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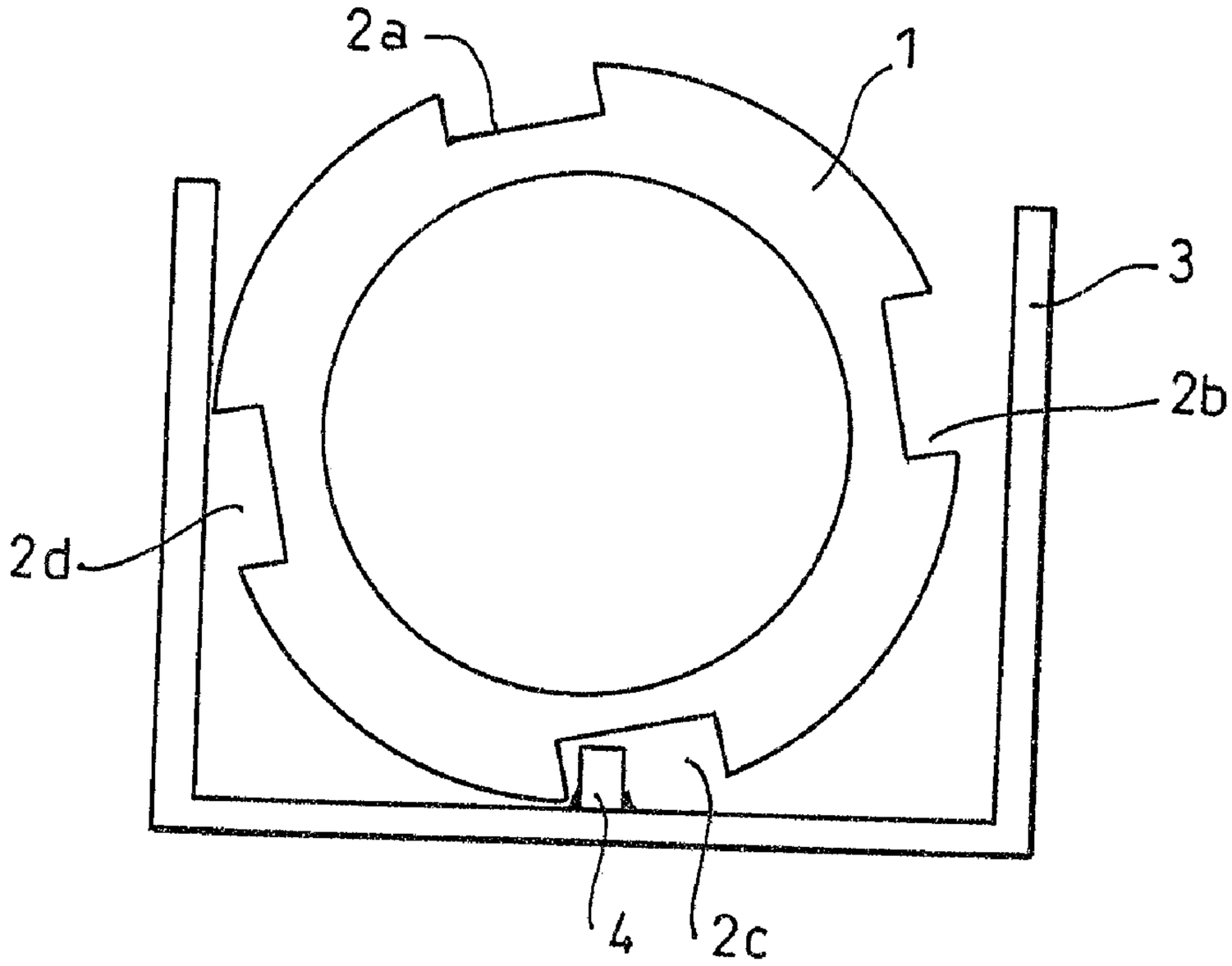
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(54) Titre : DISPOSITIF DE PROTECTION CONTRE LE BRIS D'UN ARBRE TOURNANT
(54) Title: SAFETY DEVICE AGAINST RUPTURE OF A ROTARY SHAFT



(57) Abrégé/Abstract:
A safety device against rupture of a rotary shaft (1) for preventing the shaft from rotating and for preventing broken portions thereof from falling, the device being particularly suitable for use with a shaft that winds up lifting straps for a raisable curtain or that winds up the curtain itself, the device being characterized in that at least one safety element (3, 5) is placed to retain the shaft to prevent it from falling, and in that the peripheral surface of the shaft and the facing surface of said safety element are provided with means such as portions in relief (2, 6) that co-operate to prevent the shaft from rotating when a portion of the shaft is retained by said safety element due to the shaft rupturing.

A B S T R A C T

A safety device against rupture of a rotary shaft (1) for preventing the shaft from rotating and for preventing broken portions thereof from falling, the device being particularly suitable for use with a shaft that winds up lifting straps for a raisable curtain or that winds up the curtain itself, the device being characterized in that at least one safety element (3, 5) is placed to retain the shaft to prevent it from falling, and in that the peripheral surface of the shaft and the facing surface of said safety element are provided with means such as portions in relief (2, 6) that co-operate to prevent the shaft from rotating when a portion of the shaft is retained by said safety element due to the shaft rupturing.

A SAFETY DEVICE AGAINST RUPTURE OF A ROTARY SHAFT

The present invention relates to a safety device against rupture of a rotary shaft, in particular a device intended to stop rotation and to prevent broken portions of the shaft from falling. The invention is particularly suitable for the wind-up shafts of raisable curtain doors. Such a shaft may wind up a flexible curtain of cloth or plastics material directly or it may wind up straps which in turn serve to raise the curtain which may, itself be formed of panels that are rigid or flexible and that are suitable for folding up above the doorway.

Such doors are used in factories and warehouses and they often have to operate under difficult conditions: they may be required to operate several hundreds or even thousands of times a day, starting and stopping suddenly, being interrupted roughly in the event of accidents, shocks, etc. It can happen that a wind-up shaft breaks. Not only may the pieces of the broken shaft fall to the ground, thus constituting a first danger, but also, since the shaft is broken, one of the parts thereof is no longer braked, and since it is thus free to rotate it will necessarily allow any door portions such as straps or curtains that it was supporting to unwind, thus causing the curtain to be unwound on one side, giving rise to further risks of parts falling, and also giving rise to risks that the curtain will tear or be damaged some other way.

The present invention provides a safety device against rupture of a rotary shaft for preventing the shaft from rotating and for preventing broken portions thereof from falling, the device being particularly suitable for use with a shaft that winds up lifting straps for a raisable curtain or that winds up the curtain itself, the device being characterized in that at least one safety element is placed to retain the shaft to prevent it from falling, and in that the peripheral

surface of the shaft and the facing surface of said safety element are provided with means such as portions in relief that co-operate to prevent the shaft from rotating when a portion of the shaft is retained by said safety element due to the shaft rupturing.

In one embodiment, the safety element is a bracket surrounding the bottom portion of the shaft, the inside of the bracket being provided with portions in relief such as at least one rib, and the surface of the shaft also being provided with portions in relief, such as at least one longitudinal groove suitable for engaging said rib to be locked thereagainst.

In another embodiment, the safety element is a rod engaged inside a hollow shaft, the inside peripheral wall of said shaft including portions in relief such as at least one longitudinal groove suitable for engaging said rod so as to be locked thereon.

Other characteristics and advantages of the invention appear from the following description of an embodiment of the invention given by way of non-limiting example and described with reference to the accompanying drawings, which show clearly how the invention can be implemented.

In the drawings:

Figure 1 is a section view through a mechanism in normal operation, the mechanism comprising a wind-up shaft of the invention and the section being through a safety element;

Figure 2 is a section view through the same elements after a raisable curtain door has broken; and

Figure 3 is a section view through a variant embodiment.

Figure 1 shows a mechanism in normal operation, comprising a shaft 1 formed by means of a hollow tube that includes, at least at certain locations therealong, longitudinal grooves 2a, 2b, 2c, and 2d that have no effect in normal operation. At the locations

corresponding to these portions in relief, safety elements are disposed beneath the shaft and they may be constituted by brackets 3 fitted with at least one respective rib 4, e.g. in the bottommost portion of the bracket. The sections of the grooves and of the ribs are designed to lock the shaft against rotation should it come to bear against the bottom of a bracket. These portions in relief are therefore made with sharp angles, e.g. at 90°. The shaft could be provided with ribs instead of being provided with grooves.

Figure 2 shows the same portion of the shaft 1 after the shaft has broken. Since the shaft is no longer continuous, it drops, generally being held by joints at its ends. It can clearly be seen from the drawing that the broken shaft does not fall to the floor, but is supported by the bracket which is itself fixed to the doorframe. In addition, the shaft is prevented from rotating. Thus, in the event of rupture, nothing falls down, and the broken shaft is immediately prevented from rotating.

The shaft may have the section shown along its entire length.

The safety element may extend along the entire corresponding length, thus having the overall shape of a gutter. This disposition is suitable for shafts that wind up lifting straps. A large fraction of the shaft remains uncovered.

When the curtain itself winds onto the shaft, the above-described safety dispositions can be applied only to the ends of the shaft beyond the region of the shaft onto which the curtain is wound. Under such circumstances, other embodiments of the safety device are possible.

Figure 3 shows a variant in which the safety element is a rod 5 engaged inside the shaft 1'. Four notches 6a to 6d are formed in the inside periphery of the shaft, facing the rod 5. The section of the rod has sharp

angles so as to prevent the shaft from rotating should it come to rest thereon. The notches 6a to 6d could be replaced by ribs.

Naturally, other shapes of relief could be adopted, the essential points being:

1 - a length of broken shaft must be retained so as to prevent it from falling to the ground; and

2 - it must be prevented from rotating.

Claims:

1. A safety device against rupture of a rotary shaft for preventing the shaft from rotating and for preventing broken portions thereof from failing, the device being particularly suitable for use with a shaft that winds up lifting straps for a raisable curtain or that winds up the curtain itself, the device being characterized in that at least one safety element is placed to retain the shaft to prevent the shaft from falling, and in that a peripheral surface of the shaft and a facing surface of said safety element are provided with means that co-operate to prevent the shaft from rotating when a portion of the shaft is retained by said safety element due to the shaft rupturing.

2. A device according to claim 1, in which the safety element is a bracket surrounding a bottom portion of the shaft, the inside of the bracket being provided with portions in relief, and the surface of the shaft also being provided with portions in relief.

3. A device according to claim 1, in which the safety element is a rod engaged inside a hollow shaft, said hollow shaft having an inside peripheral wall including portions in relief suitable for engaging said rod so as to be locked thereon.

4. A device as defined in claim 1, wherein said means include cooperating relief portions formed on the shaft and on the safety element.

5. A device as defined in claim 2, wherein the portions in relief of the bracket include at least one rib, and wherein the portions in relief of the shaft include at least one longitudinal groove suitable for engaging said rib to be locked thereagainst.

6. A device according to claim 3, wherein the portions in relief on said inside peripheral wall include at least one longitudinal groove.

7. A safety device operable in the event of rupture of a rotary shaft for preventing the shaft from rotating and for preventing broken portions of the shaft from falling, for use with a shaft that winds up one of lifting straps for a raisable curtain and the curtain itself, characterized in that at least one safety element is placed below and along a substantial portion of the shaft to retain the shaft to prevent it from falling, wherein a peripheral surface of the shaft and a facing surface of said safety element comprise means for cooperatively preventing the shaft from rotating when a portion of the shaft is retained by said safety element due to the shaft rupturing.

8. The device according to claim 7, wherein the safety element comprises a bracket surrounding the bottom portion of the shaft, an inside of the bracket being provided with a first member and the surface of the shaft also being provided with a second mating member suitable for engaging said first member to thereby lock said shaft.

9. The device according to claim 8, wherein said second mating member comprises at least one longitudinal slot and wherein said first member comprises a rib disposed substantially parallel to said longitudinal slot.

10. Device according to claim 7, wherein said shaft is a hollow shaft, wherein the safety element is a rod disposed inside the hollow shaft, the inside peripheral wall of said hollow shaft including a mating member for engaging with said rod so as to prevent shaft rotation.

11. The device according to claim 10, wherein said mating member comprises at least one rib protruding from said inside peripheral wall of said hollow shaft.

12. A safety element for a roll up door including a shaft suspended above a door way, said safety element comprising:

first means disposed parallel to the length of the shaft for supporting the shaft in the event of a shaft rupture, which rupture thereby moves a ruptured portion of the shaft into contact with said first means, and

second means for preventing rotation of said ruptured portion of the shaft when the ruptured portion of the shaft moves into contact with said first means.

13. The safety element as recited in claim 12, wherein said first means comprises a bracket disposed beneath said shaft.

14. The safety element as recited in claim 12, wherein said second means comprises:

a first member operatively supported beneath said shaft;

a second mating member connected to said shaft and opposing said first member for engaging said first member when said ruptured shaft is moved into contact with said first means.

15. The safety element as recited in claim 14, wherein said first member is a male member and wherein said second mating member is a female member.

16. The safety element as recited in claim 14, wherein said first member is a male member and wherein said second mating member is a male member.

17. The safety element as recited in claim 12, wherein said shaft is a hollow shaft, wherein said first means is a rigid rod member, and wherein said rod member is disposed inside of said hollow shaft.

18. The safety element as recited in claim 17, wherein said second means comprises:

said rod member;

a mating member provided on an inside surface of said hollow shaft, said mating member being brought into engaging contact with said rod member when said ruptured shaft is moved into contact with said first means.

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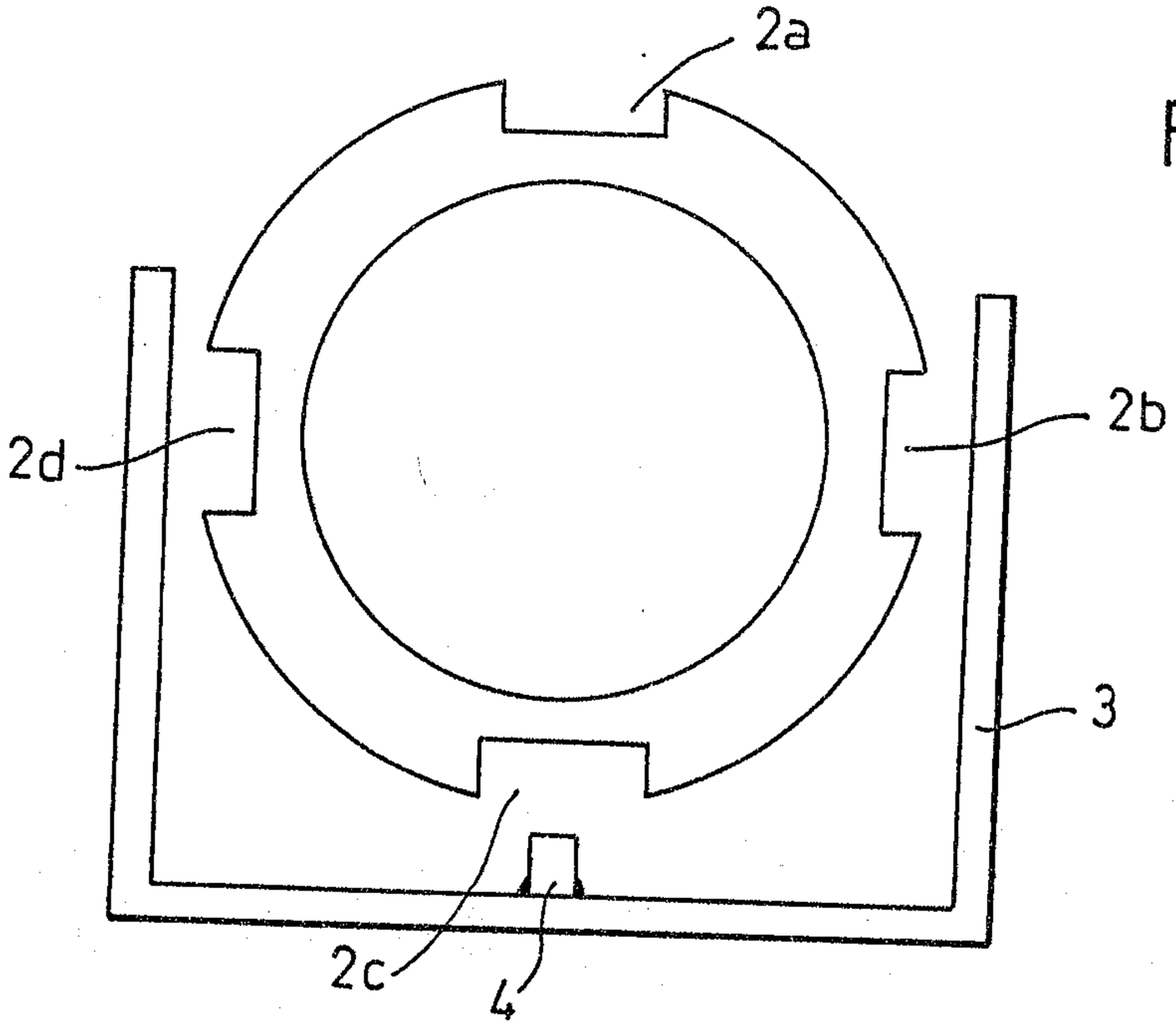


FIG.1

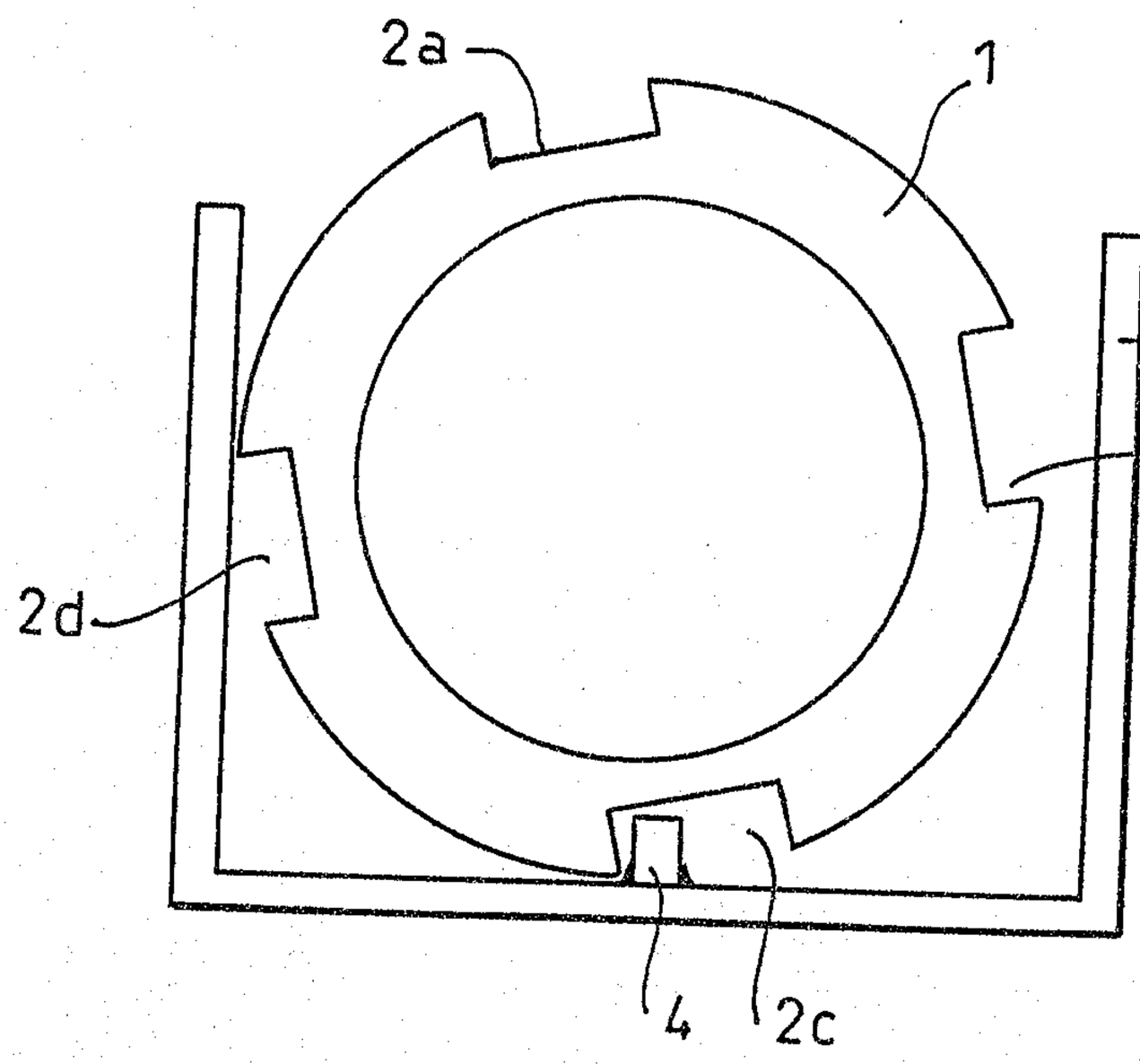
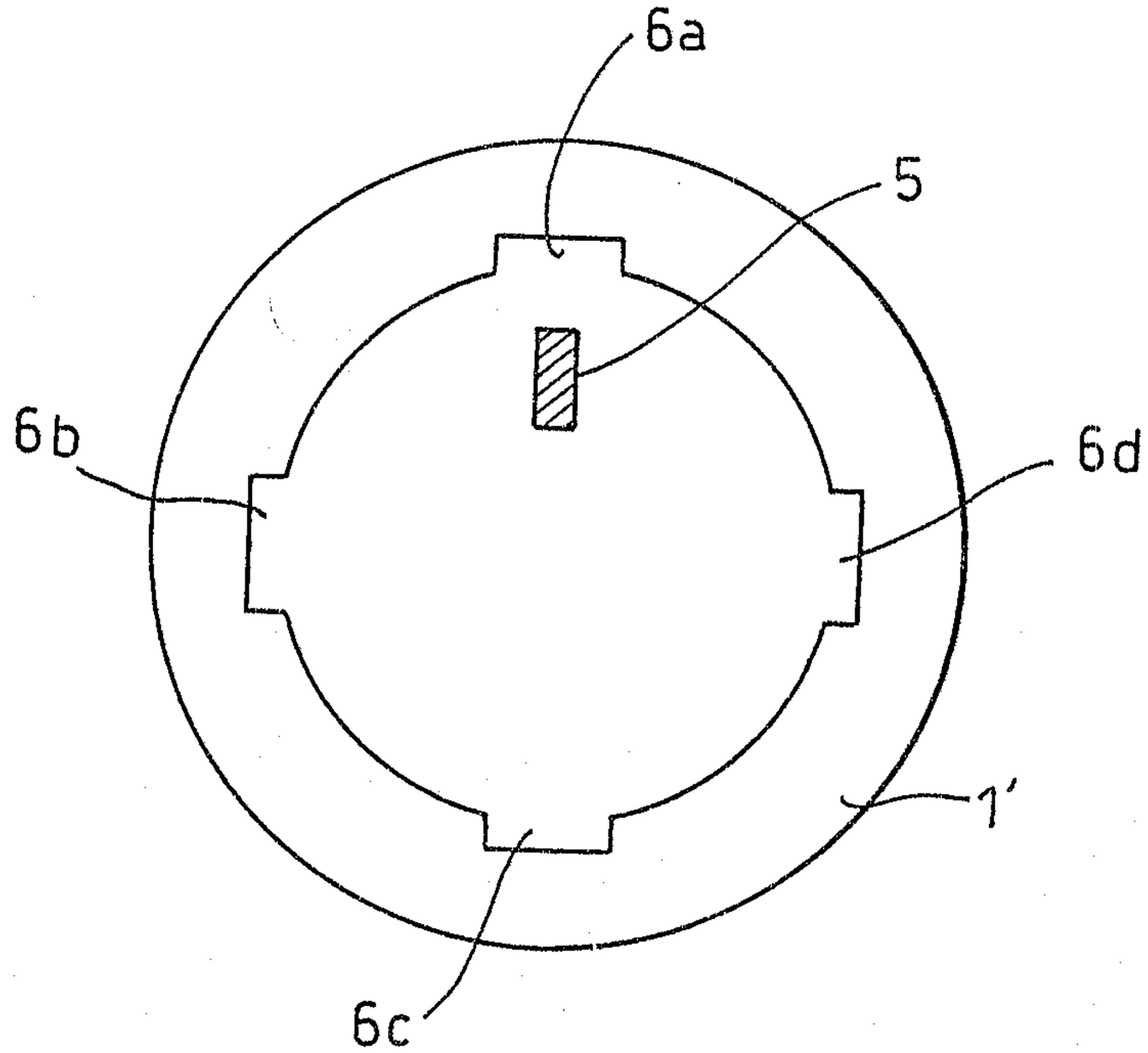


FIG.2

PATENT AGENTS

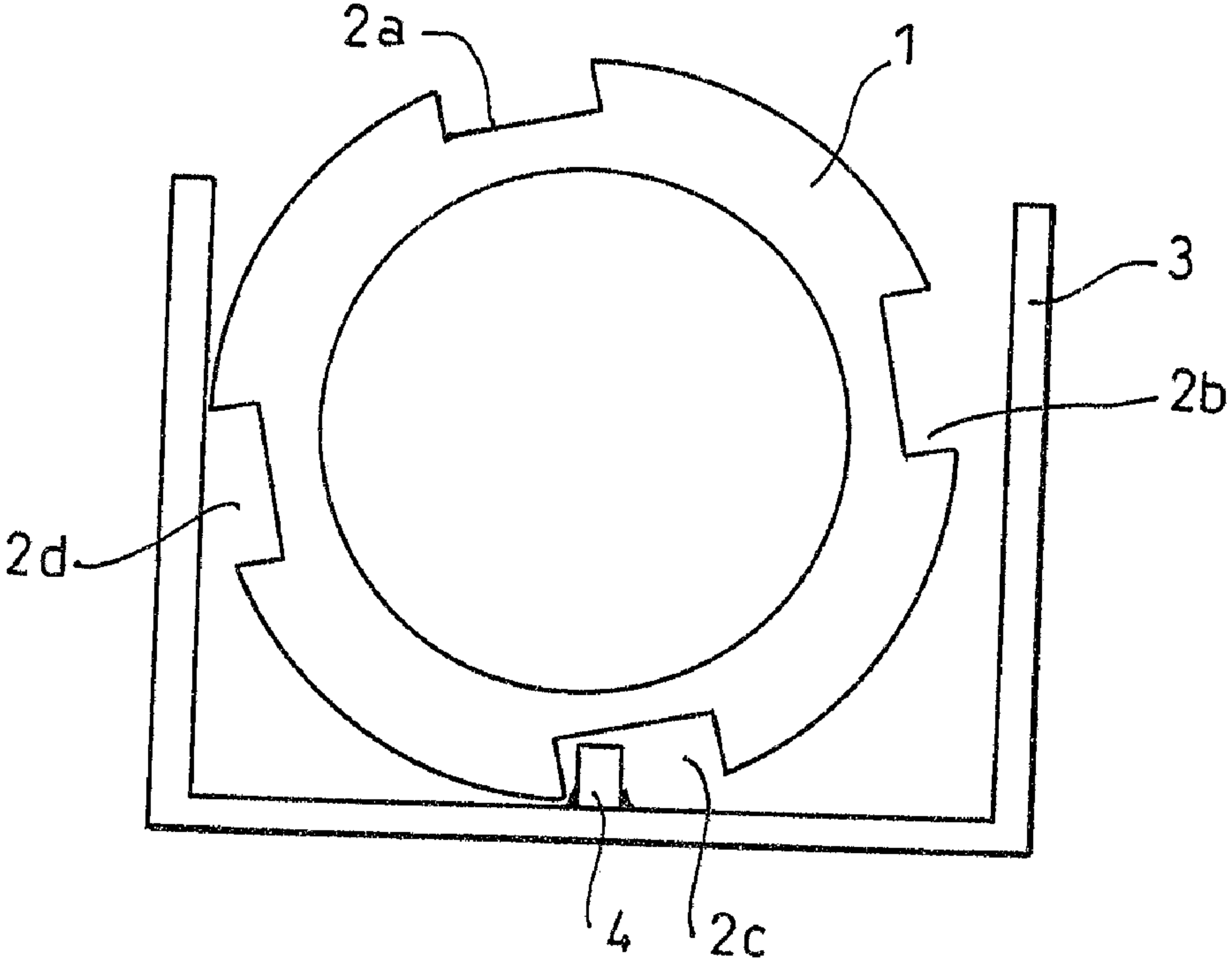
Dunlop Ogilvy Renault

FIG.3



PATENT AGENTS

Rowley Ogilvy Kenrick


2a
1
3
2b
2d
4
2c