

(21) Application No:	0320634.9	(51) INT CL ⁷ :	F16K 31/60
(22) Date of Filing:	03.09.2003	(52) UK CL (Edition X):	F2V VS17
(71) Applicant(s): Danfoss A/S (Incorporated in Denmark) DK 6430 Nordborg, Denmark		(56) Documents Cited:	GB 1464722 A GB 1321773 A GB 0940585 A US 1654550 A
(72) Inventor(s): Stig Andreasson Morten H Christensen Kuno Nielsen		(58) Field of Search:	UK CL (Edition W) F2V INT CL ⁷ F16K Other:
(74) Agent and/or Address for Service: Abel & Imray 20 Red Lion Street, LONDON, WC1R 4PQ, United Kingdom			

(54) Abstract Title: **Extension fitting for radiator valve control**

(57) An extension fitting 1, for turning a radiator valve control 2, comprising a valve control engaging element 4, a turnable hand control 6 and coupling means connecting the hand control to the engaging element 4 so that turning the hand control turns the engaging element 4 characterised in that axial movement of the radiator valve control 2 is accommodated by the extension fitting 1 without being transmitted to the hand control 6. The axial movement may be accommodated without being transmitted by a sliding key and groove connection between parts of the coupling means. The hand control 6 may be hollow and have a inside wall which constitutes one part of the coupling means. The coupling means may provide a unique connected orientation of the hand control 6 and the engaging element 4. A spring 20 may bias the hand control 6 away from the engaging element 4. The engaging element 4 may be a sleeve shaped to positively engage the radiator valve control 2. Also provided are a radiator valve control, especially a thermostatic radiator valve head unit, having such an extension fitting and a radiator, especially a low surface temperature radiator, provided with such a radiator valve control.

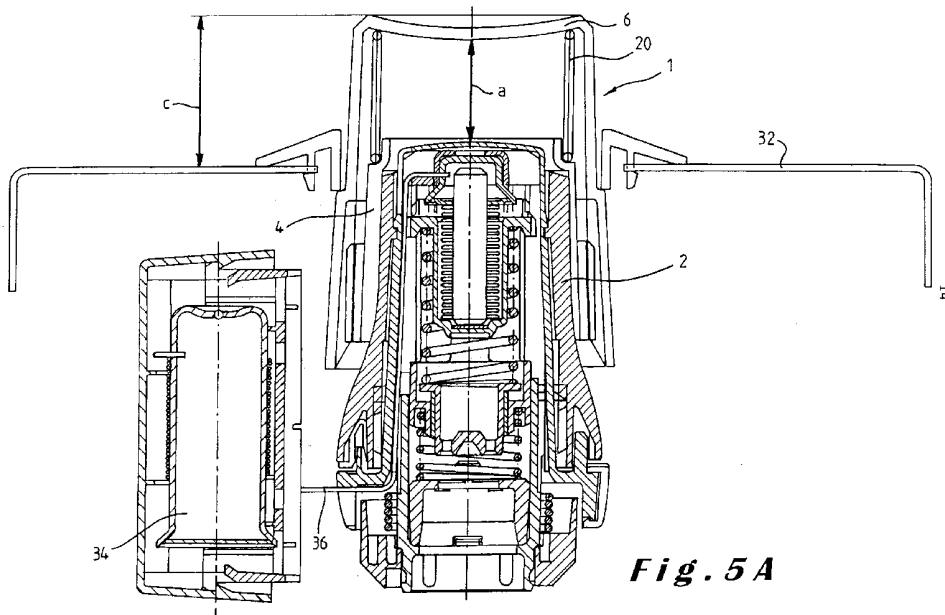


Fig. 5A

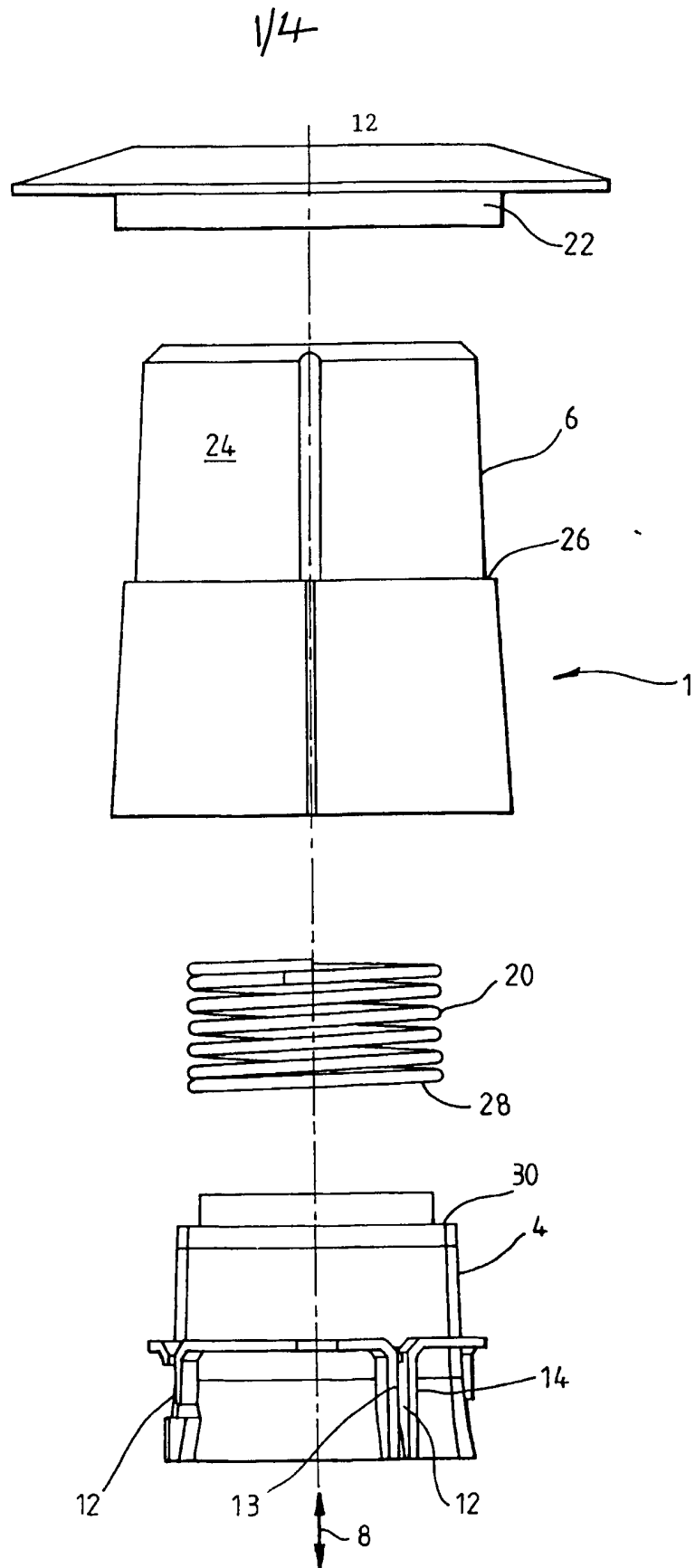


Fig. 1

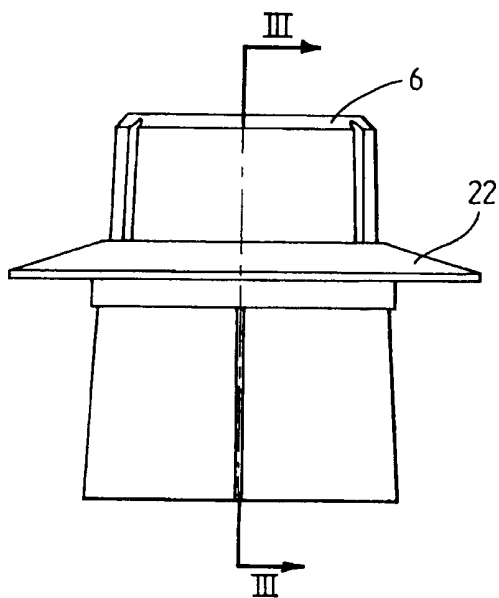


Fig. 2

13

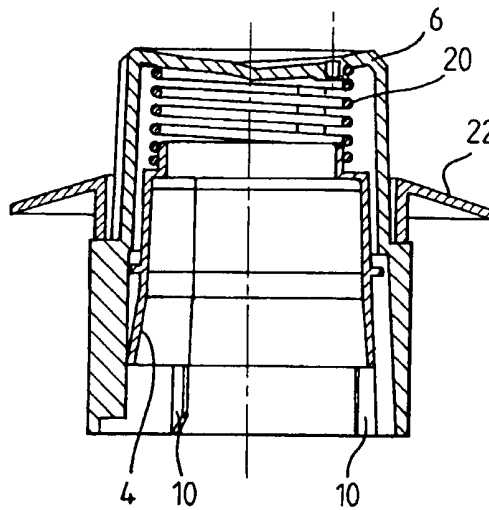


Fig. 3

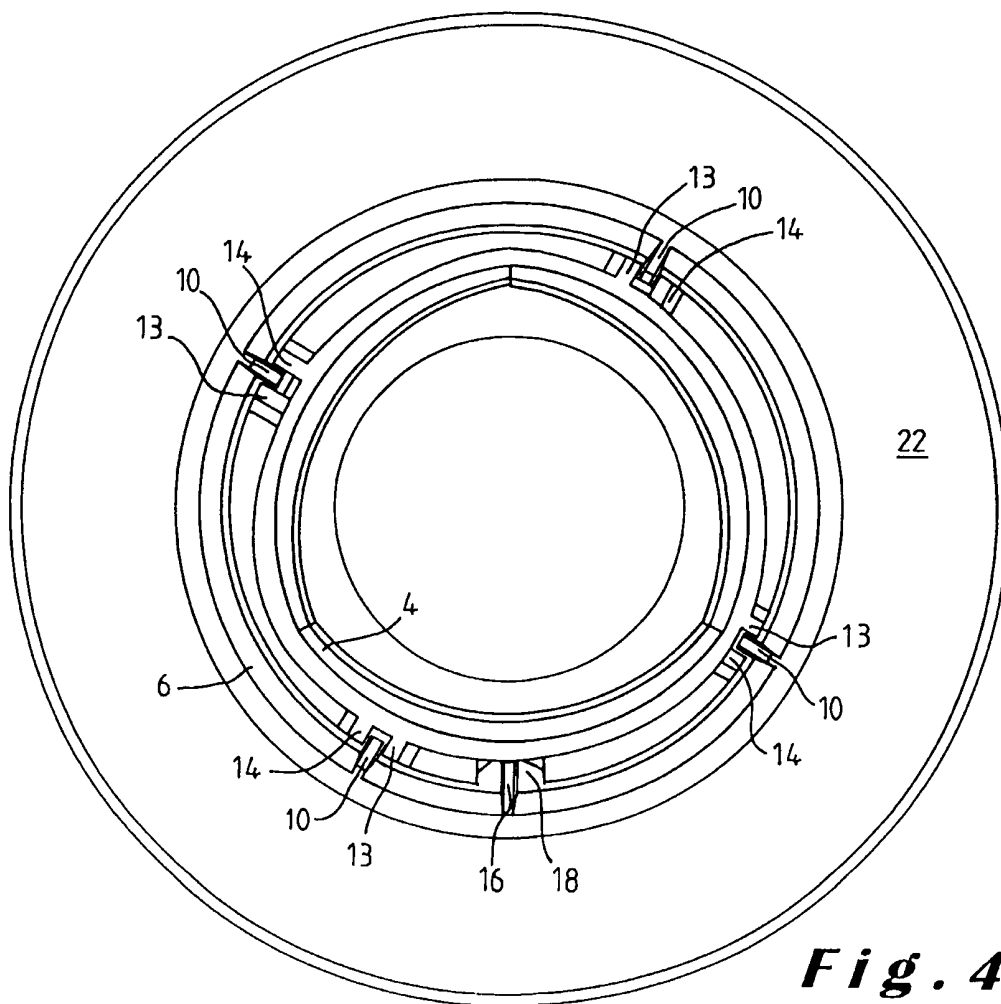


Fig. 4

3/4

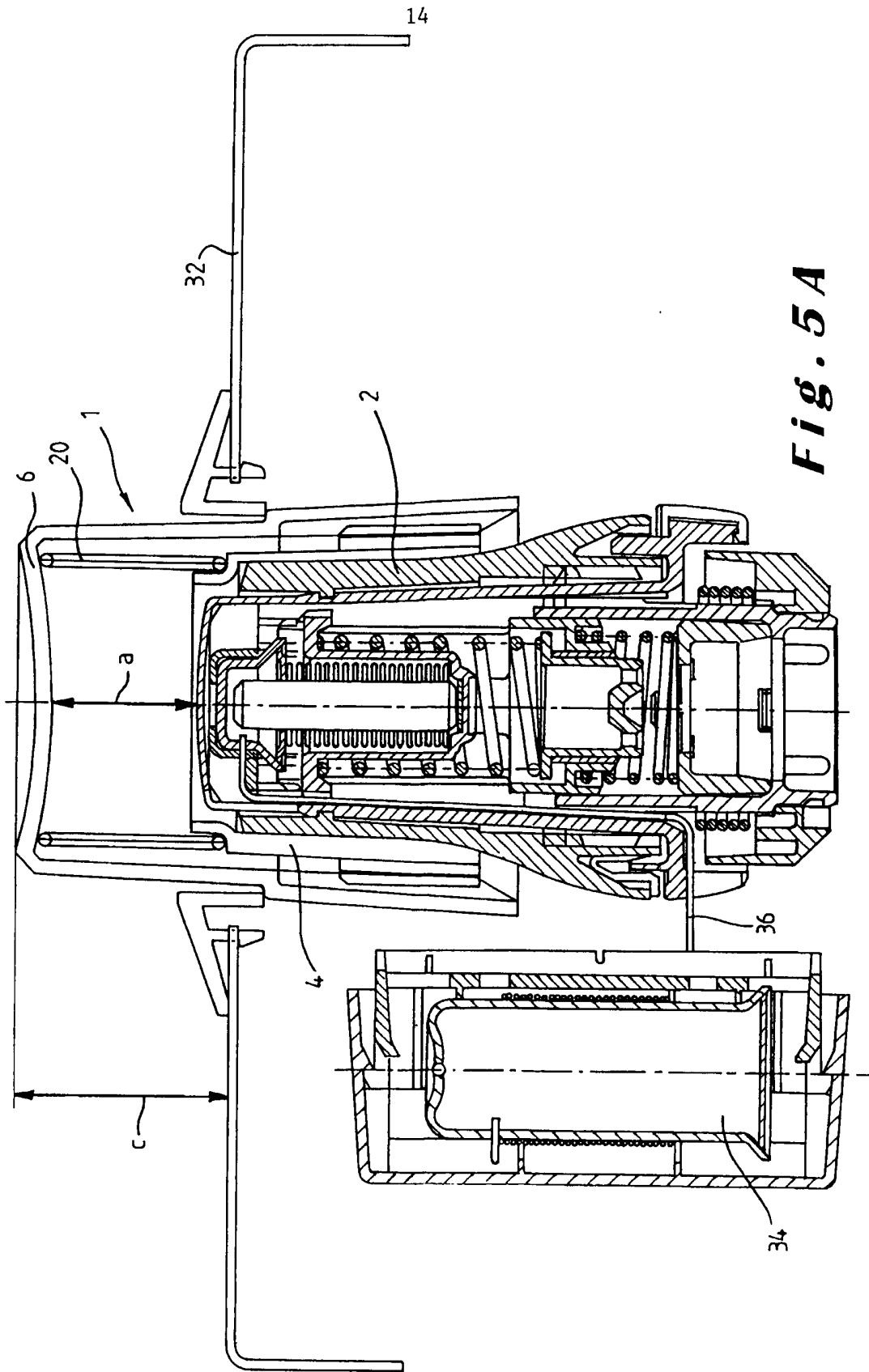


Fig. 5A

4/4

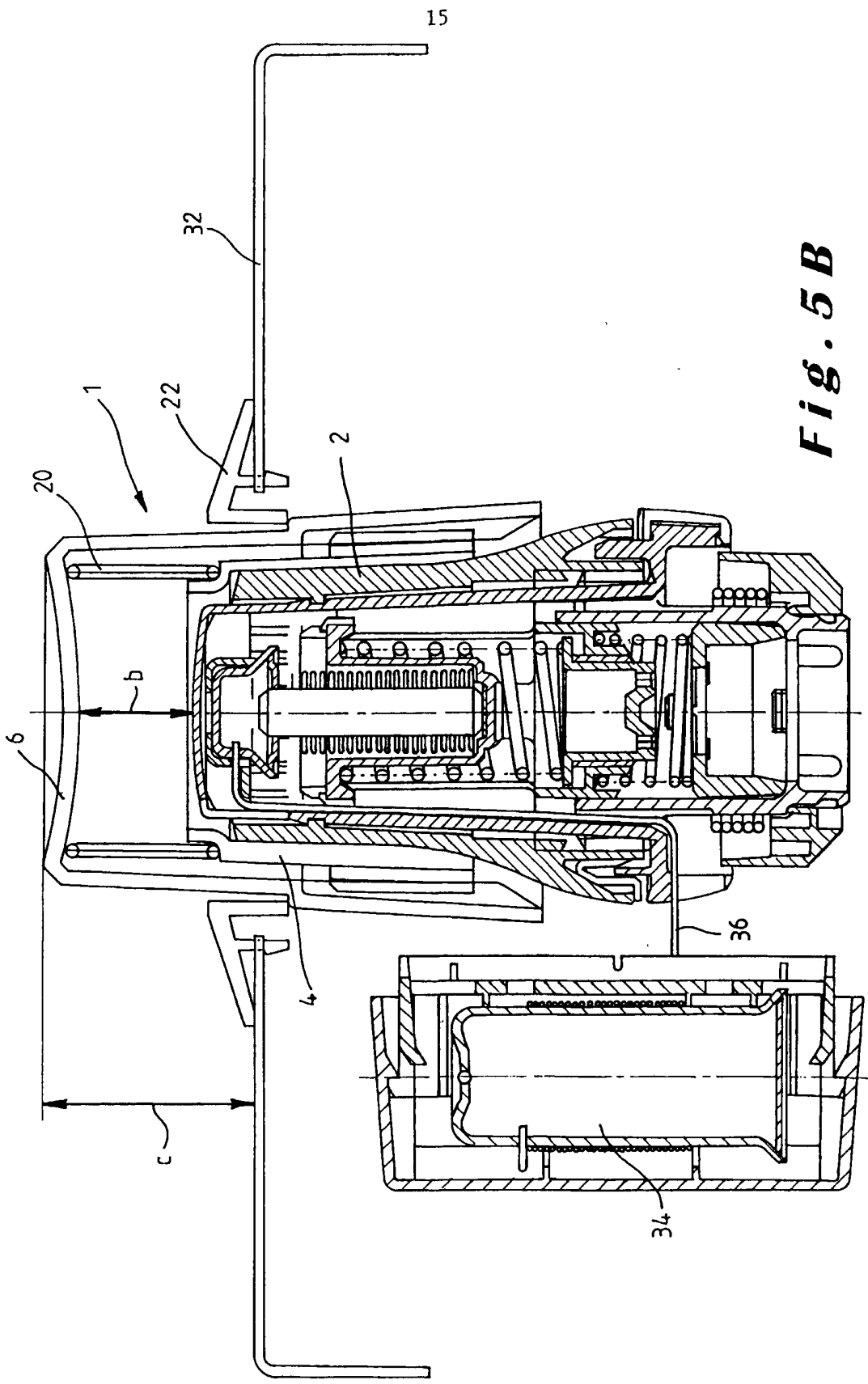


Fig. 5 B

Extension fittings for turning radiator valve controls

This invention relates to an extension fitting for turning a radiator valve control, the extension fitting comprising a radiator valve control engaging element for engaging the radiator valve control and turning it about its axis, a turnable hand control for adjusting the radiator valve control at a distance, and coupling means connecting the hand control to the engaging element so that the hand control turns the engaging element.

Central heating radiators of the hot water type are usually controlled by a valve in the inlet pipe to the radiator, a thermostatic head unit being screwed onto the valve to provide temperature control. The user turns a knob at the top of the thermostatic head unit to set the desired temperature.

In some cases, for example in homes for the elderly, the radiator is screened by an outer casing to avoid the danger of accidental injury by prolonged contact with the surface of the radiator. The combination of radiator and outer casing forms what is termed a low surface temperature (LST) radiator unit. When the radiator proper is within an outer casing, some kind of extension fitting is needed to

enable the radiator control valve to be operated from the outer casing.

Various proposals have been made for extension fittings of which some examples will now be given.

5 Patent specification GB 2 312 037 discloses a spindle extension member fitted at one end onto a radiator valve of the type having a spindle which is pushed in to close the valve. A thermostatic radiator head unit is screwed onto the other end of the extension member.

10 Patent specification EP 0 533 455A discloses a valve spindle extension which has one end secured to the spindle of a radiator valve and at its other end has an operating knob.

Patent specification GB 2 259 758A discloses a coupling
15 in the form of a pair of bellows interconnected by a flexible capillary tube arranged between the thermal head of a conventional thermostatic radiator valve and the valve body of the valve.

The known extension fittings suffer from one or more of
20 the disadvantages that they are relatively expensive to manufacture, are easily damaged during fitting, or create an undesirable gap between the fitting and the outer casing of an LST radiator unit.

It is an object of the invention to provide an improved extension fitting which is able to overcome these disadvantages.

The present invention provides an extension fitting for
5 turning a radiator valve control, the extension fitting
comprising a radiator valve control engaging element for
engaging the radiator valve control and turning it about its
axis, a turnable hand control for adjusting the radiator
valve control at a distance, and coupling means connecting
10 the hand control to the engaging element so that the hand
control turns the engaging element, **characterized in that**
the extension fitting is arranged to accommodate axial
movement of the part of the radiator valve control engaged
by the engaging element without transmitting the said axial
15 movement to the hand control. Such an extension fitting has
the advantage that turning of the radiator valve control can
take place without the hand control moving towards or away
from the radiator valve control during use. In operation,
many radiator valves and thermostatic radiator valve head
20 units exhibit an axial movement of the part turned and if
that axial movement were to be communicated to the hand
control the latter would shift its position relative to a
surrounding surface, in particular the casing of an LST
radiator unit. Such a shift in position could result either

in the hand control looking as if it were displaced and therefore broken, or could open up a gap in relation to the surrounding surface. The invention enables such problems to be overcome and, moreover, the extension fitting can be
5 manufactured cheaply as a simple robust unit. The invention also enables any tolerances between the hand control and radiator valve control, which might otherwise lead to disengagement, to be accommodated.

Advantageously, the accommodation of axial movement
10 without transmission of axial movement is provided by at least one key on one part of the coupling means engaging a corresponding axial groove on a second part of the coupling means. By this means, the at least one key and the axial groove can simply slide relative to one another when there
15 is axial movement at the radiator valve control.

Advantageously, the axial groove is defined by the space between two projecting walls. If desired, one or both of the walls can be made discontinuous. These measures provide for economy in the use of material and smooth
20 operation of the fitting.

Advantageously, the hand control is a hollow knob, the inside surface of the knob constituting one or the other parts of the coupling means. Such an arrangement is simple and economical on the use of space.

The inside surface of the knob may have at least one internally-projecting key. Such an arrangement is simple to produce and economical in the amount of material used.

Preferably, the hollow knob has a plurality of
5 internally projecting keys spaced about the periphery of its inside surface. Such a construction is able to provide greater reliability and better balanced operation.

Advantageously, the keys are spaced substantially uniformly about the said periphery, and means are provided
10 to define a unique assembly orientation of the hand control and engaging element. By this means, assembly errors can be avoided by a simple means.

The means to provide the unique assembly orientation may comprise a key on or one or the other of the hand
15 control and the engaging element mating with a slot on the other component.

Advantageously, the outside surface of the engaging element constitutes one or the other parts of the coupling means. Such a construction is very simple and effective.

20 Advantageously, a compression spring is provided to bias the hand control away from the engaging element. By this means, the imparting of a feeling of looseness of the parts to the user can be avoided.

The fitting may further include a mounting ring against which the hand control is biased by the said spring. Such a mounting ring provides a simple means of positioning the fitting on the housing of a LST radiator.

5 Preferably, the hand control has an end section of a first diameter to pass through the mounting ring, and a shoulder to engage the mounting ring. Such a construction is particularly simple and effective.

 Preferably, one end of the said spring engages a flange
10 on the outside surface of the engaging element.

 The engaging element may be in the form of a sleeve internally shaped to make positive engagement with the radiator valve control.

 The invention also provides a radiator valve control
15 provided with an extension fitting as defined above.

 The radiator valve control may be a thermostatic radiator valve head unit. Instead, the radiator valve control could be the spindle of a non-thermostatic radiator valve of the type in which the spindle is turned to open or
20 close the valve.

 The invention also provides a radiator provided with a radiator valve control as defined above.

 The radiator may be an LST (low surface temperature) radiator.

An extension fitting for turning a radiator valve control in accordance with the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

5

Figure 1 is an exploded side elevational view of an extension fitting embodying the invention;

Figure 2 is a side elevation showing the fitting
10 assembled;

Figure 3 is a cross-section taken on the line III-III marked in Figure 2;

15 Figure 4 is a plan view from beneath of the fitting shown to a larger scale; and

Figures 5A and 5B show the fitting in use with an LST radiator and thermostatic radiator valve head unit.

20

Referring to the accompanying drawings, an extension fitting 1 is provided for turning a radiator valve control 2. The extension fitting 1 comprises a radiator valve control engaging element 4 of plastics material for engaging

the radiator valve control 2 and turning it about its axis,
a turnable hand control 6 of plastics material for adjusting
the radiator valve control at a distance, and coupling means
connecting the hand control 6 to the engaging element 4 so
5 that the hand control 6 turns the engaging element 4. The
extension fitting 1 is arranged to accommodate axial
movement, indicated by the double-headed arrow 8, of the
part of the radiator valve control 2 engaged by the engaging
element 4 without transmitting the said axial movement to
10 the hand control 6.

The accommodation of axial movement without
transmission of axial movement is provided by keys 10 on the
hand control 6 engaging corresponding axial grooves 12 on
the engaging element 4.

15 Each, axial groove 12 is defined by the space between
two projecting walls 13, 14.

The hand control 6 is a hollow knob, the inside surface
of the knob 6 constituting one of the parts of the coupling
means, namely, the keys 10. The inside surface of the knob
20 has four internally-projecting keys 10 which are spaced
uniformly about the said periphery, and means are provided
to define a unique assembly orientation of the hand control
and engaging element.

The means to provide the unique assembly orientation comprise a key 16 on the inner periphery of the knob 6 mating with a slot 18 on the outside of the engaging element 4.

5 The outside surface of the engaging element 4 defining the walls 13, 14 and the axial groves 12 constitutes the other part of the coupling means.

A compression spring 20 is provided to bias the hand control 6 away from the engaging element 4. A mounting ring 10 22 of plastics material is provided against which the hand control 6 is biased by the said spring 20. The hand control 6 has an end section 24 of a first diameter to pass through the mounting ring 22, and a shoulder 26 to engage the mounting ring 22. The engaging element 4 is provided with a 15 mark (not shown) to be aligned during fitting with a corresponding mark on the radiator valve control to enable correct orientation of the engaging element 4 on the radiator valve control. Suitable markings (not shown) are provided on the hand control 6 and the mounting ring 22 to 20 enable the user to perceive the degree of turning of the hand control 6 and thus the radiator setting.

One end 28 of the spring 20 engages a flange 30 on the outside surface of the engaging element 4.

The engaging element 4 is in the form of a sleeve internally shaped to make positive engagement with the radiator valve control 2. The internal shaping takes the form of a flared generally triangular shape with arcuate sides to the triangle (see Figure 4).

The radiator valve control shown in the drawings is a thermostatic radiator valve head unit 30 for an LST (low surface temperature) radiator of which the outer housing 32 is shown in the drawings. The mounting ring 22 is a snap-fit in an aperture in the housing 32.

The thermostatic radiator valve head unit 30 has a sensor 34 connected by capillary tubing 36 and is of conventional form and will not therefore be described in detail.

Figure 5A shows the thermostatic radiator valve head unit 30 with its control member so turned that the topmost part of the valve head is in its lowest position. Figure 5b shows the thermostatic radiator valve head unit 30 with its control member so turned that the topmost part of the valve head is in its highest position. It can be seen that the spacing **a** to the hand control 6 in Figure 5A is greater than the corresponding spacing **b** in Figure 5B. On the other hand, the spacing **c** between the top of the casing 32 and the top of the hand element 6 is exactly the same in both

Figures 5A and 5B, the engaging element 4 having slid up inside the hand element 6 against the bias of the spring 20 on turning of the extension fitting 1. It can readily be seen that the spring 20 is more compressed in Figure 5B than in Figure 5A.

C L A I M S:

1. An extension fitting for turning a radiator valve control, the extension fitting comprising a radiator valve control engaging element for engaging the radiator valve control and turning it about its axis, a turnable hand control for adjusting the radiator valve control at a distance, and coupling means connecting the hand control to the engaging element so that the hand control turns the engaging element, **characterized in that** the extension fitting is arranged to accommodate axial movement of the part of the radiator valve control engaged by the engaging element without transmitting the said axial movement to the hand control.

2. A fitting as claimed in claim 1, wherein the accommodation of axial movement without transmission of axial movement is provided by at least one key on one part of the coupling means engaging a corresponding axial groove on a second part of the coupling means.

3. A fitting as claimed in claim 2, wherein the axial groove is defined by the space between two projecting walls.

4. A fitting as claimed in claim 2 or claim 3, wherein the hand control is a hollow knob, the inside surface of the

knob constituting one or the other parts of the coupling means.

5 5. A fitting as claimed in claim 4, wherein the inside surface of the knob has at least one internally-projecting key.

6. A fitting as claimed in claim 5, wherein the hollow knob has a plurality of internally projecting keys spaced about the periphery of its inside surface.

10 7. A fitting as claimed in claim 6, wherein the keys are spaced substantially uniformly about the said periphery, and means are provided to define a unique assembly orientation of the hand control and engaging element.

15 8. A fitting as claimed in claim 7, wherein the means to provide the unique assembly orientation comprises a key on or one or the other of the hand control and the engaging element mating with a slot on the other component.

9. A fitting as claimed in any of claims 2 to 8, wherein the outside surface of the engaging element constitutes one or the other parts of the coupling means.

20 10. A fitting as claimed in any preceding claim, wherein a compression spring is provided to bias the hand control away from the engaging element.

11. A fitting as claimed in claim 10, further including a mounting ring against which the hand control is biased by the said spring.

12. A fitting as claimed in claim 10, wherein the hand
5 control has an end section of a first diameter to pass through the mounting ring, and a shoulder to engage the mounting ring.

13. A fitting as claimed in any of claims 10 to 12, wherein one end of the said spring engages a flange on the
10 outside surface of the engaging element.

14. A fitting as claimed in any preceding claim, wherein the engaging element is in the form of a sleeve internally shaped to make positive engagement with the radiator valve control.

15 15. An extension fitting for turning a radiator valve control, the fitting being substantially as herein described with reference to, and as illustrated by, the accompanying drawings.

16. A radiator valve control provided with an
20 extension fitting as claimed in any preceding claim.

17. A radiator valve control as claimed in any preceding claim, wherein the radiator valve control is a thermostatic radiator valve head unit.

18. A radiator provided with a radiator valve control as claimed in claim 16 or claim 17.

19. A radiator as claimed in claim 18, wherein the radiator is an LST (low surface temperature) radiator.



INVESTOR IN PEOPLE

Application No: GB 0320634.9
Claims searched: 1-14,16-19

Examiner: Eleanor Wade
Date of search: 4 February 2004

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1,2,4-6, 9,14,16-19	GB 1464722	Barking Brassware Co
X	1,2,4,9,14, 16-19	GB 940585	Markes & Company Ltd
X	1,14,16-19	US 1654550	Muend
X	1,16-19	GB 1321773	Donald Brown (Brownall)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^W:

F2V

Worldwide search of patent documents classified in the following areas of the IPC⁷:

F16K

The following online and other databases have been used in the preparation of this search report:

EPODOC, JAPIO, WPI