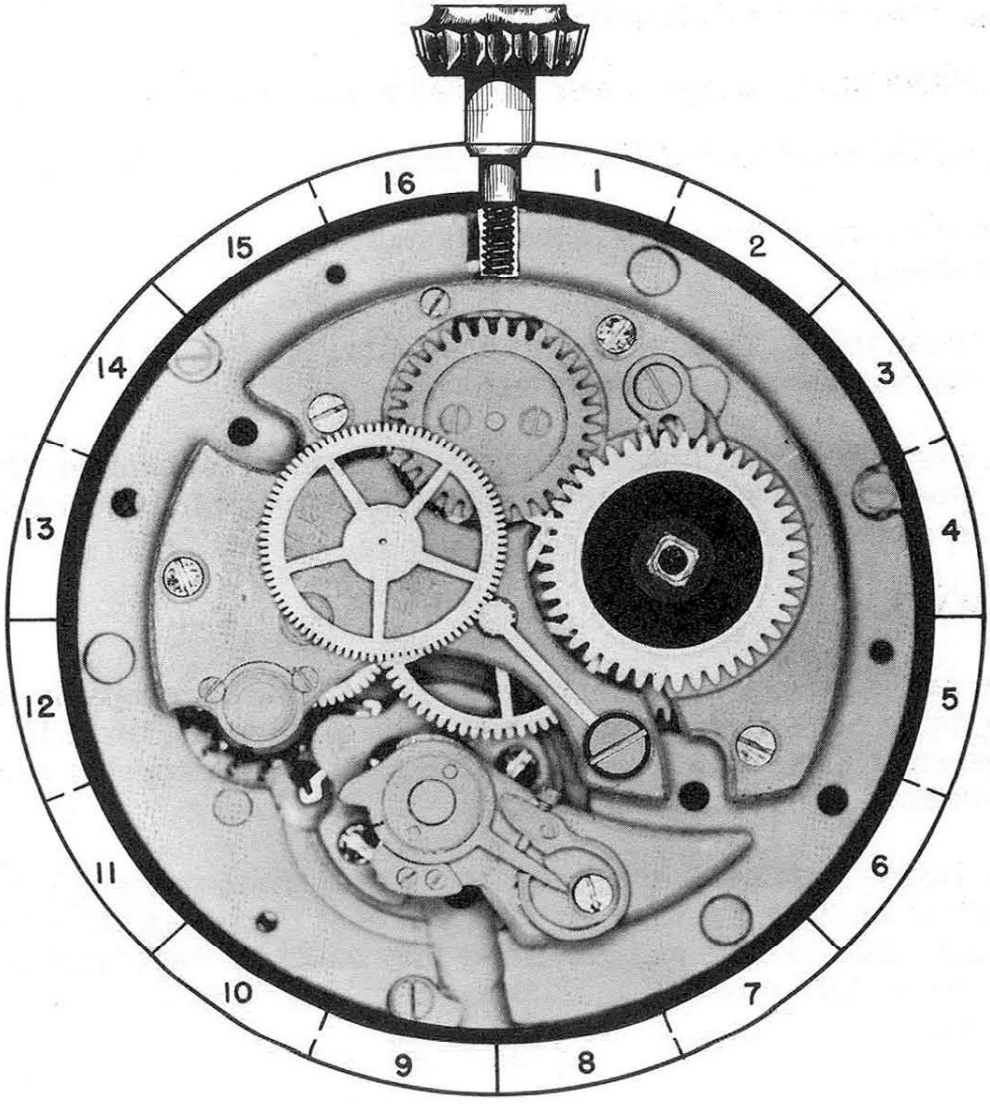
The top of the arbor is cut square. The steel spacer when placed on this shoulder provides the necessary space between the steel spacer and the plate for the winding mechanism to function properly.



Brass Spacer Assembly No. 16

OILING

The brass spacer should not be oiled.



16-A

PART NO. 17

A. DISASSEMBLY PROCEDURE OF LOWER SQUARE HOLE RATCHET WHEEL:

This ratchet wheel is lifted from the click on the lower ratchet wheel, and then lifted from the barrel arbor.

B. ASSEMBLY PROCEDURE OF LOWER SQUARE HOLE RATCHET WHEEL:

Place the square hole ratchet wheel on the barrel arbor. The wheel should go down on arbor until it rests on the click of the lower ratchet wheel. Now move the click of the lower ratchet wheel from under the square hole ratchet wheel. When the click of the lower ratchet wheel is released, the end of this click should engage with the ratchet teeth of the square hole ratchet wheel as shown in photograph. Be sure that the square hole ratchet wheel is placed on barrel arbor with the proper side down so it will function properly.

REFERENCE: Large lower ratchet wheel is Assembly 18.

C. FUNCTION OF LOWER SQUARE HOLE RATCHET WHEEL:

The function of the lower square hole ratchet wheel is to do two things:

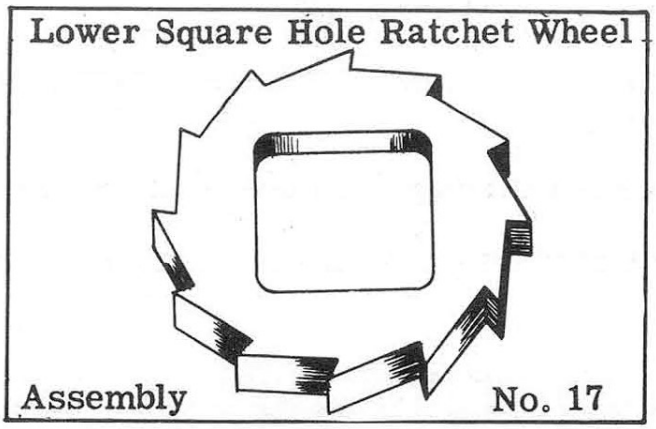
1. When the watch is wound by the stem, the square hole ratchet wheel turns the barrel arbor.

2. When the watch is wound by the automatic mechanism, this wheel turns with the arbor while the lower ratchet wheel remains stationary.

REMARKS:

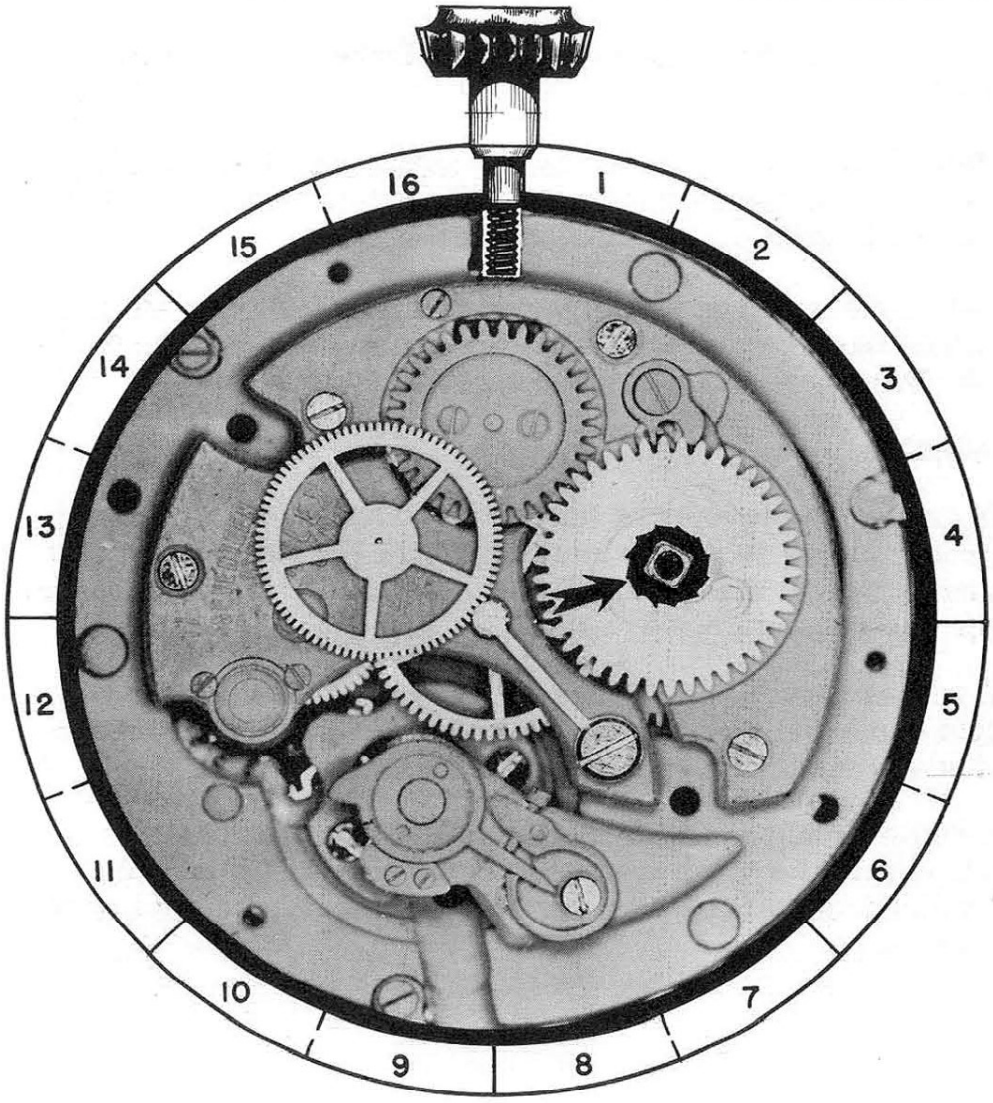
The ordinary type of mainspring will not function properly in the Rolex self-winding movement. The mainspring for this movement must be of special design to function properly and prevent overwinding of the spring.

The Rolex Watch Company claims that the mainspring made by them for this watch is made of the best tempered steel and an infallible tension and elasticity test made by their machines guarantee its immunity against breakage under stress and strain.



OILING

The teeth on the lower square hole ratchet wheel should be slightly moistened with oil where they contact the click.



PART NO. 18

A. DISASSEMBLY PROCEDURE OF LARGE LOWER RATCHET WHEEL:

To remove this wheel, simply lift it from the barrel arbor.

B. ASSEMBLY PROCEDURE OF LARGE LOWER RATCHET WHEEL:

This ratchet wheel is placed on the barrel arbor with the click up. The hole in wheel is placed over the barrel arbor and placed so the wheel rests on the ratchet wheel click which is on the plate. Now move this click out and press the ratchet wheel down on plate. When the ratchet on plate is released, the end of this ratchet should mesh with the teeth on the ratchet wheel.

C. FUNCTION OF LARGE LOWER RATCHET WHEEL:

The function of the large lower ratchet wheel is to do two things:

1. When the watch is wound by the stem, the click on this wheel turns the lower square hole ratchet wheel to wind the mainspring.

2. When the watch is wound automatically, the click on this wheel permits the square hole ratchet wheel to turn while the large lower ratchet wheel remains stationary.

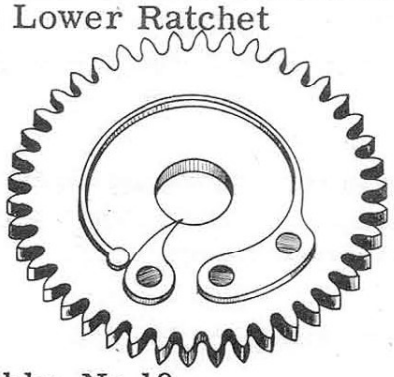
REMARKS:

The ratio of the turning of the barrel arbor to the turning of the rotor weight is approximately $73\frac{1}{2}$ to 1. This means that the rotor weight must make $73\frac{1}{2}$ revolutions to turn the barrel arbor one revolution.

Due to this reduction in gearing, the weight of the rotor weight can overcome the resistance of the fully wound mainspring and turn freely in either direction.

The rotor weight even when turning the barrel arbor this small amount for each complete revolution will fully wind the mainspring after being worn on the wrist for a period of six hours.

Large Lower Ratchet Wheel

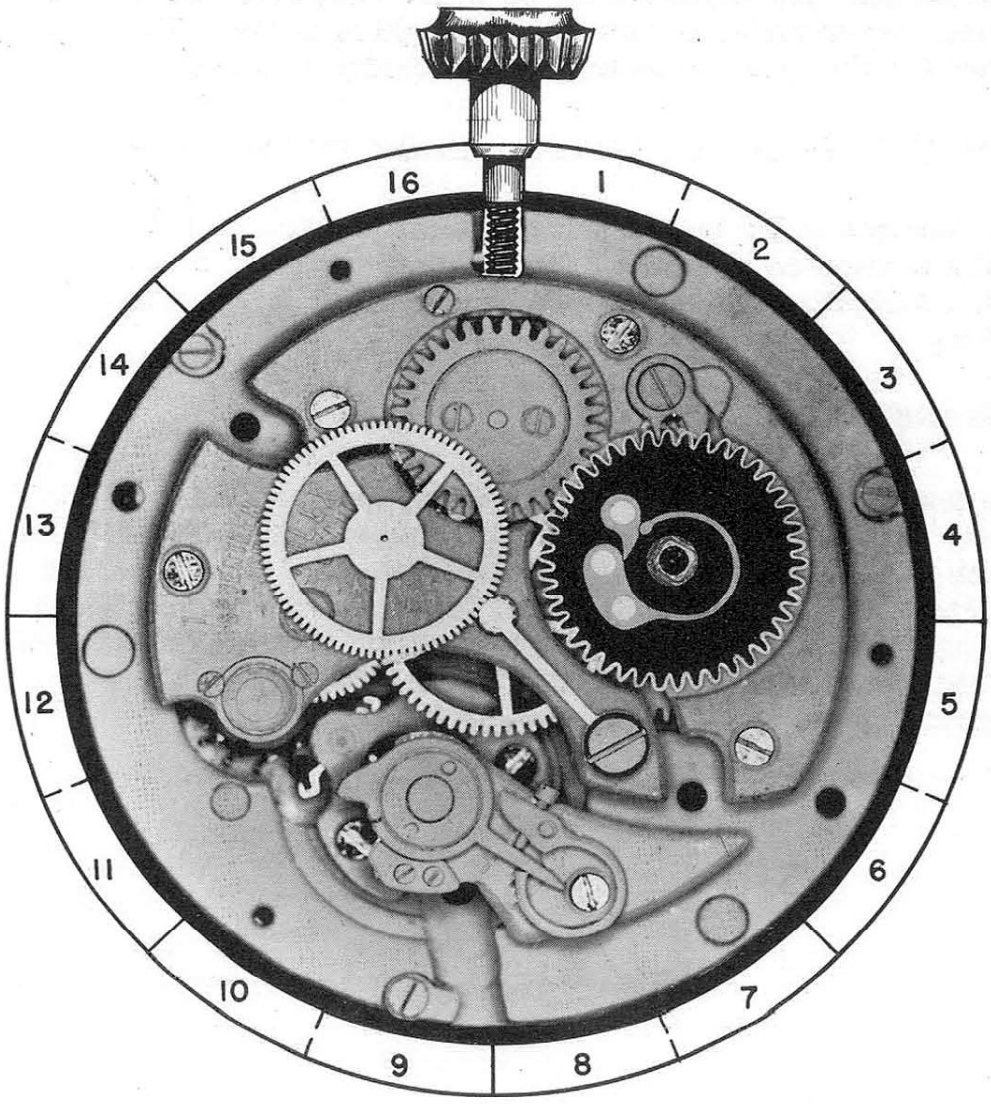


Assembly No.18

OILING

The following points of the ratchet wheel should be slightly moistened with oil:

1. **The click spring at point of contact with the click.**
2. **The surface of ratchet wheel that contacts barrel arbor.**



PART NO. 19

A. DISASSEMBLY PROCEDURE OF SWEEP SECOND PINION TENSION SPRING:

This tension spring is held in place by chamfered flat head screw CFS-1. Remove screw and spring will be free on plate and may be lifted from movement.

(The shape of screw for this part is shown at bottom of page.)

B. ASSEMBLY PROCEDURE OF SWEEP SECOND PINION TENSION SPRING:

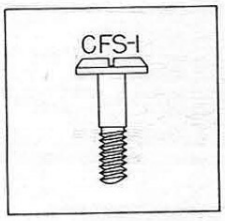
Place the hole in spring over proper hole in bridge. Now replace chamfered flat head screw CFS-1, but before tightening screw, place the end "A" of spring on top pivot of sweep seconds pinion. The pivot should be in the center of end "A" of spring. Hold spring in position and tighten screw. The screw for this part helps to hold the bridge in place.

C. FUNCTION OF SWEEP SECOND PINION TENSION SPRING:

The function of the sweep second pinion tension spring is to hold a tension on the sweep second pinion so that it turns with a smooth, even action with no irregular jumping or jerking.

REMARKS:

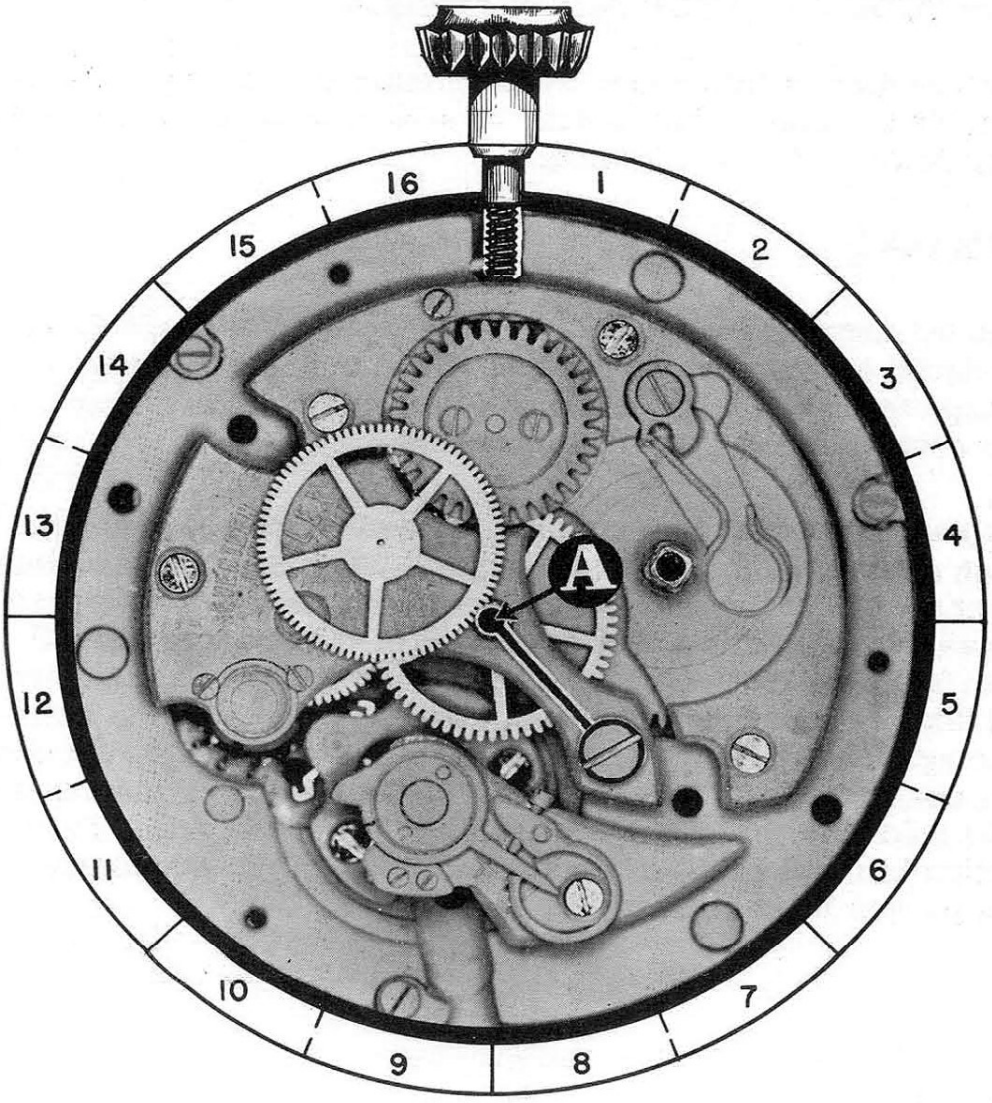
The tension of the sweep second pinion tension spring on the sweep second pinion should be adjusted so that when the watch is running, the seconds hand advances 1/5 of a second for each beat of the watch. If the tension of the spring is too strong, it may cause the watch to stop, or if the tension is not strong enough, the movement of the seconds hand may be irregular.



Sweep Second Pinion Tension Spring Assembly No. 19

OILING

The sweep second pinion tension spring should not be oiled.



PART NO. 20

A. DISASSEMBLY PROCEDURE OF SWEEP SECOND PINION:

The sweep second pinion is lifted straight up to remove the long post "A" from the hollow center pinion.

B. HAZARDS IN DISASSEMBLY OF SWEEP SECOND PINION:

Lift the sweep second pinion up to remove it, as tilting of pinion may bend the post on pinion or burr the hollow center pinion.

C. ASSEMBLY PROCEDURE OF SWEEP SECOND PINION:

Place the long post "A" of the sweep second pinion down in hollow center pinion.

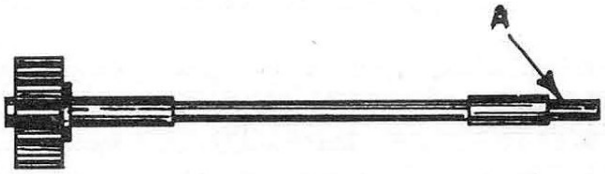
D. FUNCTION OF SWEEP SECOND PINION:

The function of this pinion is to indicate the passage of seconds on the dial. This is done by a hand being attached to the long post "A" on this pinion.

REMARKS:

The mainspring and barrel shown in drawing on Page 21 is designed to prevent overwinding of the mainspring even though the rotor arbor continues to wind the mainspring after the desired tension has been reached.

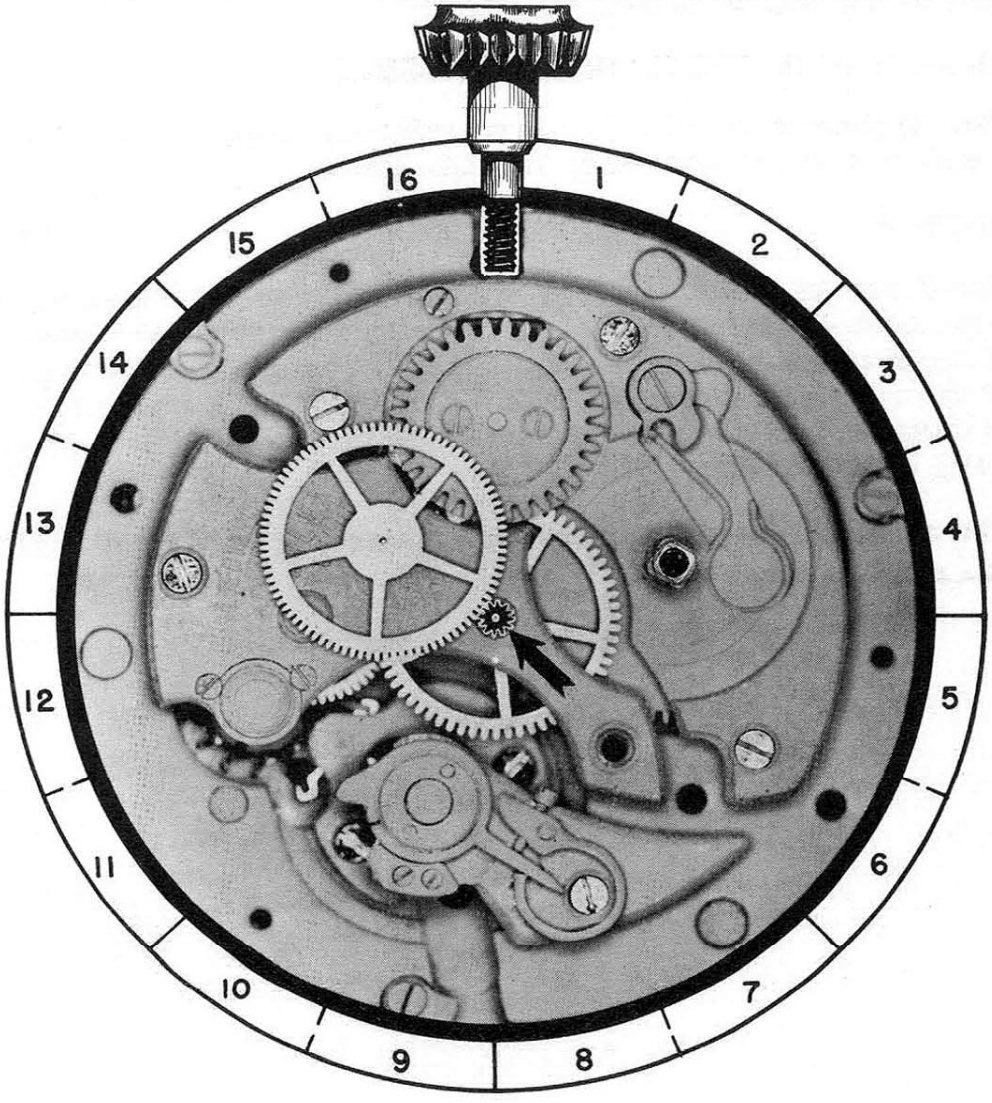
As the mainspring is wound up, the coils become closer to each other around the barrel arbor. When the coils are wound tight enough around the barrel arbor to produce the desired tension on the spring, the outer coil of the mainspring will slip from the notch in the rim of barrel due to the pressure on this outer coil being released by the winding of the mainspring. The end of the mainspring will turn until it reaches the next notch when the pressure of the unwinding mainspring will hold it in this notch until spring is wound again. This action is repeated each time the mainspring is wound beyond the proper tension for the spring.



Sweep Second Pinion
Assembly No.20

OILING

The sweep second pinion should not be oiled.



20-A

PART NO. 21

A. DISASSEMBLY PROCEDURE OF SWEEP SECONDS WHEEL:

This wheel fits friction tight on the long post of the third wheel. This wheel should be removed with a sweep wheel remover, but can be removed with two small thin-blade screw-drivers. The screw-drivers are placed opposite each other under the hub of the wheel. One screw-driver is turned clockwise, while the other is turned counter-clockwise.

B. ASSEMBLY PROCEDURE OF SWEEP SECONDS WHEEL:

The hub of this wheel fits over the third wheel post. It should be placed on post with hub "A" down. The wheel should be staked down until the wheel is friction tight on the third wheel post.

C. HAZARDS IN ASSEMBLY OF SWEEP SECONDS WHEEL:

Care must be used when staking this wheel down so the third wheel post is not bent or broken.

D. FUNCTION OF SWEEP SECONDS WHEEL:

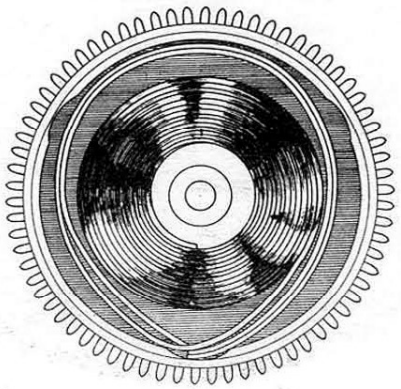
The function of the wheel is to transfer the power from the third wheel of watch to the sweep seconds pinion.

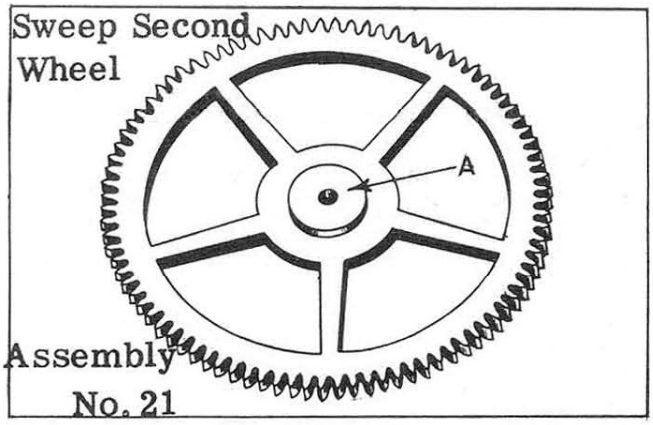
NOTICE NOTICE NOTICE

The design of the mainspring and barrel prevent the mainspring from over-winding. There are three notches cut in the inner circle of the mainspring barrel. The end of the mainspring catches in one of these notches and holds until the mainspring is wound to a certain tension. It then slips to the next notch thus keeping the watch from being over-wound.

The construction of the barrel and the proper position of mainspring are shown in the drawing below.

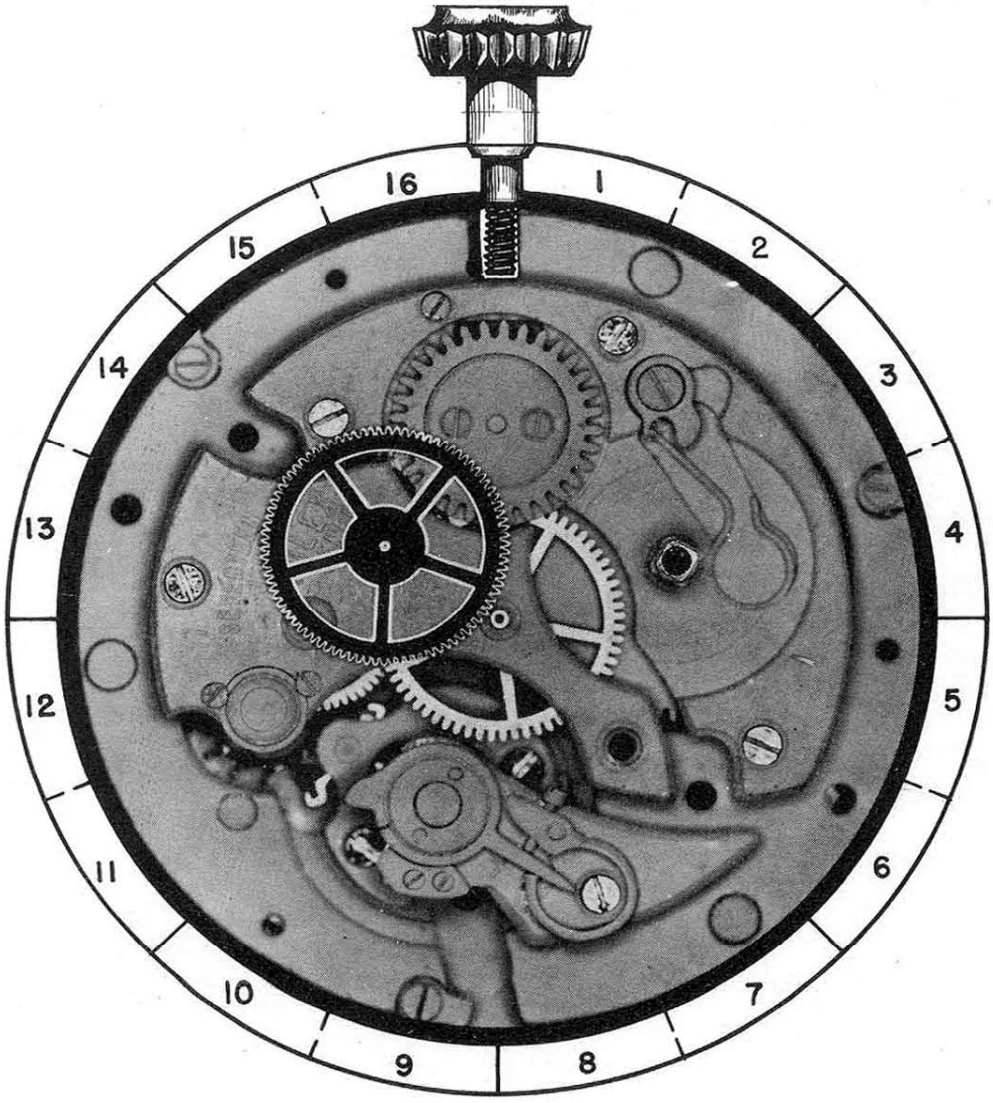
MAINSPRING BARREL





OILING

The sweep second wheel should not be oiled.



21-A