(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 306 434 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.04.2018 Bulletin 2018/15

(51) Int Cl.:
G05G 1/08 *(2006.01)* ***F24C 15/00*** *(2006.01)*
F24C 15/32 *(2006.01)*

(21) Application number: **17001472.4**

(22) Date of filing: **01.09.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **16.09.2016 SI 201600232**

(71) Applicant: **GORENJE gospodinjski aparati, d.d.**
3320 Velenje (SI)

(72) Inventors:
- **Krasovec, Rok**
  3270 Lasko (SI)
- **Kotnik, Sebastijan**
  3331 Nazarje (SI)

(74) Representative: **Golmajer Zima, Marjanca**
Patentna pisarna d.o.o.
Copova 14
1000 Ljubljana (SI)

(54) KNOB ASSEMBLY

(57) A knob assembly for setting parameters for food treatment in a household appliance provided with a steaming system for food preparation, wherein the knob assembly comprises a knob (2), a knob housing (1) and a switch holder (7), and a drawer element (3) fastened to the knob (2) for receiving water.

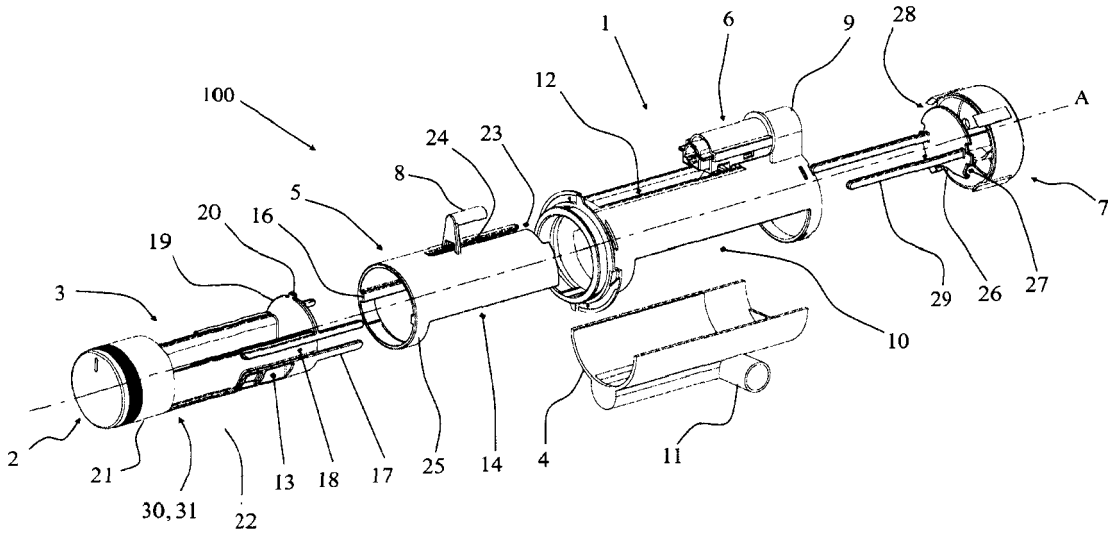

Fig. 1

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Description

Object of Invention

[0001] The object of the invention is a knob assembly for setting parameters for food treatment in a household appliance provided with a steaming system, wherein the knob assembly includes a knob, a knob housing, and a switch holder.

Technical Problem

[0002] The technical problem solved by the present invention is how to conceive such a knob assembly, preferably a retractable knob assembly to be integrated into a household appliance provided with a steaming system, which knob will not only have a primary function of a control knob for controlling a household oven, i. e. programme or temperature selection, but will also provide for a function of pouring water into a container regardless of the primary function even during operation of the appliance, wherein these functions will exclude each other and be independent from each other. The concept of the assembly of such a multifunctional knob must at the same time meet high aesthetic standards in the field of household appliances, this is why integration of such a multifunctional knob into a control panel of a household appliance should not change its existing outer appearance. The concept of a multifunctional retractable knob must also meet the requirements for economic production, which is demanded in this branch of industry.

Prior Art

[0003] A household appliance that comprises an oven provided with a steaming system includes a container that needs to be sporadically filled with water. The water in the form of steam is then delivered to a food processing compartment depending on a programme for heat treatment of food. Water is poured into the container either directly into the container or through a filling drawer.

[0004] In case of direct access to the container, the container is located in direct vicinity of the control panel. The container is accessible through a special door arranged on the control panel of the household appliance. There are also known embodiments, in which the entire front panel of a household appliance is displaced upwards. Advantageously, solutions of this type do not considerably change the outer appearance of a household appliance, however a need for special guides, an additional electric motor and consideration of the entire dynamic displacement of electronic on a control panel are very demanding in terms of construction and hence economically unjustifiable.

[0005] Another known way of filling a container with water is using a filling drawer that is arranged as an extra element behind the control panel and connected via a conduit with the container in the interior of a household appliance. The filling drawer should be rather unnoticeable due to aesthetic reasons, this is why it is arranged behind the control panel, yet it must be accessible. Such filling drawer can be arranged in an exhaust gap of the oven, which is arranged above the oven door. The filling drawer is concealed, it is only expanded when filled with water but the oven door must be opened during this procedure. Always when using the over, the water level in the container should be checked. Moreover, the filling drawer is very inconvenient for being filled since its height can only correspond to the space intended for air exhaust. Practically speaking, huge precision is required when filling it with water.

[0006] A solution with a water drawer is known from EP 2550902 A1 (Winkelmann et al.), wherein the drawer is integrated in the control panel of the household appliance in the form of a knob. The push cover of the knob is extended into a cylindrical filling drawer via an intermediate element. When the knob cover is pushed, a push-in pop-out mechanism is activated, which shifts the retractable knob from the closed position to an opened position. One part of the filling drawer pops out together with the push-in part from the knob housing and thus from the control panel plain. An extra opening for receiving such a filling drawer needs to be made in the control panel. Said retractable knob which contains a filling drawer only has one function, i. e. filling water into the container. Since this extra element is arranged on the control panel, such a filling drawer requires an amendment of the control panel and this is, particularly for aesthetic reasons, not desirable. The extra element destroys the symmetric appearance on the control panel of the apparatus, which is a very important issue in household appliances of this type.

Solution to the Technical Problem

[0007] The technical problem is solved by a knob assembly, the main characteristic of which is defined in claim 1.

[0008] The knob assembly, preferably a retractable knob assembly, which is integrated into a control panel of a household appliance provided with a steaming system, such as a household oven provided with a steaming system, comprises a knob, via which a user controls a respective electrical switch and as a result the oven, a knob housing, and a knob holder, to which the electrical switch is fastened. The fundamental function of the knob is programme selection and desired temperature setting. The knob has several positions in the built-in state. Before use, the retractable knob is in a zero, inactive position, its front surface is substantially aligned with the control panel. When the front surface of the knob is pushed towards the interior of the appliance, the push-in pop-out system is activated, which shifts the knob from its zero, inactive position to its primary, active position. The knob in this position functions as a knob; a user uses it to control the oven by rotating the knob in a certain direction

and for a certain angle. With the knob in this position, no water can be filled into the container via the knob, because the water drawer is not accessible. When the knob of the invention is arranged in a predetermined position, a user can make a translational shift in a direction away from the control panel to a secondary position. In this position, the drawer element gets available and the user uses the knob as the filling drawer to fill water into the container which is arranged in the interior of the household appliance.

[0009] The knob assembly is formed in a way to entirely preserve its primary function of programme and temperature selection and has one additional function which is filling water into the container and consequently into the oven. Despite the fact that these two functions are active on one single assembly, they function separately and independently from each other. When the knob has the primary knob function, it can only be rotated, while longitudinal shifts of the knob, with which the drawer element is opened, are disabled. And vice versa, when the knob is in its secondary function, it can be shifted in longitudinal direction, its rotational movement is disabled. When the knob functions as the drawer in its secondary function, the knob assembly disengages in its rear part and the knob is no longer connected with the switch. This is an additional safety feature. Simultaneous water filling and oven control are herewith prevented.

[0010] Integration of the retractable knob assembly of the invention does not call for any changes in the concept of the control panel in case of an oven with a steaming system. A one-piece concept of the knob and the drawer element does not require either any constructional changes in the control panel or changes in the outer appearance of the control panel. It is therefore economically very justifiable due to unified production. No additional cut-outs are needed in the control panel, smoother lines can be designed. The retractable knob assembly of the invention further allows for much freedom in construction: the drawer element inside the assembly can have various shapes, the water can be filled rapidly without spilling. The drawer element in the retractable knob is accessible also while the oven is functioning. No critical part of the oven needs to be opened, the water can be filled into the container even when the oven is functioning.

[0011] The invention will be described in more detail by way of an embodiment and a drawing representing in

Fig. 1 A retractable knob assembly of the invention in exploded view.

[0012] As shown in Figure 1, a retractable knob assembly 100 includes

- a knob housing 1,
- a knob 2 coaxially arranged within the housing 1 and not in direct connection with it,
- a drawer element 3 shaped as a hollow tubular element configured to receive water and mounted to the knob 2 as its extension; in the embodiment, this element is in a form-locking connection with the knob 2;
- a control element 5 coaxially arranged between the knob 2 with the drawer element 3 and the housing 1 and fastened in the housing 1 via a holder 8 in a suspended manner, wherein the control element 5 is provided with grooves 23, 24 for receiving a projection 20 arranged on the drawer element 3, which grooves allow for a longitudinal movement of the knob 2 and simultaneously lock rotational movement of the knob 2;
- push-in pop-out mechanism 6 that gets activated if the knob 2 is pushed and said mechanism shifts the knob from the zero, inactive position into a primary active position;
- a switch holder 7 that closes the housing 1 and on which a switch of any known type is arranged from the outer side; it is a support element for the drawer element 3;
- a water guiding means 4 that receives the water from the drawer element 3 and guides it through the tubular duct into the water container in the interior of the household appliance.

[0013] The retractable knob assembly 100 has the tubular housing 1 with a flange on its front end, with which it is integrated into a cut-out of the control panel on the front side of the oven based on a form-locking connection. On the other end of the housing 1, which is distal to the knob 2, the switch holder 7 is arranged with a form-locking connection. The holder 7 is provided with two screw holes arranged at a conventional distance for fastening the electrical switch for oven control. As shown in Figure 1, the push-in pop-out mechanism 6 of any known type is fastened on a special holder 9 on the upper part of the shell of the housing 1. The upper part of the shell of the housing 1 is further provided with a longitudinal groove 12 that extends in parallel with the longitudinal axis A of the housing 1 and the retractable knob assembly 100, respectively. The push-in pop-out mechanism 6 acts in direction of the longitudinal axis A. A cut-out 10 is arranged diametrically opposite the longitudinal groove 12 in the shell of the housing 1, said cut-out being closed by the complementary shaped guiding means 4. The guiding means 4 collects the water originating from the drawer element 3 and guides it through a discharge 11 into a tubular conduit and further into the water container (not shown in the figure) inside the household appliance.

[0014] The knob 2, with which a user controls the oven, when the assembly is built in the control panel, is connected with the drawer element 3 on the internal side in axial direction, and they both together form a manipulation module 22. The drawer element 3 is of a tubular hollow shape with an opened upper portion to receive water. In the bottom area distal to the knob 2, the drawer element 3 is provided with an opening 13, through which the water flows into the guide means 4 and further

through the discharge 11 via tubular conduct into the water container inside the oven. The drawer element 3 is closed by a rear wall 19, from which the projection 20 engaging with the grooves 23, 24 of the control element 5 projects, thus defining the type of movement of the knob 2 and the drawer element 3. The grooves 23, 24 and their functions will be illustrated in more detail hereinbelow. The drawer element 3 is provided on each side wall in a section distal to the knob 2 with a groove fork 17 that projects over the rear wall 19 of the drawer element 3 and in the assembled state engages with a respective cut-out 27 in a rotational plate 26 of the switch holder 7, which plate transfers the rotation of the knob 2 to the switch and at the same time provides support to the groove forks 17 and the drawer element 3. A stabilisation groove 18 is formed between each groove fork 17, which groove 18 continues in direction towards the knob 2 on part of the side wall of the drawer element 3. Each stabilisation groove 18 corresponds to each longitudinal guide 16 arranged in the interior of the control element 5 and engages with a respective stabilisation groove 18 when the knob is in its secondary position, i. e. in a position which allows oven control. Rotation of the knob 2 and the drawer element 3 is herewith prevented.

[0015] The housing 1 is connected with the knob 2 and the drawer element 3 via control element 5 of a tubular shape, which is provided with the console holder 8 on the upper part of the outer shell. The control element 5 is coaxially arranged within the housing 1 such that the console holder 8 reaches through the longitudinal groove 12 of the housing 1 and is fastened in a suspended manner in the push-in pop-out mechanism 9 on the housing 1. The knob 2 with the drawer element 3 is coaxially arranged within the control element 5. The control element 5 is provided on the circumference diametrically opposite the console holder 8 with a circumferential cut-out 14, which is closed by a stop ring 25 at the proximal end of the knob 2 and open at the distal end of the knob 2. The cut-out 14 coincides with the cut-out 10 of the housing 1 and allows the water to flow from the drawer element 3 into the guide means 4. The control element 5 is provided at the end distal to the knob 2 by a rotational groove 23 extending over part of the circumference and the length of which determines the angle of rotation of the knob 2, which is required for the oven control. On the upper part of the outer shell of the control element 5, the rotational groove 23, diametrically opposite the circumferential cut-out 14, continues into the longitudinal groove 24 extending substantially perpendicularly to the rotational groove 23. The projection 20 of the drawer element 3 engages with the rotational groove 23 and the longitudinal groove 24 and defines the movement of the manipulation module 22 of the knob 2 and the drawer element 3.

[0016] The knob 2 and the drawer element 3 are coaxially arranged within the control element 5, such that part of the drawer element 3 abuts on the stop ring 25 of the control element 5. The mutual position of the drawer element 3 and the stop ring 25 is defined by a first 30 and a second limiting bulge 31 on the lower part of the drawer element 3. The first limiting bulge 30 which is larger than the second limiting bulge 31 allows for a total longitudinal shift of the drawer element 3 and the control element 5 when moving into the primary position and at the same time defines the size of the longitudinal shift of the knob 2 from the zero to the primary position. The zero position of the knob is the position, in which the knob is retracted and its front surface is aligned with the control panel. The primary position of the knob is the position, which allows oven control. On the other side, the drawer element 3 with the groove fork 17 projects through the control element 5 to the switch, more precisely into cut-outs 27 arranged on the rotational plate 26 of the switch holder 7. The switch having a conventional design is provided with an axle, on which a hub 28 is arranged, said hub being connected with the rotational plate 26 in a material-locking manner. At the same time, the drawer element 3 is connected with the housing 1 through the rotational plate 26, the hub 28 and the switch, which housing 1 offers support to the drawer element 3. The rotation of the knob 2 is transferred through the groove fork 17, the rotational plate 26 and the hub 28 to the switch, wherewith the control of the oven is provided for. In direction of the axis A, stabilisation prongs 29 are integrally formed with the rotational plate 26, which prongs assist in guiding the knob 2 and the drawer element 3 when being transferred from the primary position into the secondary position.

[0017] When the knob 2 in the zero position is pushed towards the interior of a household appliance, when the retractable knob assembly is integrated into a household appliance, the control element 5 gets displaced, the push-in pop-out mechanism 6 gets triggered and pushes the console holder 8 and the control element 5 back in direction towards the control panel. When the control element 5 moves, the drawer element 3 with the knob 2 moves longitudinally as well, such that part of a gripping part 21 of the knob 2 pops out from the control panel and a user can use the knob in its primary function, i. e. control the oven by rotating the knob 2. Said control is made possible due to the projection 20 engaging with the rotational groove 23 of the control element 5, the longitudinal guides 16 of the control element 5 are disengaged from the stabilisation guides 18 and the knob 2 can rotate together with the drawer element 3. The rotation of the knob 2 is transferred to the switch via the groove fork 17 of the drawer element 3, which fork remains engaged with the cut-outs 27 on the rotational plate 26. The limiting bulges 30, 31 hold the drawer element 3 and the control element 5 in their mutually unchanged position. In this position, the drawer element 3 is not visible to and accessible by the user.

[0018] When the user wants to pour water into the container, the knob 2 with the drawer element 3 needs to be pulled in a direction away from the control plate. The knob 2 thus gets transferred from the primary position into the secondary position, wherein, when the knob 2 is moved,

the drawer element 3 moves simultaneously and becomes accessible. The knob 2 in the secondary position functions as a filling drawer. Before the position of the knob 2 is changed, the knob must be positioned in its predetermined position, in which it is ascertained that the projection 20 of the drawer element 3 is located in the rotational groove 23 on the mouth of the longitudinal groove 24. When the user pulls the knob 2, the projection 20 gets displaced into the longitudinal groove 24 and the drawer element 3 slides by means of each stabilisation groove 18 and each longitudinal guides 16 within the control element 5. The length of the longitudinal pull-out is determined by the length of the longitudinal groove 24, on the rear edge of which the projection 20 abuts. The rotation of the knob 2 and the drawer element 3 is prevented by each stabilisation grooves 18 and by each longitudinal guide 16 of the control element 5 together with the groove fork 17. Due to an extra longitudinal shift of the knob 2 with the drawer element 3, the link between the groove fork 17 and the rotational plate 26 opens and the connection with the switch is interrupted.

[0019] When the knob assembly is integrated in the control panel of a household appliance, it is returned to its primary or zero inactive position by being pushed in the opposite direction, i. e. towards the control panel.

[0020] In another embodiment of the retractable knob assembly it can be provided with a guiding means that is configured as part of the housing. Here, the drawer element has a discharge fastened to the opening. The water poured by the user into the drawer element is guided by the discharge into the tubular duct and further into the water container within the household appliance. The rotation of the knob is limited due to the rotation of the discharge and consequently the tubular duct.

[0021] A third embodiment is a knob assembly having a knob which is not retractable into the control panel and does not include a push-in pop-out mechanism. Such a knob assembly can be adapted by minimum constructional changes.

[0022] A person skilled in the art can, understandably, conceive different embodiments without circumventing the essence of the invention.

Claims

1. A knob assembly for setting parameters for food treatment in a household appliance provided with a steaming system for food preparation, wherein the knob assembly comprises a knob (2), knob housing (1) and a switch holder (7),
   characterized in that
   it includes a drawer element (3) mounted on the knob (2) to receive water.

2. The knob assembly according to claim 1, **characterized in that** a control element (5) is coaxially arranged between the knob (2) with the mounted drawer element (3) and the housing (1), said control element (5) allowing for longitudinal movement of the knob (2) with the mounted drawer element (3) and at the same time blocking the rotational movement of the knob (2) with the mounted drawer element (3).

3. The knob assembly according to claim 2, **characterized in that** the control element (5) is fastened in the knob housing (1) via holder (8) in a suspended manner.

4. The knob assembly according to claim 3, **characterized in that** the control element (5) is provided circumferentially on the end distal to the knob (2) with a rotational groove (23) for receiving a projection (20) and its length is compatible with the angle of rotation of the knob (2) in the primary position.

5. The knob assembly according to claim 4, **characterized in that** the control element (5) is provided with a longitudinal groove (24) for receiving the projection (20) arranged on the drawer element (3).

6. The knob assembly according to claims 4 and 5, **characterized in that** the longitudinal groove (24) extends perpendicularly to the rotational groove (23) and its length defines the size of the longitudinal shift of the knob (2).

7. The knob assembly according to claim 1, **characterized in that** the switch holder (7) is fastened at the end of the housing (1) distal to the knob (2) and is a support for the drawer element (3).

8. The knob assembly according to any preceding claim, **characterized in that** the control element (5) has a tubular shape.

9. The knob assembly according to claim 1, **characterized in that** the drawer element (3) has a hollow tubular shape.

10. The knob assembly according to claims 8 and 9, **characterized in that** the drawer element (3) is provided on each side wall by a groove fork (17) and a stabilisation groove (18) therebetween, the length of which corresponds to the length of each longitudinal guide (16) arranged in the interior of the control element (5).

11. The knob assembly according to claim 10, **characterized in that** the drawer element (3) is provided on its bottom part by a first (30) and a second limiting bulge (31), between which a stop ring (25) of the control element (5) is arranged.

12. The knob assembly according to any preceding claim, **characterized in that** the knob (2) is a retract-

able knob.

13. The knob assembly according to claim 12, **characterized in that** a holder (9) is fastened to the housing (1) for receiving a push-in pop-out mechanism (6).

14. The knob assembly according to any preceding claim, **characterized in that** the drawer element (3) is provided with an opening (13), the control element (5) is provided with a circumferential cut-out (14) and the housing (1) is provided with a cut-out (10), wherein the opening (13), the circumferential cut-out (14) and the cut-out (10) coincide and are closed by a guiding means (4) for discharging water.

15. A household appliance provided with a steaming system for food preparation, preferably a household oven with a steaming system that comprises a retractable knob assembly according to any preceding claim.

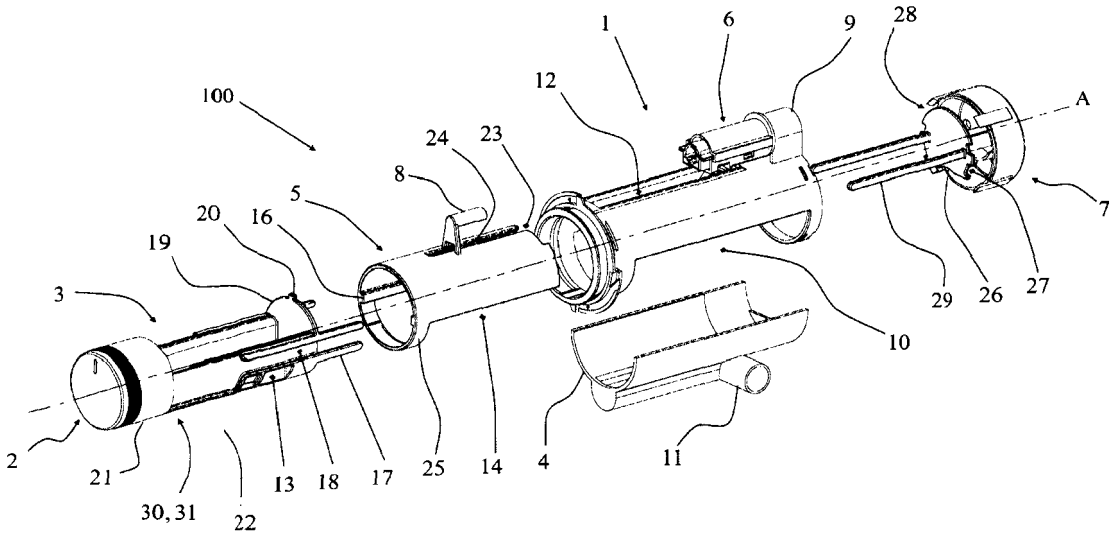
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Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 17 00 1472

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 0 276 458 A2 (BUDERUS KUECHENTECHNIK [DE]) 3 August 1988 (1988-08-03) * column 2, line 10 - column 4, line 7; figures 1-3 *	1-9 10-15	INV. G05G1/08 F24C15/00 F24C15/32
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TECHNICAL FIELDS SEARCHED (IPC)

F24C
G05G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 February 2018	Areso y Salinas, J

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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REFERENCES CITED IN THE DESCRIPTION

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