

Steam-iron drip-feed valve

The invention relates to a drip-feed valve for controlling flow of water from a water tank to a vaporization chamber of an electrically heated steam iron.

5 Drip-feed valves for electric steam
irons have been known for many years. Such a valve
serves to supply water from the water tank of a
steam iron to the vaporization chamber which is
arranged under the drip-feed valve and in which
10 the water required for ironing is converted from
the liquid to the vapour phase. In most steam
irons, the water supply is cut off automatically
when the iron is put down on its rear rest. On
the other hand, when the steam irons are put down
15 on their sole plate during turning-over and folding
times which occur during ironing, either the drip-
feed valve must be closed to cut off the water
supply or water flows unimpeded through the open
valve from the water tank into the vaporization
20 chamber. The disadvantages of these known drip-
feed valves are an unnecessary power consumption,
an increased throughflow of water and a shortening
of the useful life of the automatic steam iron.

According to the invention there is provided
25 a drip-feed valve for controlling flow of water
from a water tank to a vaporization chamber of
an electrically heated steam iron, the valve having
a water flow passage and control means operable
to open the passage for steam ironing or to close
30 it, the flow passage including an opening in the
lowest region of a concave surface which faces
upwards in the ironing position of the iron, there
being a ball received on said surface such that
in said ironing position the water flow opening
35 is closed by the ball when the iron is motionless

and is opened when the iron is moved.

When such a device is incorporated in a steam iron, it cuts off the water supply from the water tank to the vaporization chamber whenever the iron is temporarily put down on its sole plate, even
5 though the control means is left in the steam ironing position. When the iron is motionless, the ball arranged on the concave surface rolls to the lowest point thereof, where the water flow opening is provided. The ball covers the opening and thus
10 cuts off the outflow of water from the tank. As soon as the steam iron is moved again, the ball exposes the opening and allows water to flow from the water tank into the vaporization chamber.

The control means of the drip-valve makes
15 it possible to close the drip-feed valve reliably, should this be necessary for transport purposes or the like. In one preferred embodiment, the control means comprises a valve stem having a member for engaging the ball to centre it over the water flow
20 opening, thereby closing the water flow passage. When it is desirable to close the drip-feed valve for a relatively long period of time, the ball engaging member can be used to centre the ball over the opening and to retain the ball in this
25 position until it is released. Preferably the ball engaging member is in the form of a conical hollow.

In another preferred embodiment, the control means comprises a valve stem connected to a piston
30 axially movable in a cylinder, a valve needle on the piston at the end thereof nearest the vaporization chamber in use, and a valve bore in which the valve needle is engagable to close the water flow passage, and wherein the piston has an axial bore which

forms part of the water flow passage, the concave surface being provided on the piston at the upstream end of the axial bore.

The arrangement of the piston with the axial
5 bore makes it possible to arrange the ball on the concave piston surface. Whenever the control means is operated to close the drip-feed valve, the needle secured to the piston and pointing towards the vaporization chamber penetrates through the valve
10 bore (which may be formed in a valve body) and eliminates any lime deposits in the valve bore.

In a further preferred embodiment, the water flow passage comprises a valve chamber and a channel for connecting the water tank to the valve chamber,
15 the concave surface being provided at the upstream end of the channel and being enclosed together with the ball by a cage.

In this arrangement, the water can flow from the tank interior only via the connecting channel
20 to the drip-feed valve. Inside the water tank, the connecting channel opens out in the lowest region, for example the centre, of the concave surface. When the piston is in the position of rest on its sole plate, the ball arranged on the concave
25 surface comes in front of the channel opening and blocks the supply of water to the vaporization chamber. The cage retains the ball in the region of the concave surface and prevents the ball from inadvertently drifting out of the region of the
30 concave surface provided on the tank bottom. The channel preferably extends laterally from the valve chamber.

In this arrangement the closure means preferably comprises a valve stem projecting into the valve
35 chamber and engageable in a valve bore to close the water flow passage, the valve stem passing through a seal arranged to seal the valve chamber from the water tank. When the control means is operated to close the drip-feed valve, the valve

stem passes through the valve chamber unimpeded and clears any lime deposits away from the valve bore.

Certain preferred embodiments of the invention will now be described by way of example and with reference to the drawings in which:

Figure 1 shows, in section, a first embodiment of the drip-feed valve according to the invention;

Figure 2 shows a further embodiment of the drip-feed valve according to the invention; and

Figure 3 shows a further embodiment of the drip-feed valve according to the invention.

The valve body 1 of the drip-feed valve illustrated in Figure 1 is fastened in the water-tank bottom 2 of the water tank of a steam iron (not shown). A pressure body 3 is mounted displaceably inside the valve body 1. The pressure body 3 is secured to a valve stem 4 which passes through the water tank. The surface 5 of the valve body 1 located on the same side as the water tank is curved concavely, whilst the surface of the pressure body 3 facing the surface 5 is designed as an abutment end having a conical hollow 6. In the valve body 1 there are an opening 7 and a valve bore 8, through which the water flows from the water tank into the vaporization chamber 9. On the surface 5 of the valve body 1 rests a ball 10, the diameter of which is greater than the opening diameter of the valve bore 8. To block the flow of water from the water tank into the vaporization chamber 9, the pressure body 3 is moved by the valve stem 4 in the direction of the vaporization chamber 9. The ball 10 is centred over the valve bore 8 by means of the conical hollow 6, and the bore 8 is closed. During steam-ironing the ball 10 can move freely on the surface 5. As long as the iron is moved, the ball 10 exposes the valve bore. Water flows from the water tank into the vaporization chamber 9, where it is converted into the vapour phase. When the movements of the

iron are interrupted, the ball 10 rolls on the surface 5 to the lowest point of the latter and closes the mouth opening of the valve bore 8. The flow of water to the vaporization chamber 9 is thereby cut off.

In the design shown in Figure 2, a cylinder 11 with at least one orifice 12 is formed on the valve body 1. A piston 13 is guided in the cylinder 11. The piston 13 has a central bore 14, of which the surface 15 located on the same side as the water tank is concave. The ball 10 is mounted on the surface 15. Arranged on the piston 13 on the same side as the sole plate is a valve needle 16 which can be connected operatively to the valve bore 8 in the valve body 1. The valve stem 4 is secured to the side of the piston 13 facing the water tank. A sealing ring 17 is provided on the outer wall of the piston in the region of the valve needle 16. During steam-ironing, the water flows from the water tank into the vaporization chamber 9 via the orifices 12 in the valve body 1, through the bore 18 in the piston 13 and through the valve bore 8 in the valve body 1. The flow of water from the water tank to the vaporization chamber 9 is cut off by the ball 10. When the steam iron is motionless, the ball 10 closes the mouth opening of the bore 18. During ironing, the ball 10 exposes the mouth opening of the bore 18 and thus opens the way for the water to flow to the vaporization chamber 9. To cut off the flow of water during dry-ironing or after the ironing operation has ended, the valve bore 8 is closed by the valve needle 16 as a result of the actuation of the valve stem 4. As a result, any lime deposits in the valve bore 8 are scraped off by the needle 16.

In the embodiment illustrated in Figure 3, the valve stem 4 passes through the seal 19 arranged in the valve body 1. The seal 19 on the one

hand prevents an uncontrolled flow of water from the water tank to the vaporization chamber and on the other hand guides the valve stem 4. The water flows from the water tank into the vaporization chamber 9 through the channel 20 which connects the valve-body interior 21 to the water tank. In the region of the channel opening 22, the tank bottom 2 has a concave surface 23, on which the ball 10 is mounted. A cage 24 fastened to the tank bottom 2 engages over the surface 23 and the ball 10 mounted on the latter. The cage 24 allows a movement play of the ball 10 on the surface 23, but at the same time prevents the ball 10 from drifting out of the region of the surface 23 during ironing or when the steam iron is put down on its rear rest. Otherwise, the flow of water from the water tank into the vaporization chamber 9 is closed and opened in the same way as in the embodiments described previously.

It will be seen that in each preferred embodiment the diameter of the ball which closes the opening when the iron is motionless is greater than the diameter of the opening and smaller than that of the concave surface.



CLAIMS:

1. A drip-feed valve for controlling flow of water from a water tank to a vaporization chamber of an electrically heated steam iron, the valve having a water flow passage and control means operable
5 to open the passage for steam ironing or to close it, the flow passage including an opening in the lowest region of a concave surface which faces upwards in the ironing position of the iron, there being a ball received on said surface such that
10 in said ironing position the water flow opening is closed by the ball when the iron is motionless and is opened when the iron is moved.
2. A drip-feed valve as claimed in claim 1,
15 wherein the control means comprises a valve stem having a member for engaging the ball to centre it over the water flow opening, thereby closing the water flow passage.
- 20 3. A drip-feed valve as claimed in claim 2, wherein the ball engaging member is in the form of a conical hollow.
4. A drip-feed valve as claimed in claim 1,
25 wherein the control means comprises a valve stem connected to a piston axially movable in a cylinder, a valve needle on the piston at the end thereof nearest the vaporization chamber in use, and a valve bore in which the valve needle is engagable
30 to close the water flow passage, and wherein the piston has an axial bore which forms part of the water flow passage, the concave surface being provided on the piston at the upstream end of the axial bore.



5. A drip-feed valve as claimed in claim 1,
wherein the water flow passage comprises a valve
chamber and a channel for connecting the water
tank to the valve chamber, the surface being provided
5 at the upstream end of the channel and being enclosed
together with the ball by a cage.

6. A drip-feed valve as claimed in claim 5,
wherein the channel extends laterally from the
10 valve chamber.

7. A drip-feed valve as claimed in claim 5 or
6, wherein the closure means comprises a valve
stem projecting into the valve chamber and engageable
15 in a valve bore to close the water flow passage,
the valve stem passing through a seal arranged
to seal the valve chamber from the water tank.

8. A drip-feed valve substantially as hereinbefore
20 described with reference to Figure 1 or Figure 2 or Figure
3 of the accompanying drawings.

9. An electrically heated steam iron including
a drip-feed valve as claimed in any preceding claim.
