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ALARM WRIST-WATCHES

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Fig. 2.

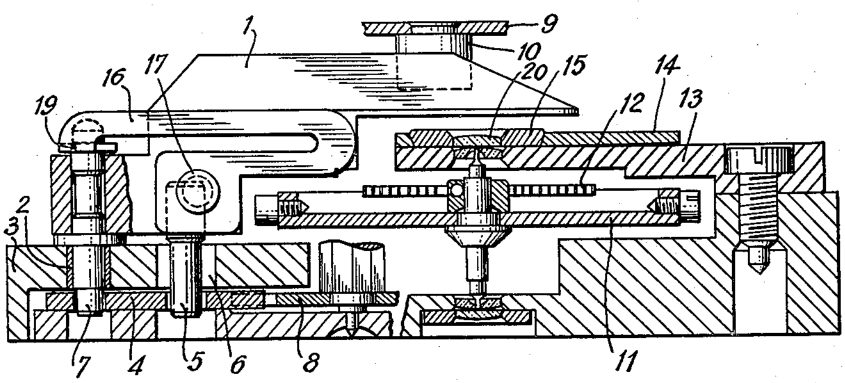

Fig. 1.

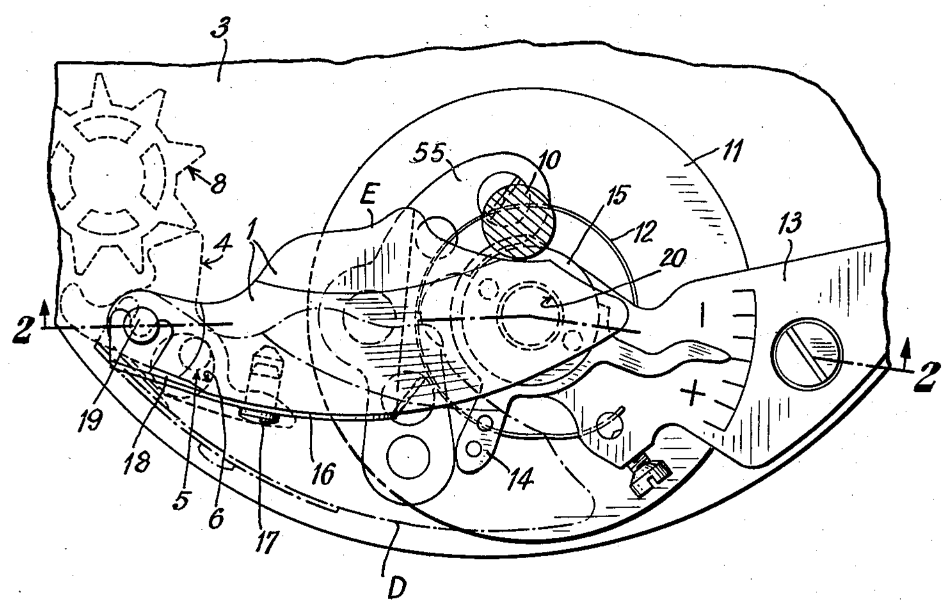

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Fig. 3.

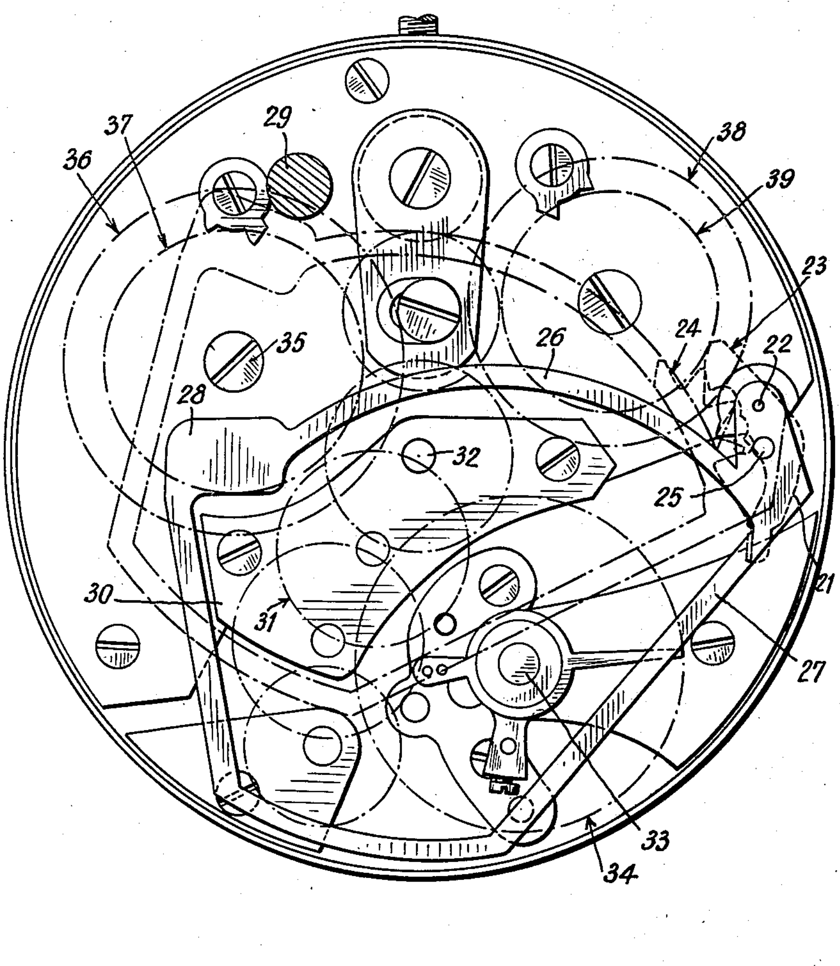

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Fig. 4.

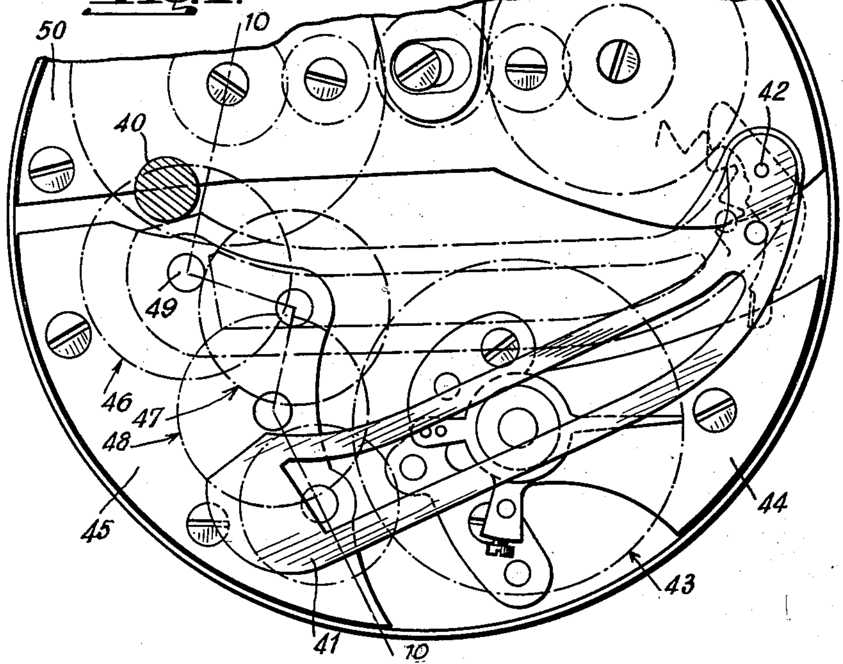

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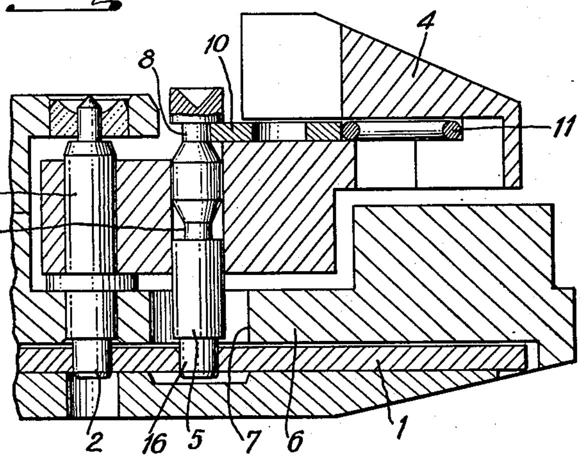
Fig. 6.



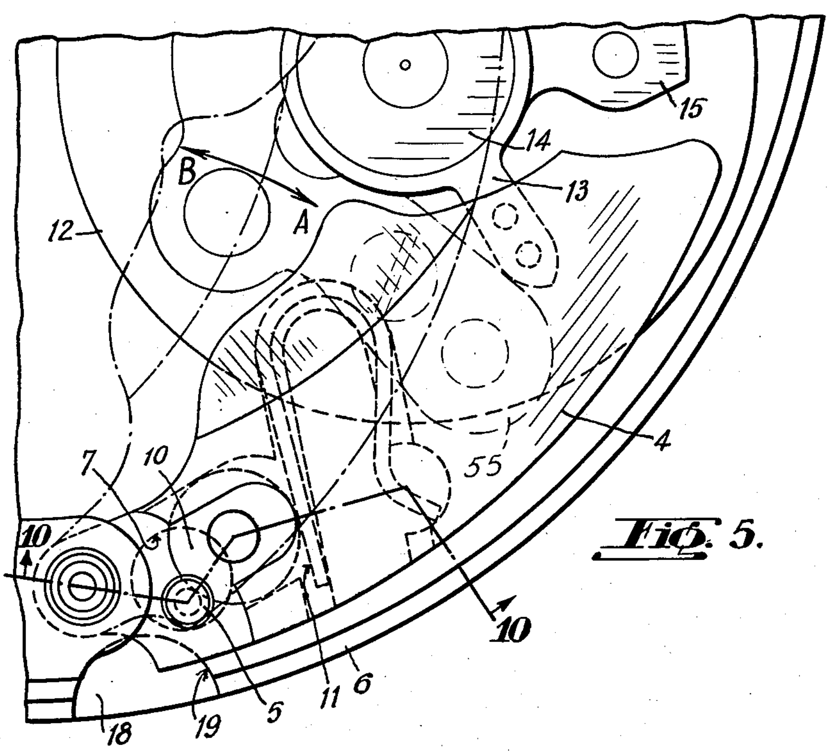


Fig. 5.

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FIG. 8.

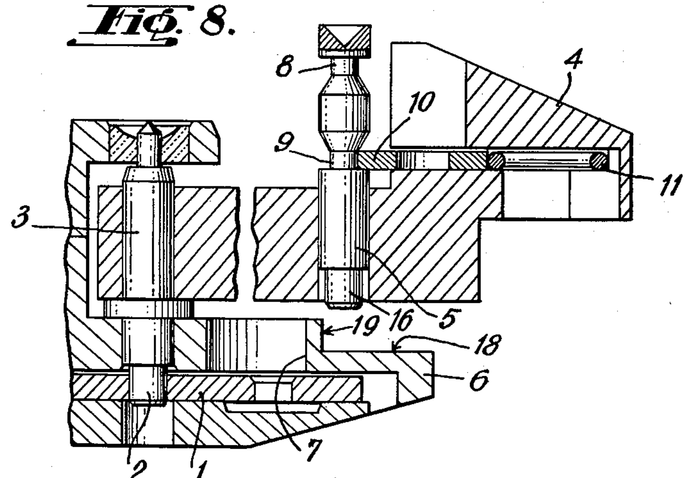
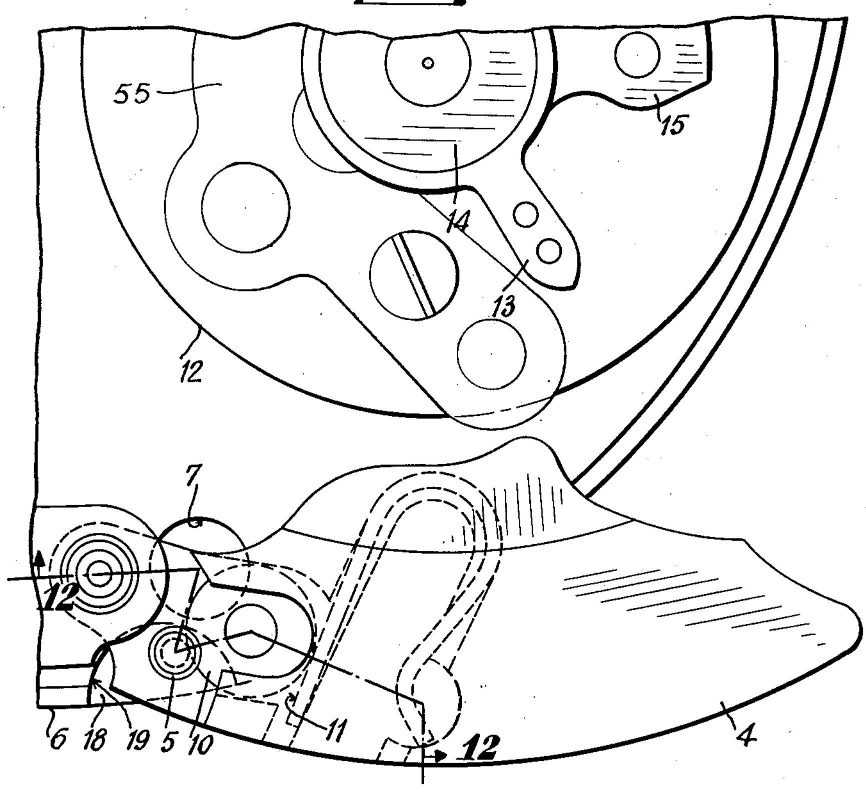


FIG. 7.



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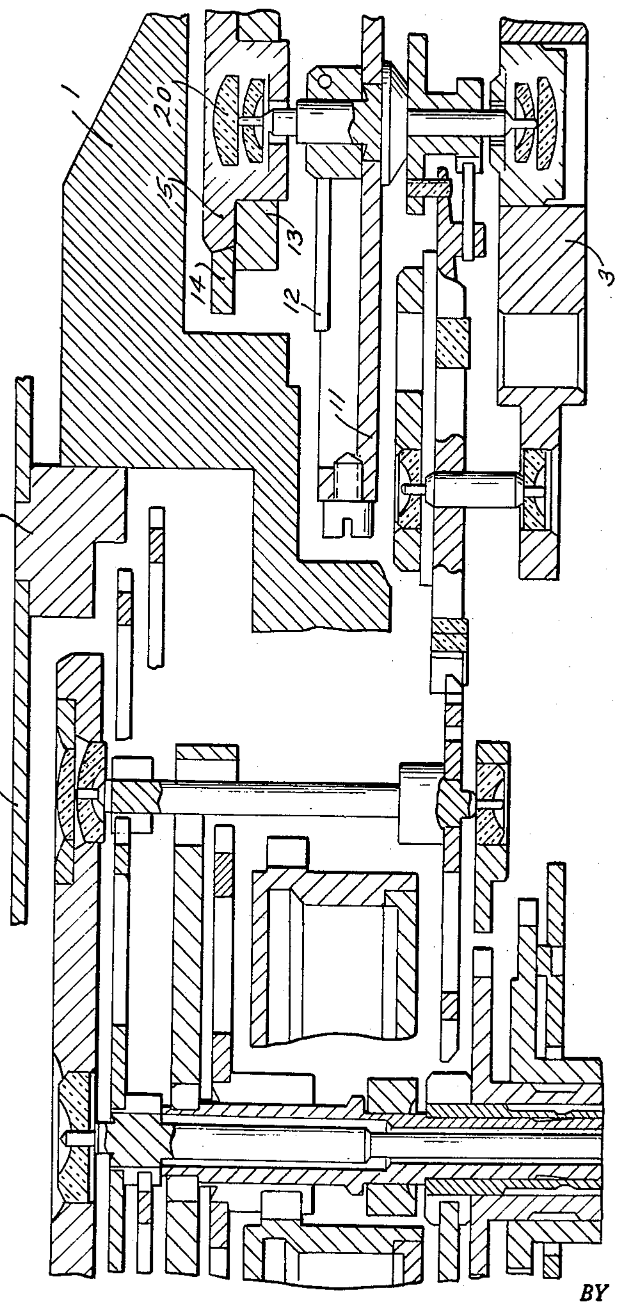

FIG. 9

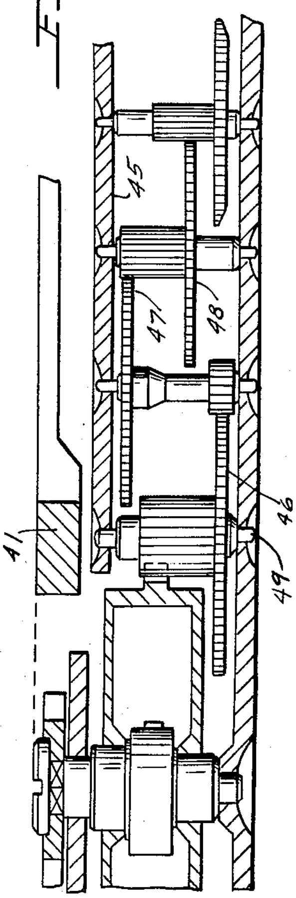

FIG. 10

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ALARM WRIST-WATCHES

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Application February 1, 1957, Serial No. 637,774

Claims priority, application Switzerland May 19, 1956

1 Claim. (Cl. 58—57.5)

Ladies' wrist-watches are generally smaller than men's. Their maximum size is not determined but horological practice sets it approximately at a diameter of 23 mm. for round movements. For so-called "form" movements the largest dimension is habitually less than 23 mm.

If, within this space, the attempt is made to group the components of a simple movement and the components of an alarm mechanism as has been done up to now for men's alarm wrist-watches, this can only lead to a very bad result, owing to the lack of space. Either the alarm mechanism is sacrificed to the movement and the striking becomes definitely insufficient; or the movement is sacrificed to the alarm and becomes very small, very costly and unprecise; or else a compromise which is just as bad is reached between these two extremes. In particular, a hammer of small volume gives a striking duration which is notably insufficient and a striking frequency which is so rapid that it stifles the sonority of the membrane. In addition, it is often impossible to position the banking pin as it should be situated, owing to lack of space, or else because there is generally an incompatibility between the possible emplacements for the hammer and those required to enable the membrane to be vibrated in a favourable manner.

The aim of the present invention is to eliminate these obstacles in a large measure and to furnish a construction which can be used to obtain a lady's alarm wrist-watch.

Its object is a wrist-watch, for instance for ladies, comprising an alarm hammer and which is characterized in that the effective or striking part of this hammer moves permanently above at least one of the following components: balance, balance staff, lever of the movement, escape wheel of the movement, barrel of the movement, barrel of the alarm, gears of the movement, and in that the upper level of this part does not project beyond the upper plane of the movement so that the presence of this hammer within the thickness of the movement does not result in an increase of the height of the latter.

The frequency of the oscillations of the hammer depends, for a given driving torque, on its moment of inertia in relation to its axis of rotation. In this moment of inertia the radius intervenes in the square (in the second power), and consequently the more the matter of the hammer is removed away from its pivoting centre, the easier it is to reduce its mass. We will call "effective part" of the hammer that part which contributes the most to the formation of its moment of inertia.

The drawing illustrates, by way of examples, nine embodiments of the watch constituting the object of the invention.

Figure 1 is a plan view of the first embodiment, showing a hammer oscillating above the balance pivoting.

Figure 2 is a cross-section along 2—2 in Fig. 1.

Figure 3 is a plan view of the second embodiment, showing a hammer passing above both the pivoting of the balance and of one of the barrels.

Figure 4 is a similar view of a third embodiment.

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Figure 5 is a plan view of the fourth embodiment, showing the components in their normal position.

Figure 6 is a cross-section along 10—10 in Fig. 5.

Figure 7 is a plan view similar to that of Fig. 5, showing the hammer turned outside.

Figure 8 is a cross-section along 12—12 in Fig. 7.

Figure 9 is a cross section of a portion of Fig. 2 on an enlarged scale and with a portion of the hammer and other background parts cut away and showing the plane of the hammer relative to the plane of other parts of the movement.

Figure 10 is a cross section along line 10—10 of Fig. 4.

Referring to Figs. 1, 2 and 9, the hammer **1** pivots on a stud **2** screwed or driven into the plate **3**, and it is made to oscillate with the alarm lever **4** by means of a pin **5** passing through the plate **3** in an opening **6**. This pin is secured to the hammer, whereas it is free in the lever. Conversely, it could be secured to the lever and be free in the hammer. The alarm lever **4** pivots on an extension **7** of the stud **2** and cooperates with the lever escapement wheel **8** of the alarm. When it passes from the position shown by dotted and dashed lines D to the position shown in full lines E in Fig. 1, the hammer sets the membrane **9** (Fig. 2) vibrating by striking against the stud **10**. This hammer, which oscillates above the upper pivot **20** of the balance (and thus also above the balance staff, the lever of the movement and the escape wheel of the movement) is cut away underneath in order to allow it to pass over the balance **11**, the hairspring **12**, the balance cock **13**, the regulator **14** and the upper cap **15**, whereas it is largely chamfered above. The hammer **1** also passes over part of the escape wheel bridge **35** during its oscillation. The spring bolt **16**, permanently secured to the body of the hammer **1** by a rivet **17** permits the removal of said hammer very rapidly. As a matter of fact, said hammer can be gripped by introducing one of the branches of the tweezers in the space **18** (Fig. 1), which will thus withdraw the bolt **16** from the groove **19** cut in the stud **2**. It will be seen immediately from the drawing that putting it back into place is just as easy.

In this construction, the upper level of the hammer **1** (i.e., of its effective part) does not project beyond the upper plane of the movement, the height of which has been subjected to no increase, in comparison with a watch of the same type having no alarm, owing to the disposition of the hammer and to the shortening of the balance staff, which can be effected without detriment to the movement. Fig. 9 shows how the level of the center of the movement, shown at the left in this figure, compares with the level of the hammer.

In Fig. 3 the hammer **21** the shape of which is of a cut out form, pivots in **22**. It is made to oscillate with the alarm lever **23**, which cooperates with the alarm lever escapement wheel **24**, by means of a pin **25**, in exactly the same way as that described for Fig. 2.

The two arms **26** and **27** of the hammer are joined together at the effective part **28** which strikes against the stud **29**. They are situated on either side of the bridge **30** in which pivot the sweep second wheels **31** and **32**. The upper level of the bridge **30** determines the maximum height of the movement; the hammer does not project beyond this level.

When the hammer oscillates, the arm **27** passes over the upper pivot **33** of the balance **34** (thus also above the balance, the balance shaft, the lever of the movement and the escape wheel of the movement) and the other arm **26** together with the effective part **28** passes over the upper pivot **35** of the barrel **36** of the movement (thus also above the barrel of the movement) and over the ratchet wheel **37** of the movement, whereas it only covers permanently a part only of the alarm barrel **38** and of the alarm ratchet wheel **39**.

The spring bolt described in the Figs. 1, 2 and 9 can also be applied to this embodiment.

The invention can be applied to a watch without a sweep second hand. Figs. 4 and 10 show such an example.

The hammer **41**, pivoting in **42**, strikes against the stud **40** and oscillates above the balance **43**, the balance cock **44** (thus also above the balance staff, the lever of the movement and the escape wheel of the movement) and the train bridge **45** (i.e., also above the gears of the movement) in which pivot the wheels **46**, **47**, **48** and the escape wheel of the movement. The so-called center wheel **46** has been displaced in **49** so as to enable the thickness of the train bridge to be reduced in relation to the barrel bridge **50**. The balance cock **44** may always be situated without difficulty at a level which is lower than that of the barrel bridge **50**. Here its level corresponds to that of the train wheel bridge **45**. The hammer passes over the components **43** to **49** without increasing the thickness of the movement.

In all the embodiments described, the moment of inertia of the hammer could be increased if it were totally or partially made of heavy metal or of another heavy material (for instance tungsten carbide having a density of 16 to 17 g./cm.^{3}).

The solutions described above enabling the hammer to be rapidly removed to give access to the regulating members it covers, have the disadvantage of complicating the pivoting of the hammer, and to require it to be carried out with particular care.

The Figs. 5 to 8 illustrate another embodiment of an alarm wrist-watch comprising means arranged to allow, once the movement has been removed from the case, the regulating members to be uncovered by causing the hammer to pivot beyond the limit of its habitual angular travel towards the exterior of the movement, without removing it.

In the fourth embodiment, illustrated in the Figs. 5 to 8, as soon as the alarm device is unlocked, the alarm **1** which pivots on an extension **2** of the stud **3** of the hammer **4**, oscillates under the action of known means, which have not been shown, and drives the hammer **4** by means of a pin **5** passing through the plate **6** through a hole **7**. The pin **5**, which is freely adjusted in the lever **1** and in the hammer is provided with an upper groove **8** and with a lower groove **9** the shapes of which are symmetrical. This pin **5** is maintained engaged in the lever **1**, as may be seen in Fig. 6, by means of a roundel **10** which a spring **11** presses constantly into the upper groove **8**. The hammer oscillates from the position A to the position B (Fig. 5) whilst passing above the balance **12**, the regulator **13**, the upper cap **14** and the balance cock **15** (thus also above the balance staff, the lever of the movement and the escape wheel of the movement). When it is desired to uncover the balance cock and the balance, the hammer must be deviated so as to bring it to the position shown in Fig. 7. In order

to do this the pin **5** is raised, for instance by means of a screw-driver which is introduced into the apparent upper groove **8** (Fig. 6), in order to bring it to the position shown in Fig. 8. The withdrawal of the pin **5** from the lever **1**, then from the hole **6**, allows the hammer to be pivoted up to the position shown in Fig. 7, which uncovers the balance cock **15** and the components **12**, **13**, **14**. To keep the hammer in this position, it is merely necessary to lower the pin **5**, and its extremity coming into contact with the wall **19** of the notch **18** in the plate prevents the return of the hammer.

When it is desired to return the hammer to its operating position, the reverse procedure is followed: withdrawal of the pin **5**; pivoting of the hammer back to the position B; gentle lowering of the pin **5** until it is in contact with the face of the alarm lever **1**; pivoting of the hammer towards the position A until the extremity **16** of the pin **5** penetrates into the opening of the lever **1**.

It will be remarked that the watch according to the invention enables the obstacles mentioned in the preamble to be largely eliminated:

1st by reducing the mass of the hammer;

2nd by lodging the "effective part" of the hammer in otherwise inefficiently utilized portions of the space of the movement;

3rd by constructing and positioning essential components in space saved by reconstructing and positioning the hammer.

What we claim is:

In an alarm wrist watch having a watch movement, including the balance, balance staff, lever of the movement, escape wheel of the movement, barrel of the movement, barrel of the alarm, and the gears of the movement, which extend from the face surface of the watch upwardly to at least two connecting means spaced at different levels above said face, diaphragm means above the upper level of said movement, hammer means shaped to fit and move within the space between the lower and upper levels of said movement for striking a part of said diaphragm, means for pivotally mounting said hammer means for horizontal oscillation with the effective part thereof within said space between the two levels of the movement, said hammer means being positioned to oscillate in said horizontal plane and above at least one of said balance, balance staff, lever of the movement, escape wheel of the movement, barrel of the movement, barrel of the alarm and the gears of the movement.

References Cited in the file of this patent

UNITED STATES PATENTS

311,594	Masmejan	Feb. 3, 1885
2,593,688	Meyer	Apr. 22, 1952
2,644,294	Ditisheim	July 7, 1953
2,857,733	Maire	Oct. 28, 1958

FOREIGN PATENTS

29,468	Switzerland	Jan. 11, 1904
705,105	Great Britain	Mar. 10, 1954
730,613	Great Britain	May 25, 1955