

12

EUROPEAN PATENT APPLICATION

21 Application number: 88309097.9

51 Int. Cl.4: **G 04 B 19/253**
G 04 B 27/04, G 04 B 13/02

22 Date of filing: 30.09.88

30 Priority: 02.10.87 JP 151453/87

43 Date of publication of application:
05.04.89 Bulletin 89/14

84 Designated Contracting States: CH DE FR GB LI

71 Applicant: **SHIOJIRI KOGYO KABUSHIKI KAISHA**
3-5, 3-chome, Owa
Suwa-shi Nagano-ken 392 (JP)

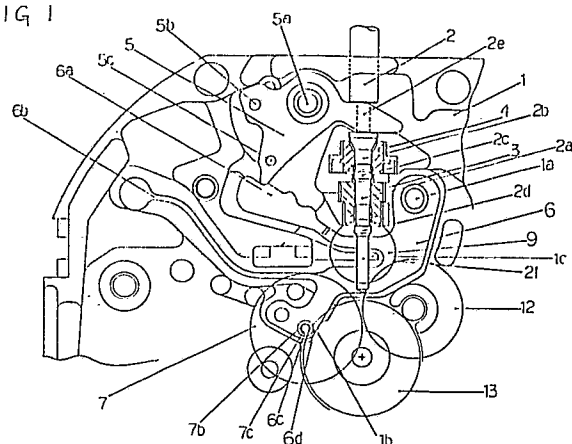
72 Inventor: **Kubota, Masaru**
Shiojiri Kogyo K.K. Oaza-shiojiri-machi 390
Shiojiri-shi Nagano-ken (JP)

74 Representative: **Miller, Joseph et al**
J. MILLER & CO. Lincoln House 296-302 High Holborn
London WC1V 7JH (GB)

54 Timepiece.

57 A timepiece having a stem (2) and an indication corrector member (3,4) such that the stem (2) may be moved manually from a non-correction to a correction position in which a calendar or time indication of the timepiece can be corrected by the indication corrector member (3,4) by effecting rotation of the stem (2) characterised in that the stem (2) has a corrector member driving portion (2c,2d), the indication corrector member (3,4) being drivingly disconnected from the stem (2) and being drivingly connected thereto by way of the driving portion (2c,2d) when in the non-correction and correction positions respectively.

FIG 1



Description

TIMEPIECE

The present invention relates to a timepiece in which a calendar or time indication can be corrected.

A timepiece is known which employs a setting lever interlocked with a stem of the timepiece which may be moved manually from the exterior of the timepiece, and there is a yoke which engages with the setting lever. As a result of moving the stem, a sliding pinion is moved into mesh with gear train members such as a setting wheel and a minute wheel during time correction and is moved into mesh with a calendar corrector operating wheel during calendar correction, e.g. date and day correction.

In the known construction, however, the sliding pinion is movable by the yoke between a position in which one side of the sliding pinion can drive the gear train members to perform time correction and another position in which the opposite side of the sliding pinion can engage the calendar corrector operating wheel to perform date and day correction. Therefore, the construction of the sliding pinion is extremely complicated and its manufacturing cost is therefore high. Further, since the sliding pinion has to be moved, some parts such as the yoke cannot be dispensed with so that adequate cost reduction cannot be achieved.

Accordingly, it is an object of the present invention to provide an inexpensive timepiece wherein parts such as a yoke can be dispensed with and the construction can be simplified.

According to the present invention, there is therefore provided a timepiece having a stem and an indication corrector member such that the stem may be moved manually from a non correction to a correction position, in which a calendar or time indication of the timepiece can be corrected by the indication corrector member by effecting rotation of the stem, characterised in that the stem has a corrector member driving portion, the indication corrector member being drivingly disconnected from the stem and being drivingly connected thereto by way of the driving portion when in the non-correction and correction positions respectively.

Preferably the said driving portion is constituted by a projection of the stem.

The indication corrector member is preferably slidably mounted on the stem.

There are preferably first and second indication correction members which are respectively arranged to effect time and calendar correction.

If desired, the stem may be movable in opposite axial directions to effect driving connection between the projection and the first and second indication correction members respectively.

Preferably, however, there are two said projections, the stem being movable in a predetermined axial direction so as to bring one only of said projections into driving engagement with the first indication correction member and being movable further in the said predetermined axial direction to cause driving engagement only between the other projection and the second indication correction

member.

The first indication correction member preferably comprises a pinion which is in constant mesh with a setting gear, the setting gear meshing with a minute gear which is driven from a drive source.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a top plan view of an embodiment of a timepiece according to the present invention, the parts being shown in their normal or inoperative condition;

Figure 2 is a top plan view of the structure shown in Figure 1 during date and day correction;

Figure 3 is a top plan view of the structure shown in Figure 1 during time correction; and

Figures 4 and 5 are cross-sectional views of the structure shown in Figure 1.

Terms such as "clockwise" and "counter-clockwise", as used in the description below, are to be understood to refer to directions as seen in the accompanying drawings.

In Figures 1, 4 and 5 there is shown a timepiece according to the present invention, the parts of the timepiece being shown in their normal or inoperative condition, i.e. in the condition in which neither the calendar nor the time is being adjusted. The timepiece is provided with a plate 1 which acts as the main frame of the timepiece and with a stem 2 which acts as an outside operation member, i.e. is operable from the exterior of the timepiece. A sliding pinion 3 is made of plastics material and is a loose or non-driving fit on the stem 2 in the normal or inoperative condition. Although the pinion 3 is referred to herein as a "sliding pinion" it should be understood that the "sliding" referred to is relative movement between the pinion 3 and the stem 2 on which it is mounted. A first calendar corrector operating wheel 4 is also made of plastics material and is a loose fit on the stem 2 in the normal or inoperative condition. A setting lever 5 is formed integrally with a rotatably mounted stub shaft 5a. The stem 2 has relatively smaller diameter portions 2a, 2b, 2e and relatively larger diameter portions, or projections, 2c, 2d. In the normal or inoperative condition, the sliding pinion 3 is a loose fit on the smaller diameter portion 2a, while the first calendar corrector operating wheel 4 is a loose fit on the smaller diameter portion 2b. The smaller diameter portions 2a, 2b are disposed on opposite sides of the larger diameter portion 2c. In the normal condition shown in Figure 1, no drive can be imparted from the stem 2 either to the sliding pinion 3 or to the first calendar correction operating wheel 4. The larger diameter portion 2c frictionally engages the first calendar corrector operating wheel 4 during date and day correction, while the larger diameter portion 2d frictionally engages the sliding pinion 3 during time correction. The smaller diameter portion 2e is positioned by the setting lever 5.

A clutch plate 6 is rotatably mounted on a shaft or dowel 1a provided on the plate 1. The clutch plate 6 is rotatably mounted on a shaft or dowel 1a provided on the plate 1. The clutch plate 6 is provided with a "click" or detent portion 6a which abuts against the setting lever 5, the latter constituting a member for changing the time and calendar indications (not shown). In accordance with the shape of the click portion 6a of the clutch plate 6, the stem 2 is maintained in its pulled-out or pushed-in condition by the setting lever 5. Thus the clutch plate 6 positions the stem 2 and determines the operation force of the latter in accordance with the shape of the click portion 6a. The clutch plate 6 is also provided with a resilient portion 6b which, in operation, produces the force to cause the clutch plate 6 to rotate counter-clockwise about the shaft 1a. The clutch plate 6 is provided with a hole 6c in which is rotatably mounted a lower pivot 7c of a third wheel and pinion 7 which is made of plastics material and which is integrally formed with a wheel 7a (Figure 4) and a pinion 7b. The abutment plate 6 has an abutment portion 6d which (as best seen in Figure 4) abuts a plate dowel 1b of the plate 1 in the vicinity of the hole 6c to determine the distance between the axis of a centre wheel and pinion 13 and that of the third wheel and pinion 7 to enable them to mesh with each other smoothly.

A gear train bridge 8 (Figure 4) which is integrally made of plastics material holds the third wheel and pinion 7, a fourth wheel and pinion 14 and a minute wheel or gear 12 in position. A setting wheel or gear 9 is integrally made of plastics material and is rotatably mounted on a shaft portion 8a (Figure 4) forming part of the gear train bridge 8. The setting wheel 9 is in mesh with a gear portion 3a of the sliding pinion 3 at all times. That is to say, the sliding pinion 3 is driven by the setting wheel 9 even in the normal or inoperative condition so as to rotate about the stem 2. The gear train bridge 8 is provided with a bearing portion 8b which is disposed beneath the shaft portion 8a, the bearing portion 8a and a bearing portion 1c of the plate 1 serving to position a tip portion 2f of the stem 2 so that there is a space H between the tip portion 2f and the plate 1 within which the clutch plate 6 is loosely mounted. The degree of looseness of the setting wheel 9 is determined by a supporting plate 10 which presses down the upper surface of the shaft portion 8a of the gear train bridge 8. The supporting plate 10 is provided with a setting lever spring portion 10a (Figure 5) for pressing down the setting lever 5.

The construction shown in the drawings also comprises a circuit substrate 11; the minute wheel 12 which meshes with the setting wheel 9; the centre wheel and pinion 13; and the fourth wheel and pinion 14. The centre wheel and pinion 13 and the fourth wheel and pinion 14 are gears to which a minute hand (not shown) and a seconds hand (not shown) are respectively attached. The construction additionally comprises a tubular centre member 15; an hour wheel 16; a second calendar corrector operating wheel 17; and a stator 18 which determines the degree of looseness of the clutch plate 6 in the vicinity of the lower pinion 7c of the third wheel and

pinion 7, the stator 18 being one of the members of a known motor for a timepiece.

When the timepiece is in normal use, i.e. when neither the time nor the calendar is being corrected, as shown in Figure 1, the sliding pinion 3 and the first calendar corrector operating wheel 4 are positioned by the plate 1 and the wall of the gear train bridge 8 respectively with a predetermined degree of looseness, and are a loose or non-driving fit on the stem 2. The click portion 6a of the clutch plate 6 is engaged with the setting lever 5, thereby causing the plate dowel 1b and the abutment portion 6d to abut each other securely. Hence, a centre wheel 13a of the centre wheel and pinion 13 and the third wheel pinion 7b are in mesh with each other with an appropriate centre distance therebetween. The other members of the construction shown such as the gear train portions perform their known movements.

The state of the parts during date and day correction will now be described mainly with reference to Figure 2. When the stem 2 is pulled radially outwardly from its normal position shown in Figure 1, the smaller diameter portion 2e of the stem 2 causes the lever 5 to rotate. Hence, the setting lever 5 and the stem 2 are positioned at the next location by reason of the shifting of the setting lever to the next recess of the click portion 6a of the clutch plate 6 whereby to establish a first changing step position. At this moment, the abutment portion 6d of the clutch plate 6 remains in abutment with the plate dowel 1b, and the centre wheel 13a is in mesh with the third wheel pinion 7b with an appropriate centre distance therebetween. Further, when the stem 2 is positioned at the first changing step position, the larger diameter portion 2c of the stem 2 is frictionally or drivingly engaged with the first calendar corrector operating wheel 4 which has previously been loosely mounted on the smaller diameter portion 2b. Then, the rotational force of the stem 2 which is produced by manually rotating it from the exterior of the timepiece is transmitted to the first calendar corrector operating wheel 4 and to the second calendar corrector operating wheel 17, thereby carrying out a date and day correction by a known date and day mechanism. Furthermore, the sliding pinion 3 at this time fits loosely on the smaller diameter portion 2a of the stem 2 in the same way as in the normal condition of the parts so that rotation of the stem 2 does not cause rotation of the sliding pinion 3 at this time.

When the time shown by the timepiece is to be corrected, the stem 2 is further pulled radially outwardly from the first changing step position shown in Figure 2 to a second changing step position shown in Figure 3, such movement of the stem 2 causing further rotation of the setting lever 5. Hence, the setting lever 5 and the stem 2 are positioned at the next location by the shifting of the setting lever 5 to another recess of the click portion 6a of the clutch plate 6. At this time, as the click spring portion 6a of the clutch plate 6 is moved by the setting lever 5, the clutch plate 6 rotates clockwise upon the plate dowel 1a as a result of the reaction force of the resilient portion 6b. Accord-

ingly, the abutment portion 6d, which maintains the appropriate centre distance between the centre wheel and pinion 13 and the third wheel and pinion 7 in the first changing step, moves out of engagement with the plate dowel 1b in order to move the third wheel lower pivot hole portion 6c and thereby move the centre wheel 13a out of engagement with the third wheel pinion 7b. Further, when the stem 2 is positioned at the second changing step, the sliding pinion 3, which has previously been loosely fitted on the smaller diameter portion 2a of the stem 2, frictionally or drivingly engages the larger diameter portion 2d thereof. As a result, the rotational force of the stem 2 which is produced by manually rotating it from the exterior of the timepiece is transmitted to the sliding pinion 3 so as to effect time correction by rotating the setting wheel 9 and minute wheel 12. Accordingly, rotation is effected of the centre wheel and pinion 13 and the hour wheel 16 to which a minute hand (not shown) and an hour hand (not shown) are attached respectively. On the other hand, the first calendar corrector operating wheel 4 is so constructed that, at this time, it is moved out of engagement with the larger diameter portion 2c of the stem 2 which it frictionally engages when in the first changing step position, the wheel 4 being moved to a position in which it loosely fits on the smaller diameter portion 2a and thus becomes free. Therefore, date and day correction cannot be carried out at this time even though the stem 2 is being rotated. Further, due to engagement between a dowel 5c provided on the setting lever 5 and a reset pattern 11a, resetting is effected.

In the embodiment described above, in contrast to the prior art, a sliding mechanism on the gear train portion of the timepiece is not required in order to move the centre wheel 13 out of engagement with the third wheel 7, so that there is no rotational torque load during time correction. Therefore, although in the past it has been necessary to make the gear train portion, and especially the gear train member of the time correcting mechanism of metallic material, in the case of the embodiment described above, all of the gear train members can be made of plastics material so as to simplify the manufacturing process and to reduce the cost of the parts.

Further, in the embodiment described above, the click portion 6a is integrally formed with the clutch plate 6, thereby achieving a smooth changing mechanism.

The setting lever 5 can be moved out of engagement with the click portion 6a of the clutch plate 6 and then becomes free. Consequently, attachment and detachment of the stem 2 can be achieved without affecting the other parts by depressing a recess 5b provided at the tail portion of the setting lever 5.

Additionally, the clutch plate 6 engages with the setting lever 5 at the click portion 6a, and the resilient portion 6b produces a force on the stem and holds and provides a mounting for the third wheel and pinion 7 and thus for a portion of the gear train. Hence, time correction with a stable operation force acting on the stem 2 can be carried out under a no-load condition of attachment and detachment of

a part of the gear train during time correction. As a result, all of the gear train members can be made of plastics, thereby achieving an inexpensive timepiece body.

The embodiment described above employs frictional engagement to impart drive to the sliding pinion 3 and the first calendar corrector operating wheel 4 for correcting purposes. However, correction can also be effected by engagement of a sliding pinion 3 having a rectangular hole or a first calendar corrector operating wheel 4 with an angular portion of a stem 2.

The axis of the setting wheel 9 is constituted by a gear train bearing in the embodiment described above, but a member such as a sweep seconds portion of the gear train can also be employed.

Further, a construction for attaching and detaching the third wheel lower pivot 7c by the clutch plate 6 and the setting lever 9 is shown in the illustrated embodiment, but time and calendar correction by means of a sliding mechanism can also be used.

Furthermore, a gear train portion can be attached or detached by operating the third wheel lower pivot 7c in the illustrated embodiment, but this can be achieved by operating both the upper and lower pivots simultaneously or only the upper pivot.

Although the illustrated embodiment employs both a calendar corrector operating wheel 4 and a sliding pinion 3, it is possible to arrange that an axially extending projection of the stem 2 resiliently engages only with the calendar corrector operating wheel 4.

In the illustrated embodiment, the sliding pinion 3 and the first calendar corrector operating wheel 4 are a loose fit on the projecting portions of the stem 2 in the normal condition. Therefore, date and day correction and time correction can be effected with fewer parts and the members of the gear train employed including the sliding pinion 3 and the first calendar correcting operating wheel 4 can be made of plastics with a simple configuration. Consequently an inexpensive timepiece can be produced.

Claims

1. A timepiece having a stem (2) and an indication corrector member (3,4) such that the stem (2) may be moved manually from a non-correction to a correction position in which a calendar or time indication of the timepiece can be corrected by the indication corrector member (3,4) by effecting rotation of the stem (2) characterised in that the stem (2) has a corrector member driving portion (2c,2d), the indication corrector member (3,4) being drivingly disconnected from the stem (2) and being drivingly connected thereto by way of the driving portion (2c,2d) when in the non-correction and correction positions respectively.

2. A timepiece as claimed in claim 1 characterised in that the said driving portion (2c,2d) is

constituted by a projection of the stem (2).

3. A timepiece as claimed in claim 2 characterised in that the indication corrector member (3,4) is slidably mounted on the stem (2).

4. A timepiece as claimed in claim 3 characterised in that there are first and second indication correction members (3,4) which are respectively arranged to effect time and calendar correction.

5. A timepiece as claimed in claim 4 characterised in that the stem (2) is movable in opposite axial directions to effect driving connection between the projection (2c,2d) and the first and second indication correction members respectively.

6. A timepiece as claimed in claim 4 characterised in that there are two said projections (2c,2d), the stem (2) being movable in a predetermined axial direction so as to bring one only (2c) of said projections (2c,2d) into driving engagement with the first indication correction member (3) and being movable further in the said predetermined axial direction to cause driving engagement only between the other projection (2d) and the second indication correction member (4).

7. A timepiece as claimed in any of claims 4

to 6 characterised in that the first indication correction member (3) comprises a pinion which is in constant mesh with a setting gear (9), the setting gear (9) meshing with a minute gear (12) which is driven from a drive source (18).

8. A timepiece as claimed in any preceding claim characterised in that the or each indication correction member (3,4) is made of plastics material.

9. A changing mechanism of a timepiece comprising:

an outside operation member (2);

a sliding pinion (3) guided by said outside operation member (2) as a shaft; and

a first calendar corrector operating wheel, wherein both said sliding pinion (3) and said first calendar correcting operating wheel (4) loose fit with said outside operation member (2) while being normally carried, and a convex portion (2c) of said outside operation member (2) engages only with said first calendar corrector operating wheel (4) to be rotatable, being interlocked with the outside operation member (2) while date and day correcting.

5

10

15

20

25

30

35

40

45

50

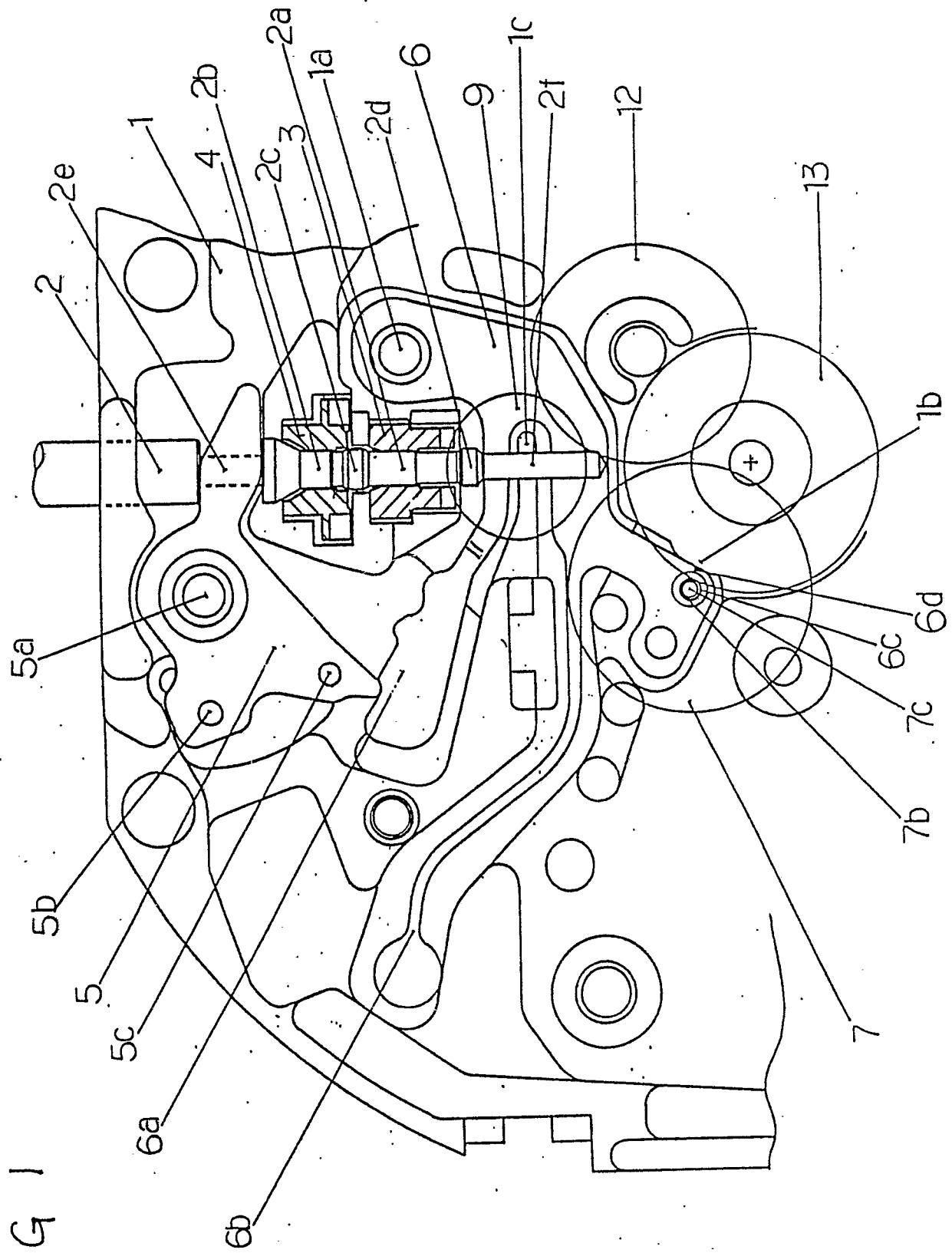
55

60

65

5

FIG 1



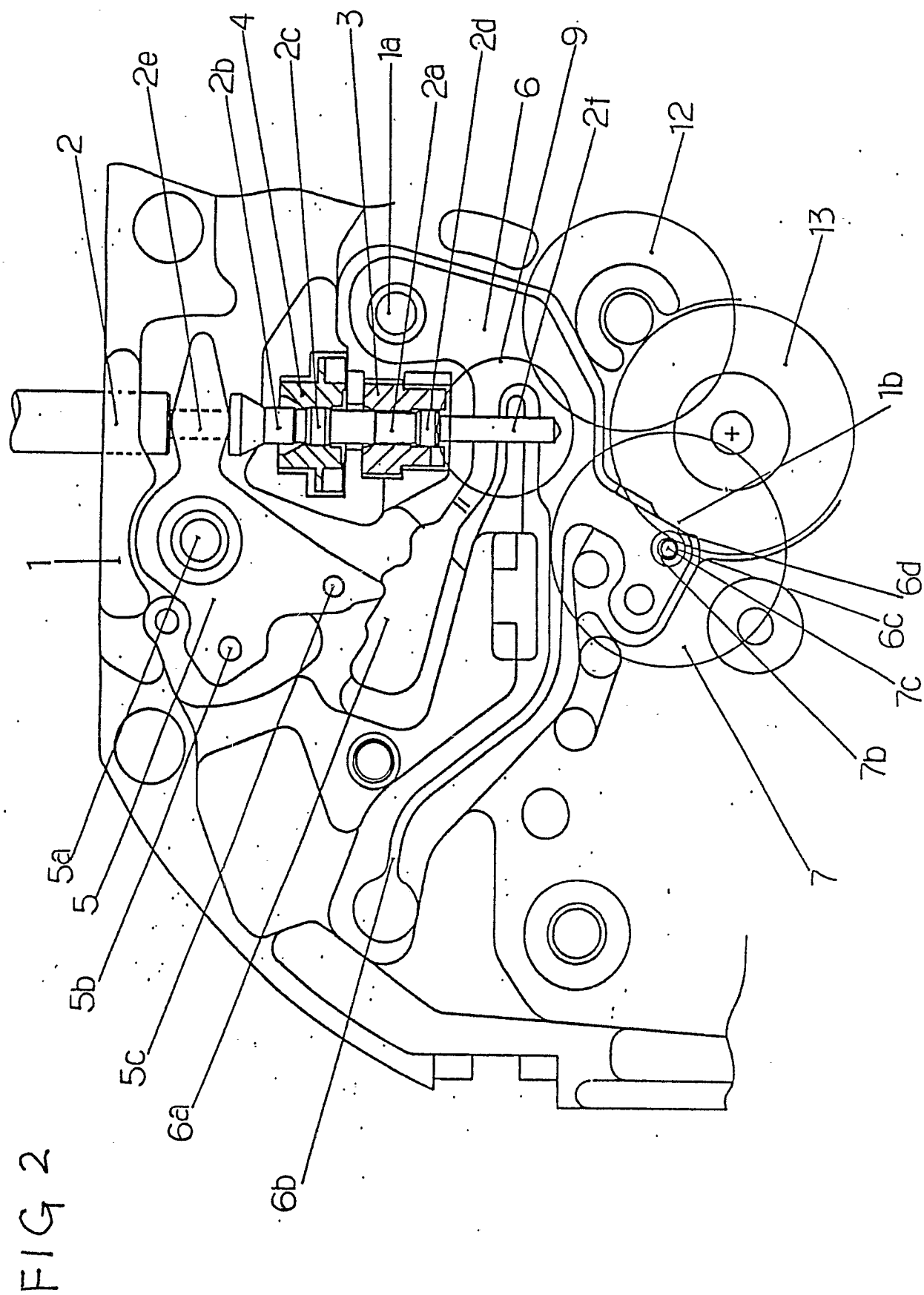
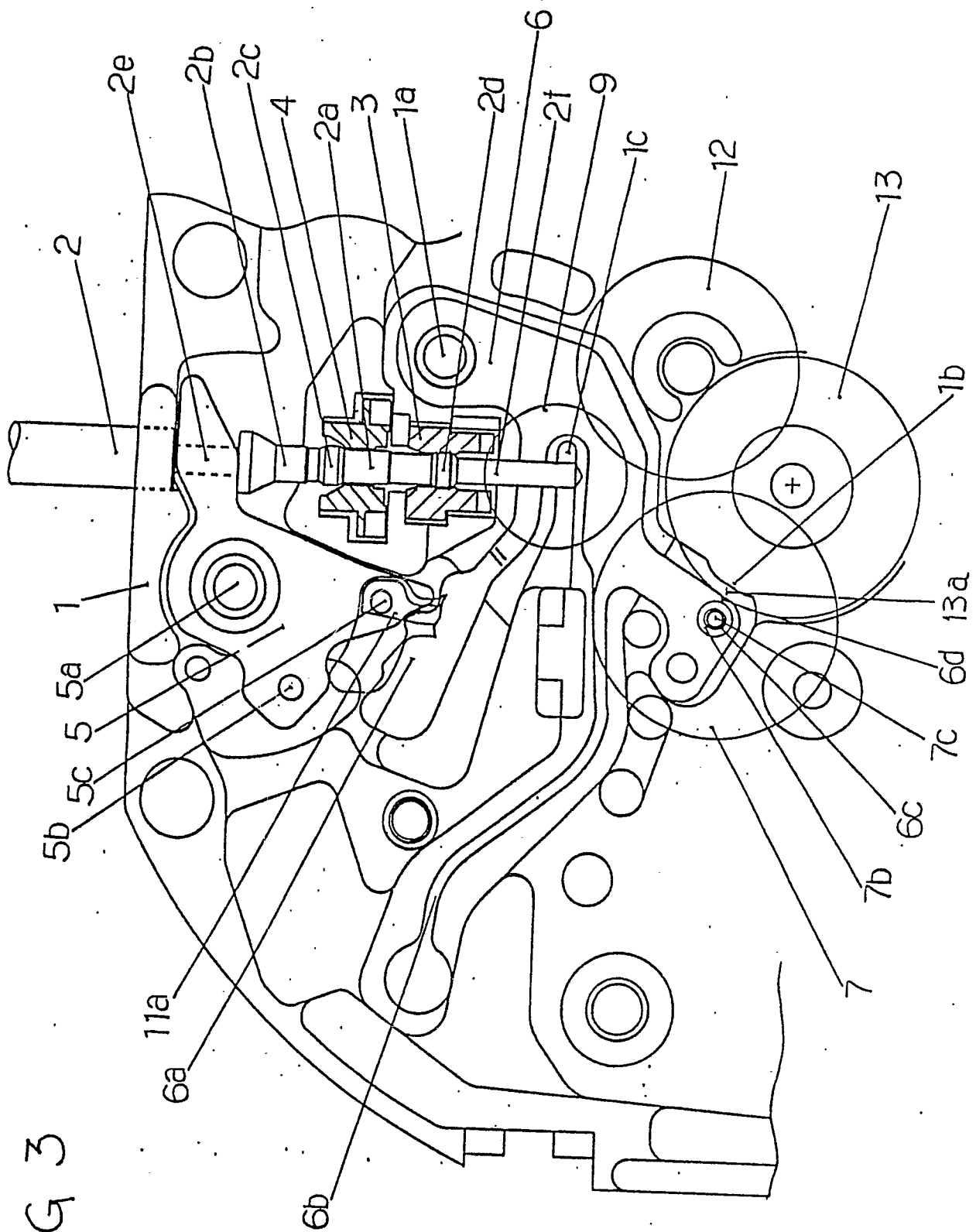


FIG 3



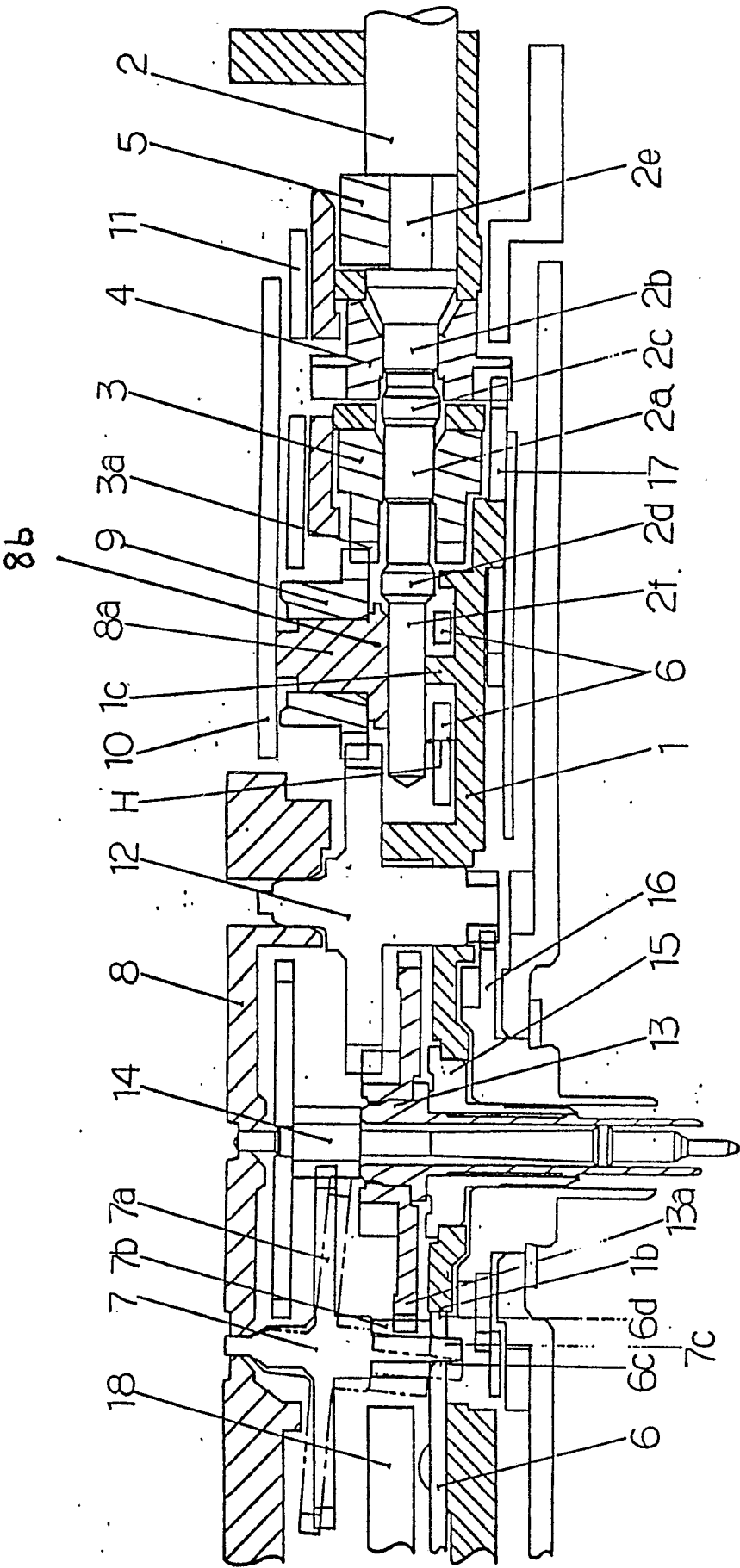


FIG 4

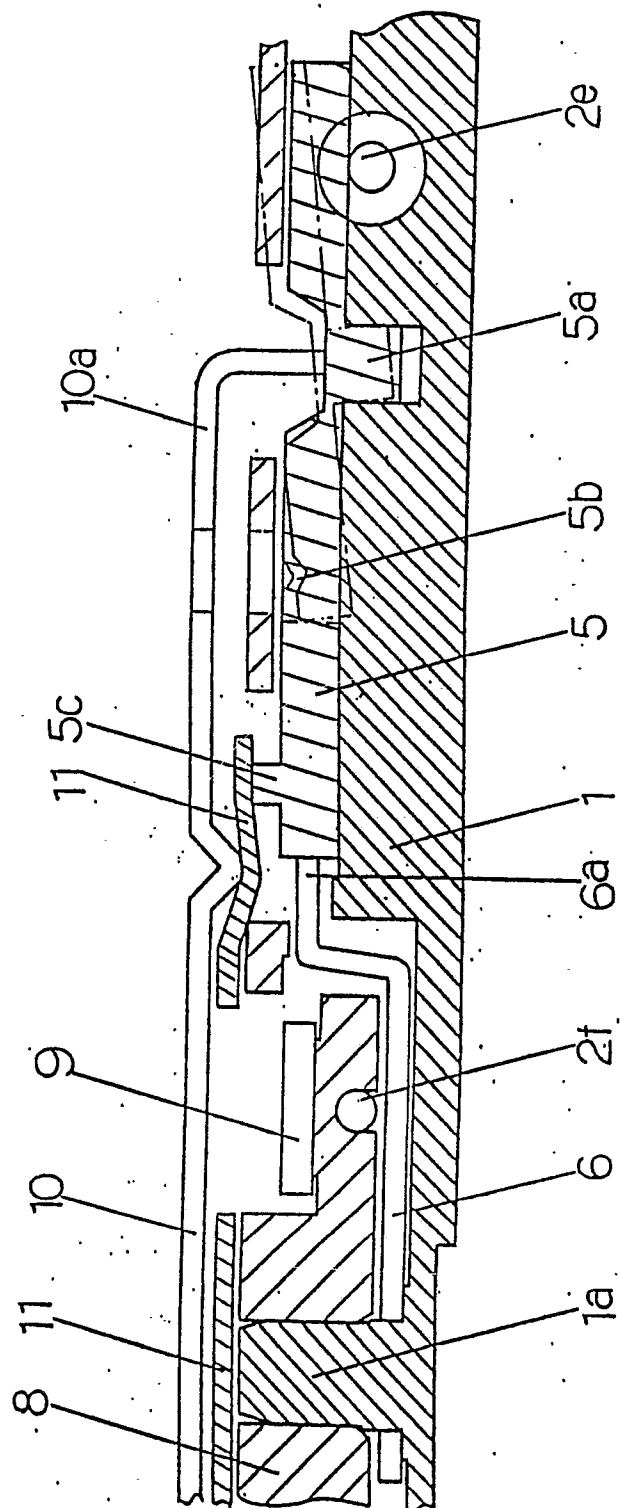


FIG 5