

EBAUCHES SA NEUCHATEL SWITZERLAND



Fontainemelon Watch Manufacturing Co.

LE LANDERON Branch, Le Landeron

11 1/2 4750

25.60 mm.

Enlarged view
of movement

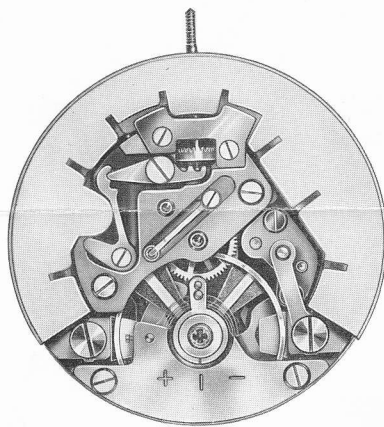


Fig. 1

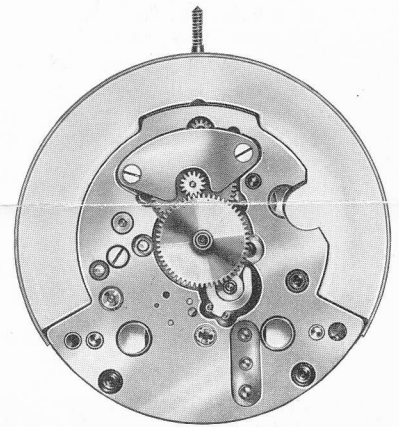


Fig. 2

Electro-mechanical watch with sweep second

Technical and practical communication for the use of the watch repairer

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1. Introduction

This technical communication is intended mainly for watchmakers and jewelers, its purpose being to make them familiar with a new type of watch so that they may understand how it works and may thus be able to service and repair it.

It has an electro-mechanical movement with a balance that acts both as a regulating organ and as a motor. To a large extent, therefore, this device follows the traditional principles of watch design.

We are sure that the information given below will enable watch repairers to widen their knowledge, for the electric watch has become a reality, and the L-4750 electric caliber represents another addition in the production of calibers by Ebauches S.A.

The driving power for the L-4750 movement may be supplied either by a dry cell or by an accumulator that can be recharged.

2. Examples of feed by dry cell or accumulator

2. 1. Feed by dry cell

The dry cell is fitted into a waterproof compartment, which is independent of the movement.

Replacing the dry cell

The user himself can replace the dry cell as follows:

Unscrew the lid of the cell compartment by means of a coin, fig. 4. If the compartment has a snap-on lid, open it by means of a knife.

Throw away the used cell.

Fit a new cell. The + side of the cell should press against the mark + engraved on the back of the lid of the cell compartment. Complete cleanliness is essential.

Screw on the lid of the cell compartment.

Voltage of a new Leclanché 15 P 3.5 dry cell = 1.65 volt \pm 0.05.

Voltage of a new Mallory WD-4 dry cell = 1.35 volt (an excess of 0.2 volt may be found if the cell is a very fresh one).

These two types of cells are interchangeable.



Fig. 3

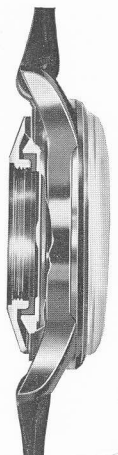


Fig. 4

2. 2. Feed by accumulator

The accumulator is independent of the movement. It is fitted into the back of the case and is hermetically sealed off from the movement.

Recharging the accumulator

Recharging is effected without opening the case, as follows:

Remove the recharging socket cover, fig. 7.

Insert the charger point into the recharging socket, fig. 7.

Place a new 1.5 volt cell of the flashlight-battery type (diameter 25 mm., height 50 mm.) in the charger, fig. 7.

Recharge for 10 to 12 hours.



Fig. 5

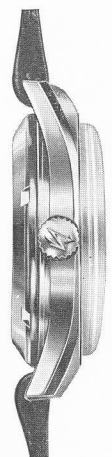


Fig. 6

Important:

It is advisable to recharge the accumulator every 6 months.

Voltage of a Leclanché 30 A 3 accumulator in working order on issue from stock = 1.30 volt \pm 0.05.

Voltage of a freshly recharged 30 A 3 accumulator = 1.40 volt \pm 0.05.



Fig. 7

3. Tools, material and instruments recommended for repair work

3. 1. Tools and material

- Movement holder, fig. 8.
- Plain feed ring, fig. 9 (for complete movement).
- Feed ring with dry cell, fig. 10 (for complete movement).
- Feed plate with 10 plain feed rings, for repairing batches of movements, fig. 11.
- Plastic cover for movement.
- Contact tweezers.
- Non-magnetic tweezers.

The above material is supplied by EBAUCHES S. A., Repair Parts Service, NEUCHATEL, Switzerland, and can be obtained from your material distributor.

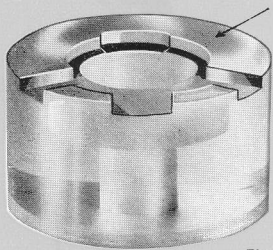


Fig. 8

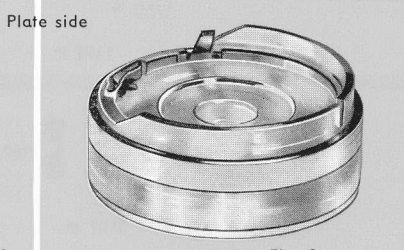


Fig. 9

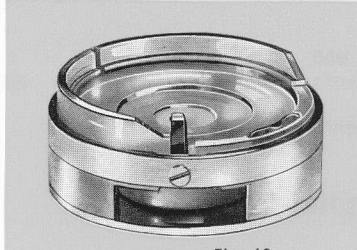


Fig. 10

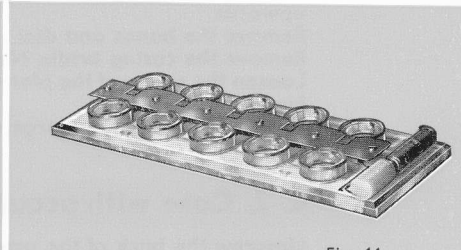


Fig. 11

3. 2. Instruments

Function

Instruments and manufacturers

Instruments

Checking voltage of cell or accumulator.

VOLT-OHMMETER

Checking continuity of circuit (break or short-circuit) and working of contact protector elements.

Volt-ohmmeter for D. C. with high internal resistance equal to or over 20,000 Ω /volt.

This instrument can be obtained from a qualified radio-electrician.



Fig. 12

Checking and observing the instantaneous rate.

The instruments now on the market are perfectly suitable (18,000 vibrations per hour).

The following are mentioned by way of example:

“ VIBROGRAF ”

Manufacturers:
RENO S.A., La Chaux-de-Fonds, Switzerland.

“ CHRONOGRAPHIC ”

Manufacturers:
GREINER ELECTRONIC, Langenthal, Switzerland.



Fig. 13

Feed of movement on plain feed ring.

One or other of the following instruments may be recommended:

“ ELECTROTEST ”

Manufacturers:
RENO S.A., La Chaux-de-Fonds, Switzerland.

“ MULTISCOPE ”

Manufacturers:
GREINER ELECTRONIC, Langenthal, Switzerland.

Checking and measuring current consumption.

Checking the contact image by means of the oscilloscope.

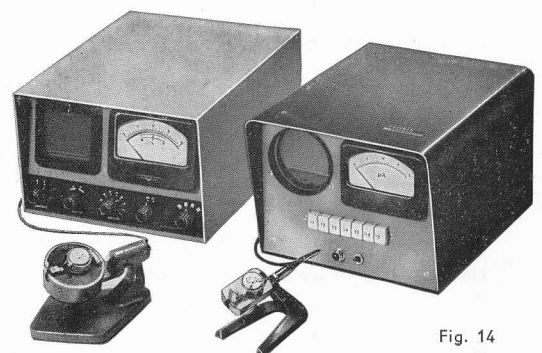


Fig. 14

4. Removing the case

The method of fixing the movement inside the case varies according to the casing system used. Two commonly used types are described below.

4. 1. Case with dry cell, fig. 15

Remove the used cell (see 2. 1.).
 Unscrew the back of the case.
 Remove the feed bridge No. 4035.
 Remove the setting lever No. 443.
 Withdraw the hand-setting stem No. 405.
 Withdraw the hand-setting pinion No. 412.
 Remove the two special case screws No. 5102.
 Take the movement out of the case and place it on the flat side of the movement holder, with the dial upwards.
 Remove the hands and dial.
 Remove the casing bridge No. 960.
 Loosen the screw of the plate-enlargement ring, No. 5158.
 Withdraw the plate-enlargement ring.

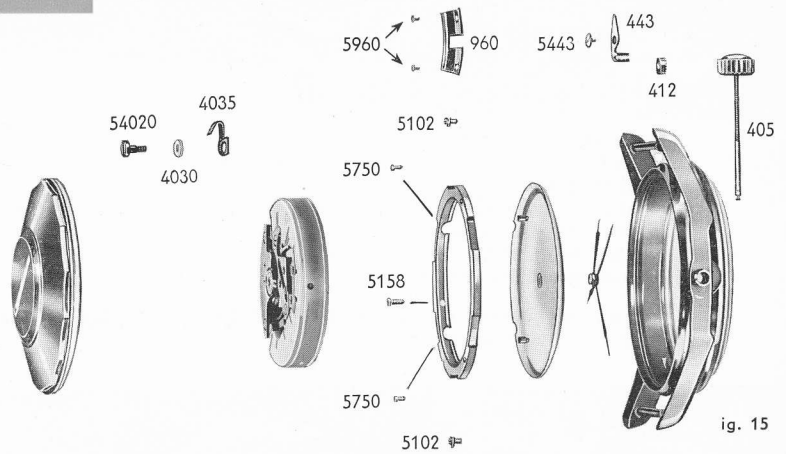


fig. 15

4. 2. Case with accumulator, fig. 16

Unscrew the back of the case.
 Do not remove the accumulator.
 Remove the feed bridge for accumulator No. 4036.
 Remove the setting lever No. 443.
 Withdraw the hand-setting stem No. 405.
 Withdraw the hand-setting pinion No. 412.
 Remove the two special case screws No. 5102.
 Take the movement out of the case and place it on the flat side of the movement holder, with the dial upwards.
 Remove the hands and dial.
 Remove the casing bridge No. 960.
 Loosen the screw of the plate-enlargement ring, No. 5158.
 Withdraw the plate-enlargement ring.

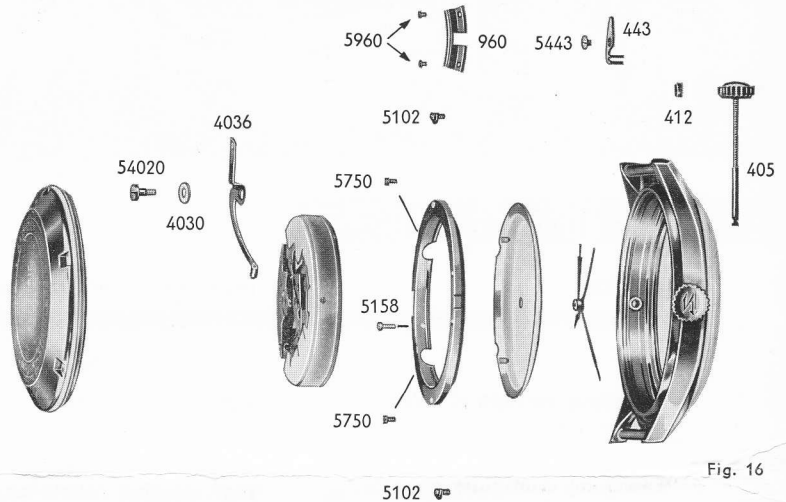


Fig. 16

4. 3. Replacing the accumulator

When an accumulator shows traces of oxidation, if it is swollen or if it will no longer take a fresh charge, it should be replaced as follows:
 Unscrew the clamping ring for accumulator No. 4953.
 Remove the accumulator No. 4969.
 Remove the waterproof joint of the accumulator compartment No. 4952.
 Remove the compensation spring No. 4954.

Note: To reassemble the accumulator, reverse the foregoing procedure, making sure that all parts are perfectly clean.

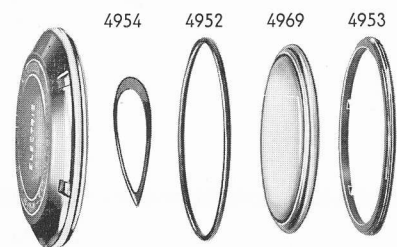


Fig. 17

5. Overhauling the movement

For a complete overhaul, the following order of operations is recommended:

5. 1. Disassembly.
5. 2. Cleaning.

5. 1. Disassembly

Place the movement on the flat surface of the movement holder.

- a) Disassemble the hand-setting mechanism.
- b) Disassemble the shock protectors (balance bearings).
- c) Remove the balance cock No. 121/1 and the balance No. 721.
- d) Remove the pallet cock No. 125 and the click lever No. 4330.
- e) Unscrew the lead No. 4160.
- f) Remove the stator fixing clamp No. 4025.

5. 3. Replacing any faulty parts.
5. 4. Assembling, with successive checking.
5. 5. Final checking of movement after overhaul.

- g) Carefully withdraw the motor stator No. 4020. If there are stator wedges No. 4040 between the laminations of the motor stator and the plate, **carefully separate** the one on the output terminal side of the stator from the one on the input terminal side, to avoid interchanging them when assembling the movement.
- h) Remove the friction spring of the click wheel, No. 4385, the train wheel bridge No. 110 and the train wheels.
- i) Remove the center wheel cock No. 126 and the center wheel No. 206.

Notes: The following parts may be left screwed to the plate: a) The assembled contact No. 4080. b) The contact plate No. 4091. c) The lever magnet No. 4335. In addition, the setting lever spring No. 445 may be left on the train wheel bridge and the friction spring of the sweep second wheel No. 471/4 may be left on the center wheel cock.

The components of the watch

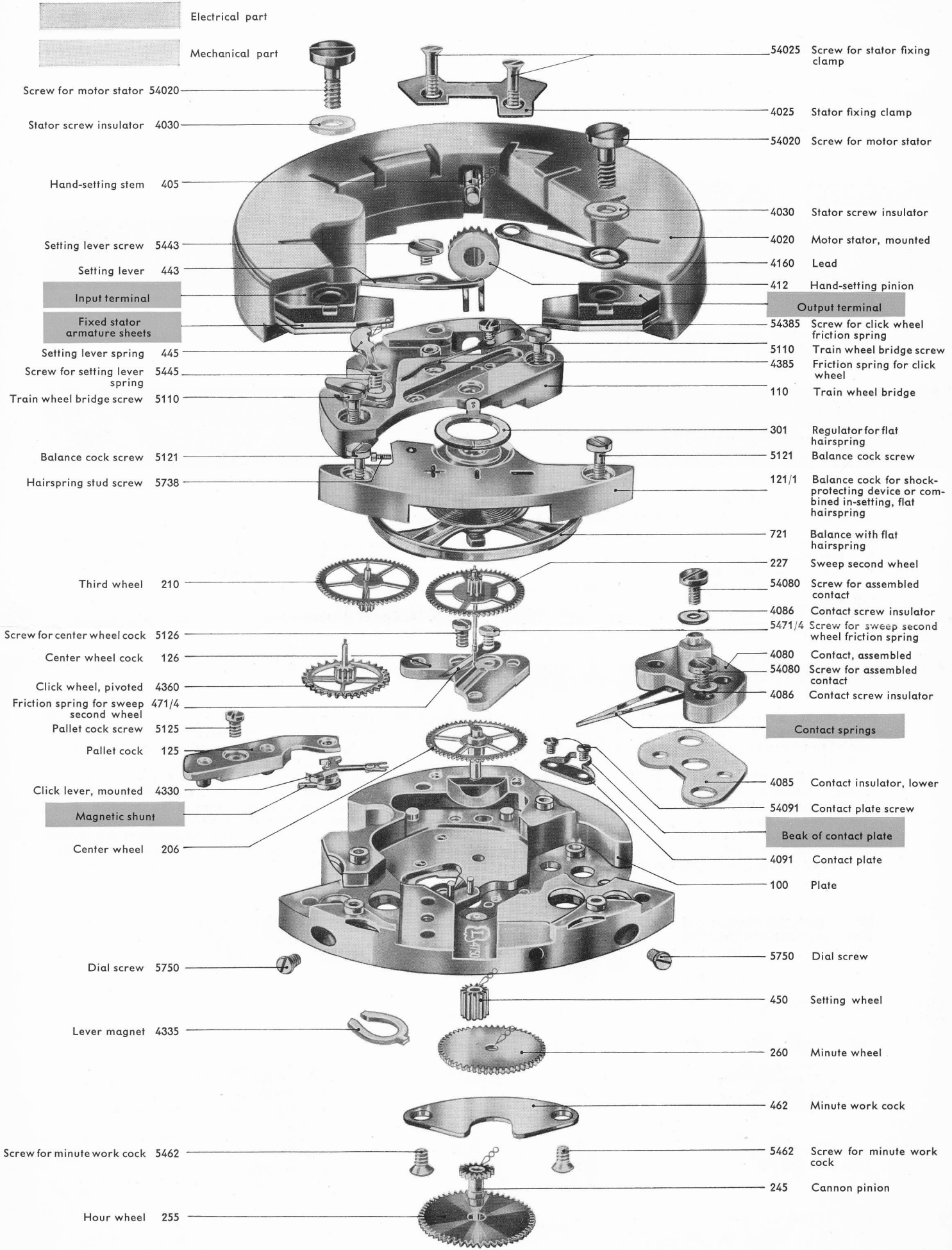


Fig. 18

Also see: 5. 10. Oiling the clickwork, and 5. 13. General lubrication.

5. 2. Cleaning

Clean all parts of the movement (except the motor stator N° 4020) in the cleaning machine, the last bath of which should consist only of isopropyl alcohol. The preceding baths may be of the usual type. Drying should be effected in warm air. The use of boxwood sawdust should in any case be avoided. Self-sticking paper should be used to remove any filings that may have been attracted by the lever magnet No. 4335. After any form of cleaning, the click lever No. 4330 and the click wheel No. 4360 must be given a coating of epilame. On no account should epilame be applied to the assembled contact N° 4080, the contact plate N° 4091 or the balance N° 721.

5. 3. Replacing any faulty parts

Before assembling the movement, check the condition of its parts and, if necessary, replace any faulty part or element. If any defect is found in the balance pivots, the contact finger or the roller, the complete balance should be replaced. The balance staff cannot be replaced by the watchmaker himself. Use only genuine repair parts supplied by the Spare Parts Service of EBAUCHES S. A., Neuchâtel, Switzerland, obtained through your materials distributor.

5. 4. Assembling, with successive checking

Important:

In the electric watch, the balance drives all the moving parts of the movement. It goes without saying that stoppage may occur as a result of any dirt, burrs or excessive friction. Great cleanliness is essential while the movement is being assembled after overhaul, and when the movement is cased up the dial and hands must be fitted with the greatest care.

For assembling, the following order of operations is recommended:

- | | |
|--|--|
| 5. 5. Checking and adjusting the contact. | 5. 10. Assembling the hand-setting mechanism. |
| 5. 6. Checking and adjusting the magnetic return action. | 5. 11. Oiling the clickwork, fitting the click lever. |
| 5. 7. Assembling the train. | 5. 12. Assembling the minute work. |
| 5. 8. Fitting the motor stator and lead, checking the continuity of the circuit. | 5. 13. Fitting the balance, checking the air gap and endshake. |
| | 5. 14. General lubrication. |

5. 5. Checking and adjusting the contact

Place the movement on the side of the movement holder that is intended to take the plate. Check for clean contacts at points a, b and c, fig. 19. Check the tips of the contact springs with special care and, if necessary, correct them with a pair of special tweezers to obtain the position shown at (a), fig. 20. See that the contact springs are correctly centered. The point at which they touch and press against each other should be in line with the hole of the balance jewel, fig. 19. Check the tension of the contact springs, fig. 21; the tension is the pressure exerted by the springs as their tips press against each other). Proceed as follows: holding one of the contact springs by its free end, draw it away with a pair of tweezers. This will release the other spring, which should automatically shift 0.4 to 0.6 mm. away from the hole of the balance jewel. The amount of this shift should be between half and two thirds of the total radius of the shock-protecting device. Check the tension of the other contact spring in the same way. The space between the contact springs and the beaks of the contact plate should be adjusted by bending the beaks slightly. The space should be equal to twice the thickness of a spring (2e), fig. 19. For checking this space and the tips of the contact springs, a strong magnifying glass (12 to 20 ×) should be used.

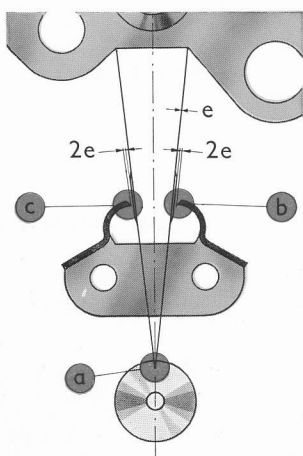


Fig. 19

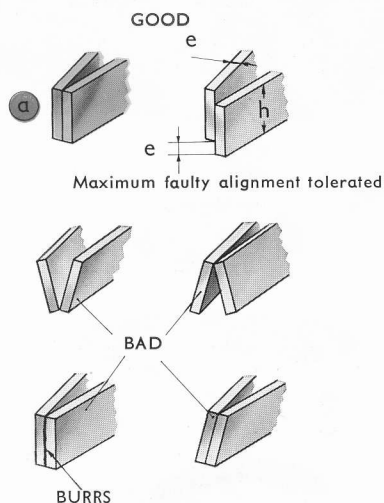


Fig. 20

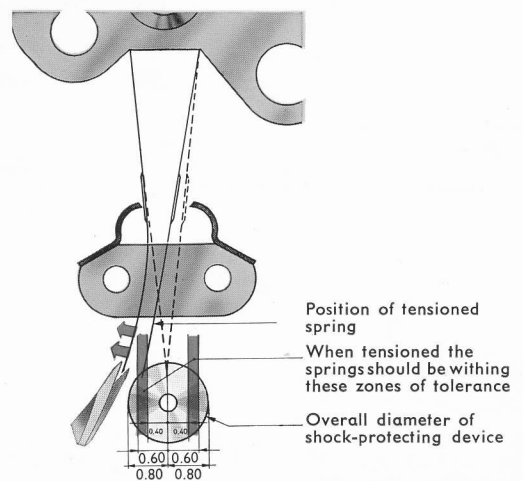


Fig. 21

Dimensions in mm.