a mass spectrometer housing comprising an aperture for receiving the inner source assembly therein, the housing comprising at least two sockets adjacent the aperture to receive the flanges therein.

Another aspect of the present invention provides a mass spectrometer assembly comprising:

a source assembly comprising a rotatable handle, the handle comprising at least two radially extending wings,

a mass spectrometer housing comprising at least two corresponding sockets to receive the wings,

wherein the surface of at least one of the wings or sockets comprises a biased protrusion, and the surface of a corresponding one of the sockets and wings comprises a depression to receive the end of the biased protrusion when the wings are received in the sockets.

Description of the drawings

Embodiments of the present invention will now be described, by way of non-limiting example only, with reference to the following figures in which:

Figure 1 illustrates an exploded view of an inner source assembly;

Figure 2 illustrates an exploded view of a part of the inner source assembly of Figure 1;

Figure 3 illustrates the ionisation chamber base with an ionisation chamber and repeller assembly located therein;

Figure 4a and 4b illustrate the arrangement of Figure 3 from a different angle, showing a second slot;

Figure 5a illustrates a side view of an inner source assembly during assembly;

Figure 5b shows an enlarged view of detail A from Figure 5a;

Figure 6 illustrates the assembly of the volume housing into the base;

Figure 7 illustrates the incorrect assembly of the volume housing into the slots of the base;

In some embodiments, the first 73A and second 73B slots may be provided on an inner cylindrical surface of the upper part of the base, and the radial distance from the inner surface of the first 73A and second 73B slots from the longitudinal axis of the base 70 may differ.

Referring to Figure 4a, the slots 73A, 73B provided on the base 70 generally constitute bayonet slots. Each slot 73A, 73B comprises a first section 77A which extends generally longitudinally (parallel to the central axis of the base) from the mouth 74A of the slot 73A, 73B. A second section 77B extends generally perpendicularly from the base of the first section 77A, in a circumferential direction along a plane which is perpendicular to the axis of the base 70. A third section 77C extends generally longitudinally from the end of the second section 77B longitudinally (parallel to the central axis of the base 70). Accordingly, the first section 77A of the slot 73A, 73B is generally parallel with the third section 77C of the slot. The slot 73A, 73B may generally be described as being 'Z-shaped'.

To assemble the volume housing 10 on the base 70, a user aligns the first protrusion 16A with the first slot 73A and the second protrusion 16B with the second slot 73B (as described above). The user then moves the volume housing 10 towards the base 70 such that the first 16A and second 16B protrusions travel into the respective mouths 74A, 74B of the first 73A and second 73B slots. The volume housing 10 can continue to be moved axially towards the base 70, until the first 16A and second 16B protrusions abut against the end of the first section 77A of the respective first 73A and second 73B slots. The change in direction between the first 77A and second 77B sections acts as a hard stop. At this point, the user can then rotate the volume housing 10 (about a central axis) relative to the base 70, such that the first 16A and second 16B protrusions travel along the second section 77B of each of the first 73A and second 73B slots. The volume housing 10 can continue to be rotated relative to the base 70 until the first 16A and second 16B protrusions abut the end of the second section 77 of the respective slots 73A, 73B (another hard stop). This action is largely similar to a conventional bayonet fitting.

In the embodiment shown in Figure 2, the inner source assembly 1 further comprises a resilient element 69, for example a spring 69, which biases the base 70 and volume housing 10 away from one another. Accordingly, in order to insert the first 16A and second 16B protrusions into the first 73A and second 73B slots, a user must apply enough axial manual force which opposes and overcomes the spring force of the resilient element 69. When the volume housing 10 has been inserted into the base 70 such that the protrusions 16A, 16B have travelled down and abutted the end of the first section 77A of each slot 73A, 73B, the user can then rotate the volume housing 10 (whilst still applying an axial force to oppose the spring force of the resilient

element 69), such that the protrusions 16A, 16B travel along the second section 77B of the respective slots 73A, 73B. Afterwards, a user may release the volume housing 10, at which point the spring force of the resilient element 69 urges the volume housing 10 away from the base 70. However, because the first 16A and second 16B protrusions are within the second section 77B of the slots 73A, 73B, and the resilient element 69 may not provide any substantial torsional force, separation of the volume housing 10 from the base 70 is prevented. In the embodiment shown, the intersection of the second 77B and third 77C sections further comprises a detent 79 (Figure 4b, 5b), in which the first 16A and second 16B protrusions are receivable, to prevent inadvertent rotation of the volume housing 10 with respect to the base 70 which could otherwise release the arrangement. This is similar to a conventional bayonet fitting (save at least for the dissimilar protrusions and/or slots).

The slot 73A, 73B may further comprise a third section 77C which extends from the end of the second section 77B, in a direction generally parallel to the longitudinal axis of the base 70 (and away from the optional detent 79). In use, when the inner source assembly 1 is assembled into and secured to a mass spectrometer housing 200, the wings 13 of the volume housing 10 abut against the heated source block 240 (Figure 9a) of an outer source assembly. Consequently, as the inner source assembly 1 is secured to the housing 200 of the mass spectrometer (Figure 12), the reactionary force applied by the outer source assembly (specifically the source block 240) on the volume housing 10 causes the volume housing 10 to move axially further towards the base 70, which causes the first 16A and second 16B protrusions of the volume housing 10 to travel along the third section 77C. The third section 77C substantially constrains the volume housing 10 to axial movement relative to base 70. When the inner source assembly 1 is released from the housing of the mass spectrometer, the spring force of the resilient element 69 causes the pins 16A, 16B of the volume housing 10 to be returned to the respective detents 79, at the intersection of the second 77 and third 78 sections.

In the embodiment described, the first 77A, second 77B and third 77C sections of the first slot 73A are generally the same as those of the second slot 73B. This is not essential. The dimensions and/or form of the first slot 73A may differ to those of the second slot 73B. For example, only on the first 73A and second 73B slots may comprise a detent 79.

In at least one embodiment, one or both of the slots 73A, 73B may otherwise be U-shaped or J-shaped.