

Candidate's answer

A device for indicating the temperature of a liquid

The invention concerns a device for indicating the temperature of a liquid, and in particular, cooking oil. The invention is also concerned with a deep fryer having a device according to any one of claims 1 to 14.

Devices are known which indicate the temperature of liquid, such as oil, close to the liquid's surface. Such devices have particular application when cooking doughnuts in a deep fryer. The doughnuts cook whilst floating at the surface of hot oil in the fryer, and cook optimally when the surface temperature of the oil is at least 180°C.

Devices for indicating the temperature of oil close to its surface are described in D1 and D2.

In D1, the device has an internal pointer which is arranged to pivot as temperature changes. The pointer can be viewed through a temperature scale painted on a transparent portion of the device to read temperature. However, it can be difficult for a user to accurately determine temperature with this device. Furthermore, it can be difficult to see the pointer when the device is splashed with oil.

In D2, which is the closest available prior art, the device has an external fin for indicating temperature. Internally, the device has a weight suspended on a compressed spring which is held in a support by wax. At low temperatures such as 20°C the weight is contained by the wax and the device is orientated so that a fin projects at an off-vertical angle. As the oil heats to 180°C, the wax melts, releasing the weight, and thereby re-orientating the device so that the fin projects vertically. A user therefore knows that, once the fin is vertical, the oil has reached a temperature of 180°C. A problem with the device of D2 is that, once it has been used, it must be discarded or reconditioned before it could be used again.

It is therefore an object of the invention to provide a device of the type described in D2 which can be repeatedly used without requiring reconditioning.

According to the present invention, there is provided the device of claim 1, which overcomes the problems felt by devices of the type described in D2.

In particular, by having the means which attach the weight to the body, also being responsive to temperature changes, the weight can be reversibly displaced between positions which correspond to specific temperature values. The differing displacement of this weight at different temperature values causes the device to adopt differing orientations which are indicative of the temperature being felt by the device. The reversible nature of the means allows the weight to automatically revert back to an

original position once cooking has been completed, and therefore ensures that the device automatically places itself in a state where it is ready to be used again, the next time a user wishes to cook an object, such as doughnuts, in a liquid, such as oil.

Further advantageous embodiments of the device according to the invention have been specified in dependent claims 2 to 14, claim 15 additionally claiming a deep fryer provided with a device according to the invention.

CLAIMS

1. A device for indicating the temperature of a liquid, the device comprising:
a body (1);
a weight (5, 22); and
means (3, 10, 11, 20, 21) for attaching the weight (5, 22) to a surface of the body (1),
characterised in that:
the means (3, 10, 11, 20, 21) are configured to reversibly displace the weight (5, 22)
in response to temperature changes, such that the weight (5, 22) can move between
a first position with respect to the body (1) at a first temperature, and a second
position with respect to the body (1) at a second temperature, and such that:
when the weight (5, 22) is in the first position, the device adopts a first orientation to
indicate the first temperature, and when the weight (5, 22) is in the second position,
the device adopts a second orientation to indicate the second temperature.
2. The device of claim 1, wherein the means (3) comprise a bimetallic strip (3) attached
to the weight, comprising two strips of metal having different co-efficients of thermal
expansion, such that the bimetallic strip (3) bends in a predetermined direction when
its temperature increases, and then bends back in the opposite direction when its
temperature subsequently decreases.
3. The device of claim 1, wherein the means (10, 11) comprise a first spring (10)
attached to the weight (5), and a second spring (11) attached to the weight (5), and
wherein at least one spring (11) is a thermo-variable spring whose stiffness is
temperature dependent.
4. The device of claim 3, wherein the at least one thermo-variable spring comprises a
nickel-titanium alloy.
5. The device of claim 1, wherein the weight (5, 22) comprises a magnetically attracted
material, and wherein the means (20, 21) comprise a tension spring (21) attached to
the weight (22) and a magnet (20) arranged to magnetically attract the weight (22).
6. The device of claim 5, wherein the magnet (20) additionally functions as a stabilising
weight to ensure the device adopts the first orientation when placed in liquid at the
first temperature.

7. The device of claim 5 or claim 6, wherein the weight (22) comprises iron.
8. The device of any preceding claim, further comprising a guiding means (23) to guide the weight (5, 22) between the first and second positions.
9. The device of any preceding claim, wherein at least a portion of the body (1) is hollow, and the weight (5, 22) is attached to an inner surface of this body (1).
10. The device of any one of claims 1 to 8, wherein the body (1) is a solid body (1) and the weight (5, 22) is attached to the outer surface of this body (1).
11. The device of any preceding claim, wherein the body (1) is spherical or elongated.
12. The device of any preceding claim, wherein the weight (5, 22) is spherical, cylindrical or cube shaped.
13. The device of any preceding claim, wherein the body (1) is provided with markers (7, 12), such as fins (12) or line markings (7), for indicating the temperature of the liquid the device is located in, and/or wherein at least a portion of the body (1) comprises transparent material to permit a user to observe the position of the weight (5, 22), thereby indicating the temperature of the liquid the device is located in.
14. The device of any preceding claim, further comprising a stabilising weight (6).
15. A deep fryer comprising the device of any preceding claim.

EXAMINATION COMMITTEE I

Candidate No.

Paper A (Electricity/Mechanics) 2012 - Marking Sheet

Category	Maximum possible	Marks awarded	
		Marker	Marker
Independent claim	50	50	50
Dependent claims	35	24	21
Description	15	13	13
Total	100	87	84

Examination Committee I agrees on 86 marks and recommends the following grade to the Examination Board:



PASS
(50-100)



COMPENSABLE FAIL
(45-49)



FAIL
(0-44)

28 June 2012

Chairman of Examination Committee I