

Service Outlet Box With Lid Frame

5 The present invention relates to service outlet boxes, and in particular, but not exclusively, to an under-floor service outlet box.

Service outlet boxes are typically used in offices, factories or other commercial premises in which electrical or electronic services are required at a variety of different
10 locations. Such service outlet boxes are typically fitted in the floor. The electrical or electronic services available from such service outlet boxes may for example include telephone, Internet, network and other telecommunication- or data-related services, and electric power. Service outlet boxes for installation within
15 the floor space are particularly beneficial in offices or buildings that require flexible usage of the space within the building. Providing such service outlet boxes in several locations in a floor space may for example enable the floor space to be partitioned with quick-to-fit partition walls and to be
20 readily used without needing to route cables through or from walls in the partitioned space.

It is desirable for such service outlet boxes to have a lid that is arranged to allow easy adjustment of the vertical distance between the lid and the box so that different
25 thicknesses of floor covering can be allowed for. It is also desirable for such service outlet boxes to have lids that are readily able to be adjustably positioned relative to base of the box so that the lid can be adjusted to be level and flush with the surrounding floor. It is desirable for such service outlet
30 boxes, to have lids that are self-levelling, for example levelling the lid relative to the floor after installation in the event of the surrounding floor settling, sinking or otherwise changing position.

A service outlet box of the prior art is disclosed in GB 2 257 847, which concerns a box having a lid assembly which is
5 vertically adjustable relative to the box by means of a pawl and ratchet arrangement. The pawl and ratchet arrangement is formed by means of four ratchet bars consisting of two ratchet bars mounted on one interior side wall of the box near opposite ends of the side wall and two ratchet bars symmetrically arranged on
10 the opposite side wall. Sloping pawl bars, mounted on the lid assembly, are spring-urged against the ratchet bars on the box. The pawl bars are held in place by a snap fit. The lid assembly may be lifted from the box by means of lifting a handle in the lid that is linked, by a linkage arrangement, to the pawl bars to
15 disengage them from the ratchet bars.

The above-mentioned prior art arrangement suffers from various disadvantages. The linkage arrangement and the pawl bars are complicated to manufacture and assemble. There is also limited adjustability in the vertical direction afforded by the
20 particular arrangement, typically being about 10mm.

According to the present invention there is provided a service outlet box comprising a base, and a lid frame mounted via a plurality of ratchet mechanisms relative to the base, wherein each ratchet mechanism comprises a pin mounted in a sleeve, one
25 of the pin and sleeve is associated with the base, and the other of the pin and sleeve is associated with the lid frame, the pin and sleeve are mounted for relative rotation about a longitudinal axis between (i) an engaged position, in which a ratchet and pawl of the ratchet mechanism are engaged so that relative movement of
30 the pin and sleeve in a first direction parallel to the longitudinal axis is restricted by the ratchet and pawl and (ii) a disengaged position in which relative movement of the pin and sleeve in the first direction is permitted.

Thus, embodiments of the present invention provide a service outlet box with a simple and cheap-to-manufacture releasable ratchet mechanism for facilitating vertical adjustment of the lid frame relative to the base and for allowing the lid frame to be removed from the box if necessary.

The lid frame may be mounted via at least four ratchet mechanisms relative to the base.

Each ratchet mechanism may include at least two ratchet racks and at least one pawl for each ratchet rack. There may in effect therefore be at least eight ratchet racks in the box.

The ratchet of each ratchet mechanism may be associated with the pin. The pawl of each ratchet mechanism may be associated with the sleeve. The pin of each ratchet mechanism may be associated with the lid frame and the sleeve of each ratchet mechanism may be associated with the base. Alternatively, the pin of each ratchet mechanism may be associated with the base and the sleeve of each ratchet mechanism may be associated with the lid frame.

The pin of each ratchet mechanism may be mounted in the region of the centre (as viewed from above) of a side of the box. The pin of each ratchet mechanism is preferably mounted in the region of a corner of the box. The pin of each ratchet mechanism is preferably housed in a hole in each corner of the lid frame.

A corner block may be provided at each of a plurality of the corners of the box. The pin of each ratchet mechanism may be mounted in such a corner block. Each corner block may be mounted on the base. The base may be defined by a base plate of the box. The sleeve may be mounted in, or even integrally formed with, the corner block.

The pin may have one, two or more formations at one end to enable the pin to be inserted into a part of the box in such a way that the formations engage with such a part to resist extraction of the pin from said part. Each of the one or more

formations may be in the form of solid protrusion, that acts as a stop, preventing extraction. The pin may need to be inserted into the part of the box in one direction, the formations resisting extraction, in the same direction, of the pin from the part. The formations may be in the form of two or more flaps. The flaps may be in the form of moveable wings. The flaps may be integrally formed with the pin. The flaps may have a resiliency (springiness) that assists with this function. Such resiliency may be provided by separate means. Preferably, however, especially in the case where flaps are integrally formed with the pin, such resiliency results from properties of the material from which the flaps are made. The pin, for example including such flaps, may be defined by a single-piece component.

Said one of the pin and sleeve may be associated with the base as a result of being mounted thereon. Said one of the pin and sleeve may be associated with the base by being mounted on, or otherwise attached to, an accessory tray in the base. Said other of the pin and sleeve may be associated with the lid frame as a result of being mounted thereon. For example, the pin of each ratchet mechanism may be mounted on the base and the sleeve of each ratchet mechanism may be mounted on the lid frame. Alternatively, the pin of each ratchet mechanism may be mounted on the base and the sleeve of each ratchet mechanism may be mounted on the lid frame.

The sleeve of each ratchet mechanism may have a longitudinal recess, for example a slot, defined therein, for example at one end of the sleeve. The longitudinal recess of the sleeve may for example facilitate the mounting of the sleeve relative to one of the base and the lid frame. The recess may for example be defined by opposing fingers formed at the end of the sleeve, which may be squeezed together when inserting the sleeve on another part of the box to mount it therein. The longitudinal recess of the sleeve may for example be so shaped and sized to be

able to accommodate the end of a screwdriver. A screwdriver may then for example be used to turn the sleeve to move the ratchet mechanism between the engaged and disengaged positions.

Alternatively or additionally, the pin of each ratchet
5 mechanism may have a longitudinal recess, for example a slot, defined therein, for example at one end of the pin. The longitudinal recess of the pin may for example be so shaped and sized to be able to accommodate the end of a screwdriver. A
10 screwdriver may then for example be used to turn the pin to move the ratchet mechanism between the engaged and disengaged positions.

The pin of each ratchet mechanism may comprise a protrusion for facilitating rotation of the pin about its longitudinal axis. The protrusion may be on one end of the pin, and preferably
15 extends in a direction normal to the longitudinal axis of the pin. The protrusion may be a handle for manipulating the pin to move the ratchet mechanism between the engaged and disengaged positions. The protrusion may also allow the position (rotation of the pin about its axis) to be readily identified. The pin may
20 comprise both a longitudinal recess (for example, for accommodating the end of a screwdriver) and a protrusion. Thus the pin may be manipulated in a number of ways.

Each ratchet mechanism may be so configured that the amount of rotational movement required to move the ratchet mechanism
25 from a fully engaged position to a fully disengaged position is between 30 and 150 degrees, or more preferably between 60 and 120 degrees. About a quarter turn may be required to move the ratchet mechanism between the fully engaged and fully disengaged positions. Each ratchet mechanism may be so configured that the
30 sleeve and pin are mounted for relative rotation of up to a given amount and are prevented from rotating by more than that given amount. The given amount may be between 30 and 150 degrees, is more preferably between 60 and 120 degrees, and could be about 90

degrees. The means for preventing the rotation beyond the given amount may be in the form of a pair of stops between which a part is arranged to move in correspondence with the rotational movement of the ratchet mechanism. For example, the part may be defined by a block and the pair of stops may be defined by the ends of a channel along which the block is arranged to move. The stops may be defined by the lid frame structure. In an embodiment in which the pin comprises a protrusion for manipulating the pin, the part may be defined by the protrusion on the pin and the pair of stops may be defined by the structure of the lid frame.

Each ratchet mechanism may include means for retaining the ratchet mechanism in one of two states, namely the engaged position and the disengaged position. Such means may for example include one formation on a first part that is arranged to move in correspondence with the rotational movement of the ratchet mechanism and two formations formed on a second part that remains stationary, the two formations each having a complementary shape to the one formation, for engagement therebetween.

Alternatively, such means may include two formations on the first part and one corresponding formation on the second part, the two formations again each having a complementary shape to the one formation, for engagement therebetween. For example, the sleeve may be arranged to rotate relative to the pin, the sleeve including a protuberance for engagement with two detents arranged on an adjacent part of the structure that does not rotate with the sleeve.

The lid frame may form part of a larger frame that forms part of the box, for example the sides of the box. The lid frame may alternatively, or additionally, form part of a lid assembly, the lid assembly for example additionally comprising a lid.

The pawl of each ratchet mechanism may be integrally formed with whichever of the pin and sleeve to which it belongs.

Similarly, the ratchet of each ratchet mechanism may be integrally formed with whichever of the pin and sleeve to which it belongs. Having the pawl and/or ratchet integrally formed with either the pin or sleeve of the ratchet mechanism may reduce manufacturing and/or assembly costs. The pin, sleeve, ratchet and pawl of each ratchet mechanism may thus be formed from only two components each being of one-piece construction.

The pawl may have a resiliency (springiness) that urges it towards the ratchet. Such resiliency may be provided by separate means. Preferably, however, especially in the case where the pawl is integrally formed with the pin or the sleeve, such resiliency results from properties of the material from which the pin/sleeve are made.

Each ratchet mechanism may be arranged such that there may be relative longitudinal movement between the ratchet and pawl, with the pawl engaging the ratchet, over a distance of at least 20mm, and more preferably at least 25mm, and possibly more than 30mm.

The pawl may be defined by a single tooth. Each ratchet of each ratchet mechanism may be arranged to engage with one or more other teeth in addition to the single tooth. For example, each pawl may be considered as comprising a plurality of teeth. The ratchet may be defined by a multiplicity of teeth.

The service outlet box may be a junction box. The service outlet box may have at least one mounting plate for mounting a terminal or socket for connecting an incoming service. A socket, mounted on the mounting plate may for example be attached to a cable for providing a service to electrical or electronic equipment positioned in the region of the service outlet box, the cable passing via the hole in the lid.

The service outlet boxes of the present invention may be installed in a floor in a building. Thus, the present invention also provides a floor comprising at least one service outlet box

mounted therein, the service outlet box being in accordance with the service outlet box of the present invention. One or more cables in the floor may terminate inside the outlet box. The one or more cables may be arranged to provide one or more incoming services. The service outlet box may include at least one terminal for connecting an incoming service. The terminal may for example be linked to, or defined by, a socket, to which a cable may be attached for providing the incoming service to a device positioned in the region of the service outlet box, the cable passing via the hole in the lid.

The lid of the service outlet box is preferably arranged to be substantially flush with floor. The lid frame may include an overhanging portion that engages with the surrounding floor to stop the lid frame from moving downwards beyond the position at which the lid is substantially flush with the floor.

The floor may comprise a region of raised floor, also known as a floating floor. The floor may comprise at least a region of screed floor. The floor may comprise a region of cable trunking onto which the service outlet box is mounted. The floor may comprise a plurality of service outlet boxes mounted therein, each service outlet box being in accordance with the service outlet box of the present invention. The floor is preferably formed as part of a building.

The present invention also provides a method of installing an under-floor service outlet box in accordance with the present invention. Such a method may for example comprise the following steps: mounting a base of a box on a floor substrate, laying cables, at least one of which terminating at the base, installing a floor layer on top of the floor substrate and around the base, mounting a lid frame at the upper end of the base via a plurality of elongate ratchet mechanisms, moving against the action of the ratchet mechanisms the lid frame down onto the base so that it lies substantially flush with the surrounding floor, the ratchet

mechanisms being in a state in which they resist movement of the lid frame away from the base. Each ratchet mechanisms is preferably arranged such that a part of it may be twisted to move it to a state in which it does not resist movement of the lid frame away from the base. A service outlet box according to the invention as described herein may be provided as one of the steps of the method.

The present invention also provides a method of removing the lid frame from an under-floor service outlet box. Such a method may for example comprise the steps of rotating a part of each ratchet mechanism, and then lifting the lid frame away from the base. The method may for example include a step of twisting or rotating the part (for example one of the sleeve and the pin) able to be moved to a state in which the ratchet mechanism does not resist movement of the lid frame away from the base.

When installing a service outlet box of the present invention in a floor, the box may be provided as a kit of parts. Upgrades or repairs to existing installations may be effected by means of providing one or more parts of a service outlet box of the present invention. Thus the present invention also provides a kit of parts including one or more parts of the service box of the present invention, the parts being one or more from the group consisting of a lid frame, a base, a pin, a sleeve, a ratchet, a pawl, and a ratchet mechanism.

It will of course be appreciated that features of the variously described aspects of the invention may be incorporated into other aspects of the invention. For example, aspects of the invention relating to the service outlet box may be incorporated into aspects of the invention relating to a floor including the outlet box and vice versa. Also, the method of the invention may be performed in such a way as to produce an outlet box of the invention as defined herein.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings of which:

5

Figure 1a is a perspective view of an outlet box according to the embodiment of the invention shown installed in a floor,

10

Figure 1b shows a cross-section through plane A-A of the outlet box of Figure 1a,

Figures 2a and 2b are a perspective and plan view, respectively, of a ratchet pin that forms a part of the outlet box of the embodiment,

15

Figure 3 is a perspective view of a sleeve that forms a part of the outlet box of the embodiment,

Figure 4a is a perspective view of parts of the base of the outlet box of Figure 1a,

Figure 4b is a perspective view of a corner block that forms one of the parts shown in Figure 4a,

20

Figures 5a and 5b are perspective top and bottom views of a lid assembly that forms part of the outlet box of Figure 1a together with a sleeve mounted therein, the sleeve being the same as that shown in Figure 3,

25

Figures 6a and 6b are perspective views, in two different configurations, of the ratchet pin of Figures 2a and 2b inserted into the sleeve of Figure 3,

Figures 7a and 7b are side views of a service outlet box according to a second embodiment of the invention,

30

Figures 8a to 8c are perspective views of the lid frame assembly of the second embodiment of the invention, and close up views of one of the corners of the lid frame assembly showing the ratchet pin in two different positions,

Figures 9a and 9b are a perspective views of the accessory tray in the second embodiment of the invention, and a close-up view of a corner of the accessory tray, showing the sleeve of the ratchet mechanism, and

5 Figures 10a and 10b are perspective views showing the pin and sleeve of the ratchet mechanism in the second embodiment of the invention.

(10 Figure 1a shows an outlet box 2 according to an embodiment of the invention mounted in a floor 1 defined by a typical floor covering such as a floor tile or carpet. Figure 1b shows the box in cross-section, the section being taking along the vertical plane coinciding with the line A-A shown in Figure 1a.

15 With reference to Figure 1b, the box 2 has a steel frame including a lid frame 4 on top of which there is mounted a lid 6. The frame 4 comprises various parts including four sides and a steel base plate 7. The lid 6 is hinged on the lid frame 4 to be moveable from the closed position (as shown in Figure 1a) to an open position for providing access to the space inside the box 2.

20 Devices, such as sockets, are mounted in the box 2 on a steel tray 9 for providing services via one or more cables (not shown) which pass out of the box through the lid 6 via cable outlets 8 (sometimes referred to as "cord caps", "cord flaps", "cord outlet covers", "cable flaps", or "cable caps" in the art).

25 The box is mounted in a floor defined in part by concrete screed 10. The lid 6 includes a steel load plate 12 and defines a recess in which is positioned a floor covering 14 (such as a carpet tile) that matches the surrounding covering of the floor

30 The lid frame 4 is mounted on the base via four ratchet mechanisms, one at each corner. Each ratchet mechanism, one of which being shown in cross-section in Figure 1b, comprises a ratchet pin 14 inserted into a sleeve 16. The pin 14 is fixed to the base via a corner block 18 and the sleeve 16 is fixed to the

lid frame 4. The lid frame 4 of the box 2 may thus be moved relative to the base, by means of the ratchet mechanisms placed one at each of the four corners of the box 2, to ensure that the lid 6 both (a) lies flush and level with the surrounding floor 1 and (b) is secured in place. The ratchet mechanisms also allow the lid to self-level over time if there is settlement or movement of the floor or its covering over time. The overhang 4a, defined by the lid frame 4, engages with the edge of the floor 1 defining the recess in which the box 2 is located. It will of course be appreciated that the overhang 4a therefore ensures that the lid 6 and lid frame 4 do not move towards the base of the box 2 further than desired.

The sleeve 16 of each ratchet mechanism may be twisted by 90 degrees about its axis between a locked position and a release position. In the locked position the ratchet mechanism defined by the pin 14 and sleeve 16 prevents the lid frame 4 from being lifted off the base of the box. In the release position, the ratchet mechanism is disengaged. Thus, when the sleeves of all four ratchet mechanisms are twisted to the release position, the lid frame 4 and lid may be lifted off and completely removed from the base of the box.

The parts of the box of Figure 1a and how they are assembled during installation of the box will now be described in further detail with reference to the other Figures.

Figures 2a and 2b show a ratchet pin 14 in perspective view and plan view, respectively. The pin is made from plastic and is of one-piece construction. The pin extends from a pin base 22 having two wings 24, resiliently hinged thereto, the resiliency resulting from the inherent properties of the plastic and the shape of the pin. The pin 14 has two ratchet racks 20 on opposite sides of the pin 14 which extend along the length of the pin. Each ratchet rack 20 is defined by a multiplicity of teeth, each tooth extending around about a quarter of the circumference

of the pin. The two regions that extend along the length of the pin and that are position between the ratchet racks do not comprise any teeth and instead define a substantially smooth surface 21. The pin is about 40mm long. As can be seen in
5 Figure 2b, as a result of the positioning of the two ratchet bars 20, the pin 14 is generally oval in cross-section along its length.

Figure 3 shows the sleeve 16 in perspective view. The sleeve includes two pawls 26 (only one of which being visible in
10 Figure 3), which in use engage with the ratchet racks 20 of the pin 14. At the upper end (as shown in Figure 3) of the sleeve 16, two opposing members 28 extend, each member being C-shaped in cross-section, the C-shaped members being defined by the sleeve as a result of a slot shaped-recess 30 in the sleeve. At the top
15 of the C-shaped members 28 are clips 32. The sleeve 16 also includes a lever 34 on top of which there is a small protuberance 36 and a block 38.

Installation of the box 2 will now be described. As shown in Figure 4a, the base plate 7 of the service outlet box 2 is
20 screwed down onto the floor substrate 1a, there being four plastic corner blocks 18 screwed, from the underside, onto the base plate 7. Figure 4b shows a corner block before separately from the base plate 7. In each corner block 18, there is defined a recess 18a, into which a pin 14 inserted. The wings 24 of the
25 pin 14 locate underneath the corner block 18 and prevent the pin 14 from being extracted from the corner block 18 once installed.

The lid frame 4 is assembled. Figure 5a shows a section at the corner of the lid frame 4. The lid frame has a part 4b that accommodates the sleeve 16 therein. The sleeve is pushed into
30 the part 4b by pushing the C-shaped members 28 into the hole defined by the part 4b, the C-shaped members thus being urged together. The sleeve 16 is pushed through so that the clips 32 of the sleeve 16 emerge from the hole, the C-shaped members 28

spring apart (under the natural resilience provided by the one piece plastic construction), thereby position the clips 32 on top of and in engaging contact with the top of the part 4b. The sleeve 16 is then prevented from moving down through and out of the part 4b that accommodates the sleeve 16 (unless or until the C-shaped members are squeezed together). Figure 5b shows the underside of the lid frame 4, in which view the two pawls 26 can be seen, each pawl defining a tooth 26a for engagement with the teeth of the ratchet racks 20 of the pin 14. The lid 6 may be mounted on the lid frame 4.

The sides (not shown) of the box 2 are added. Protecting ducting for cables is laid to allow subsequent installation of cabling, and a screed protector is positioned over the box. Other boxes and cable ducting may be prepared in the same manner. Then a screed is applied to the floor, the screed surrounding the boxes and covering the ducting. Cables are installed in the protective ducting to allow connection of the service outlet box 2 to services (such as data services) the cables terminating in the box. (The term "cable" is intended to encompass any electronic, electrical or optical cord, line, wire, fibres or the like that can convey signals or power from one location to another.) Then, devices, such as sockets, are mounted in the boxes and attached to the appropriate cables. A floor is then laid on top of the screed, the floor having apertures position over the boxes.

The lid assembly comprising the lid frame 4 and lid 6 is then attached to the rest of the box 2. The pins 14 are aligned with the sleeves 16, with the ratchet racks 14 of the pins 14 and the pawls 26 of the sleeves being aligned to engage, and the lid assembly is then pushed down onto the base. The sleeves 16 are moved over the pins 14 and the pawls 26 and ratchet racks 20 engage. The lid assembly is pushed down until the lid frame

overhang 4a abuts the adjacent floor 1, such that the lid 6 is level with the floor.

The end-user of the box may then attach a piece of electrical or electronic equipment, such as a telephone, by lifting the lid 6, plugging a phone jack leading to the telephone into a socket mounted in the box, passing the cable through a cable outlet 8, and then closing the lid 6.

As mentioned above, the ratchet mechanisms may be disengaged if ever the lid assembly is required to be removed from the box 2. The pin 14 and sleeve 16 that forms each ratchet mechanism has two states, as illustrated by Figures 6a and 6b. Figure 6a shows the ratchet mechanism in the "engaged position". Thus the pawl 26 of the sleeve is in a position in which it engages with the teeth of the ratchet rack 20 of the pin. The sleeve 16 is mounted for rotational movement relative to the pin 14 about the longitudinal axis of the sleeve. Such rotational movement can be effected by means of engaging a screwdriver in the slot 30 defined in the sleeve 16 or by means of pushing the lever 34. The sleeve 16 is held in either of the two states by means of engagement of the protuberance 36 engaging with one of two detents formed in the underside of the part 4b of the lid frame 4 that accommodates the sleeve 16. One such detent 40 is shown in Figure 5b. The block 38 of the sleeve 16 travels in a channel 42 formed in the underside of the part 4b of the lid frame 4 that accommodates the sleeve 16 (see Figure 5b). The channel has two ends 44 against which the block 38 abuts, thereby preventing further rotation. Thus, the sleeve 16 is able to rotate a maximum of 90 degrees about its axis.

Figure 6b shows the ratchet mechanism in the "disengaged position". Thus the pawl 26 of the sleeve is in a position in which it is disengaged from the teeth of the ratchet rack 20 of the pin, and instead can slide against (or glide over) the smooth surface 21 of the pin. By twisting each sleeve to the disengaged

position the lid assembly can then be freely removed from the box 2.

Figures 7a to 10b show a service outlet box according to a second embodiment of the invention. Features in the second
5 embodiment of the invention that correspond to similar features in the first embodiment of the invention, are shown with the same reference numerals as in the first embodiment, but with the addition of the prefix '1' (or '10' where appropriate).

Figure 7a is a side-view of the service outlet box 102
10 before it has been installed in a floor. The service outlet box 102 is generally cuboidal and comprises a steel base assembly 107 onto which a plastic lid frame assembly 104 is mounted. A lid (not shown) is hinged to the lid frame assembly 104 in a similar manner to that in the first embodiment.

15 The lid frame assembly is mounted to the base 107 via four ratchet mechanisms, one at each corner, and the lid frame assembly 104 may be moved relative to the base by means of these ratchet mechanisms. Figure 7b is a sectional view through a
20 corner of the outlet box, when it has been installed in a screed floor. Concrete screed 110 surrounds the sides of the outlet box and the screed is covered by a carpet tile 114. The height of the lid frame assembly 104 has been adjusted so that the overhang 104a at the edges of the frame 104 rests against the top of the carpet tile 114. The base comprises an accessory tray 109
25 supported above a cavity in the base 107 in which under-floor electrical cables (not shown) are received. The cables terminate at sockets (not shown) housed in the accessory tray 109.

It will be appreciated that the above-described features are broadly similar to those of the first embodiment of the
30 invention. In contrast to the first embodiment however, the sleeve 116 of the ratchet mechanism is associated with the base 107 and the pin 114 of the ratchet mechanism is associated with the lid frame assembly 104. More specifically, the sleeves 116

are fixed at each corner of the accessory tray 109 and the pins 114 are housed in a hole at each corner of the lid frame assembly 104. Having the pin 114 associated with the lid frame assembly and the sleeve 116 associated with the base has been found to provide a number of advantages. For example, in a service outlet box, the lid frame is typically supported a particular height above the accessory tray (for example to enable a particular type of plug to be housed beneath the lid). In the second embodiment of the invention, having the ratchet sleeve 116 associated with the accessory tray 109, means that the length of the ratchet pin required is dependent only on the height of the lid above the accessory tray 109, and not on the depth of the screed 110. One particular length ratchet pin can therefore be used for a wide variety of service outlet boxes, independent of the depth of screed used in their particular application. The ratchet mechanisms in the second embodiment of the invention are described in more detail below with reference to Figures 8a to 10b.

Each ratchet pin 114 is housed in a hole defined in each corner of the lid frame assembly 104, as shown in Figures 8a to 8c. Each ratchet pin 114 is freely rotatable in its respective hole about the longitudinal axis of the pin, but is retained (axially) in the hole by way of a snap-fit.

One of the ratchet pins is shown in Figures 10a and 10b. Since the four ratchet pins are identical, features described below in respect of this pin are equally applicable to the other three pins. Each ratchet pin 114 is of one-piece construction. The pin is generally elongate and includes a flattened pin head 115 at one end. The pin 114 has two ratchet racks 120 on opposite sides of the pin 114 which extend along the length of the pin. Each ratchet rack 120 is defined by a multiplicity of teeth, each tooth extending around about a quarter of the circumference of the pin. The two regions that extend along the

length of the pin and that are positioned between the ratchet racks 120 do not comprise any teeth and instead define a substantially smooth surface 121. As a result of the positioning of the two ratchet bars 120, the pin 114 is generally oval in cross-section along its length. The pin is about 30mm long (i.e. 10mm shorter than the pin in the first embodiment of the invention). A shorter pin, as provided in the second embodiment, tends to be easier to align with the ratchet sleeve 116 than the longer pin of the first embodiment.

The pin head 115 has two particular features which enable the ratchet pin to be manipulated by a user when it is housed in the lid frame assembly 104. Firstly, the head 115 includes an orthogonal pair of recess 117 for engagement with the end of a screw driver. This enables the pin 114 to be twisted about its longitudinal axis by simply inserting an appropriately-sized screwdriver into the recess(es) 117 in the pin head and turning the screwdriver. The pin head 115 also includes a protrusion 119, extending radially on one side of the pin head 115. The protrusion 119 is dimensioned to enable the user to easily manipulate the pin head 115 with his fingers, and, for example, twist the pin 104 about its longitudinal axis.

Both these features (the protrusion 119 and the recesses 117) enable the pin to be easily twisted about its longitudinal axis, and thus the ratchet mechanism can be easily moved from the engaged to the disengaged position (see below). The protrusion and the recesses also enable the particular position state of the ratchet mechanism to be readily identifiable by sight.

As shown in Figures 8b and 8c, the lid frame assembly structure surrounds the back of the pin head 115 and includes two notches 123 extending away from the corner. The notches 123 are of a complementary shape to that of the protrusion 119 on the pin head. When the pin 114 is twisted fully in one direction, the protrusion 119 is received in the notch 123. The lid frame

assembly 104 therefore acts as a stop to limit rotation of the pin to a maximum of 90 degrees from its previous position (see Figures 8b and 8c).

Referring now to Figure 9a, the service outlet box comprises four corner blocks 125 (one at each corner of the accessory tray). One of the corner blocks 125 is shown in Figures 10a and 10b. Since the corner blocks are identical, features described below in respect of one corner block are equally applicable to the other three corner blocks. Each corner block 125 is a one-piece plastic moulding comprising a ratchet sleeve 116 and an attachment flange 127.

The ratchet sleeve 116 comprises a generally cylindrical housing dimensioned to receive the ratchet pin 114. Two opposing sides of the housing each form a pawl 126 to engage the ratchet racks 120 of the pin. The attachment flange 127 extends perpendicularly from the longitudinal axis of the ratchet sleeve 116. The attachment flange has a counter-sunk hole 135 for receiving a screw which attaches the corner block 125 to the accessory tray 109. The corner block (and hence the ratchet sleeve) can therefore easily be attached or detached from the base unit.

During use, the lid frame assembly 104 is mounted on the base unit 107 and the ratchet pins 114 are received in their respective ratchet sleeves 116 on the corner of the accessory tray 109. Figure 10a shows the pin 114 being inserted into the sleeve 116 (for the sake of clarity, other parts of surrounding structure are not shown). The pin 114 is rotationally positioned such that only the smooth surfaces 121 face the pawls 126 in the sleeve 116. The pin 114 is therefore easily received in the sleeve 116 without the ratchet racks 120 engaging the pawls 126. When the pin is orientated in this way and received in the sleeve, the pin is freely moveable in a direction along its

longitudinal axis (i.e. the ratchet mechanism is in a disengaged position).

Referring now to Figure 10b, the pin may be twisted by 90 degrees such that the ratchet racks 120 face the pawls 126. The pawls 126 are arranged to engage the ratchet racks 120 of the pin 114 and movement of the pin in a direction along its longitudinal axis is thus restricted (i.e. the ratchet mechanism is in an engaged position). In the engaged position the ratchet pin 114 may be incrementally moved downwards, but is prevented from being pulled upwards by the action of the ratchet and pawl.

It will now be appreciated that the pin head 115 is positioned against one of the stops (defined by the lid frame structure and the notches 123 therein) when the ratchet mechanism is in the engaged position (Figure 8b), and another of the stops when the ratchet mechanism is in the disengaged position (Figure 8c). The lid frame assembly includes two padlock motifs 137 at each corner which indicate which rotational position of the ratchet pin corresponds to the disengaged/engaged position of the ratchet mechanism.

Whilst the present invention has been described and illustrated with reference to particular embodiments, it will be appreciated by those of ordinary skill in the art that the invention lends itself to many different variations not specifically illustrated herein.

In a further embodiment of the invention (not separately illustrated), the frame of the box is substantially solid.

In a further embodiment of the invention (not separately illustrated), there is no base plate and the base is instead defined by the four corner blocks which are screwed directly to the floor substrate.

The pin need not have smooth surfaces defined between the ratchet racks. If the pin were sufficiently oval-shaped, rotation of the sleeve on the pin could disengage the pawl from

the ratchet surface of the pin simply be separating the pawl from the pin surface.

In certain embodiments, the one-way travel of the pin relative to the sleeve effected by the ratchet mechanism may be effected by means of a different mechanism not reliant on engaging teeth. Such a mechanism could for example be effected by means of a one-way travel mechanism incorporating a part on the sleeve similar to a pawl that when travelling upwards pushes into a deformable, but resilient, surface on the pin such that the sleeve resists upwards movement but is able to move downwards. In a manner similar to that described above, the sleeve could be rotated to disengage the pawl-like part of the sleeve from the pin surface. This embodiment could therefore be considered as embodying a service outlet box comprising a base, and a lid frame mounted via a plurality of one-way travel mechanisms relative to the base, wherein each one-way travel mechanism comprises an elongate member (for example a pin) mounted for engagement with a surface of another part (for example the interior surface of a sleeve), one of the elongate member and said another part is associated with the base, and the other of the elongate member and said another part is associated with the lid frame, the elongate member and said another part are mounted for relative rotation about a vertical axis (when the box is installed) between (i) an engaged position, in which the elongate member and said another part interfere with each other so as to restrict upwards movement of the lid frame, whilst permitting downwards movement, and (ii) a disengaged position in which the elongate member and said another part do not interfere with each other, thereby not restricting upwards or downwards movement of the lid frame. Other features of the above-described embodiments or of other aspects of the invention as described herein may be incorporated into this embodiment of the invention.

In a further embodiment of the invention (not separately illustrated), the box has a rounded shape when viewed from above.

The box of the illustrated embodiment may be installed in a raised floor, also known as a floating floor.

5 It will be appreciated by the reader that integers or features of the invention that are described as preferable, advantageous, convenient or the like are optional and do not limit the scope of the independent claims.

Claims

1. A service outlet box comprising
a base, and
5 a lid frame mounted via a plurality of ratchet mechanisms
relative to the base, wherein
each ratchet mechanism comprises a pin mounted in a sleeve,
one of the pin and sleeve is associated with the base, and
the other of the pin and sleeve is associated with the lid frame,
10 the pin and sleeve are mounted for relative rotation about a
longitudinal axis between (i) an engaged position, in which a
ratchet and pawl of the ratchet mechanism are engaged so that
relative movement of the pin and sleeve in a first direction
parallel to the longitudinal axis is restricted by the ratchet
15 and pawl and (ii) a disengaged position in which relative
movement of the pin and sleeve in the first direction is
permitted.
2. A box according to claim 1, wherein the lid frame is mounted
20 via at least four ratchet mechanisms relative to the base.
3. A box according to claim 1 or claim 2, wherein each ratchet
mechanism includes at least two ratchet racks and at least one
pawl for each ratchet rack.
- 25 4. A box according to any preceding claim, wherein the ratchet
of each ratchet mechanism is associated with the pin and the pawl
of each ratchet mechanism is associated with the sleeve.
- 30 5. A box according to any preceding claim, wherein the base
comprises an accessory tray, and the one of the pin and sleeve
associated with the base, is mounted on the accessory tray.

6. A box according to any preceding claim, wherein the pin of each ratchet mechanism is associated with the lid frame and the sleeve of each ratchet mechanism is associated with the base.

5

7. A box according to any preceding claim, wherein the pin of each ratchet mechanism comprises a protrusion for facilitating rotation of the pin about its longitudinal axis to move the ratchet mechanism between the engaged position and the disengaged position.

10

8. A box according to any preceding claim, wherein the pin of each ratchet mechanism comprises a pin head, and the pin head comprises a recess so shaped and sized to be able to accommodate the end of a screwdriver so that the screwdriver may be used to effect rotation of the sleeve about the longitudinal axis to move the ratchet mechanism between the engaged position and the disengaged position.

15

9. A box according to any preceding claim, wherein the ratchet mechanism is configured so that the sleeve and pin are mounted for relative rotation of up to a given amount and are prevented from rotating by more than that given amount by a pair of stops, the pair of stops being defined by the structure of the lid frame.

25

10. A box according to any preceding claim, wherein each ratchet mechanism is so configured that the amount of rotational movement required to move the ratchet mechanism from a fully engaged position to a fully disengaged position is between 60 and 120 degrees.

30

11. A box according to any preceding claim, wherein the pawl of each ratchet mechanism is integrally formed with one of the pin and sleeve.

5 12. A box according to any preceding claim, wherein the ratchet of each ratchet mechanism is integrally formed with one of the pin and sleeve.

(10 13. A floor comprising at least one service outlet box mounted therein, the service outlet box being in accordance with the service outlet box of any preceding claim.

14. A floor comprising a plurality of service outlet boxes mounted therein, each service outlet box being in accordance with 15 the service outlet box of any of claims 1 to 12.

15. A floor according to claim 13 or claim 14, wherein the lid of each service outlet box is arranged to be substantially flush with floor

20 16. A floor according to any of claims 13 to 15, wherein the lid frame includes an overhanging portion that engages with the surrounding floor to stop the lid frame from moving downwards beyond the position at which the lid is substantially flush with 25 the floor.

(17. A floor according to any of claims 13 to 16, including one or more cables in the floor, the one or more cables terminating inside the outlet box at a terminal defined by a socket, to which 30 a further cable may be attached for connecting to a device positioned in the region of the service outlet box, said further cable passing via a hole in the lid of the outlet box.

18. A method of installing an under-floor service outlet box comprising the following steps

- mounting a base of a box on a floor substrate,
- laying cables, at least one of which terminating at the
- 5 base,
- installing a floor layer on top of the floor substrate and around the base,
- mounting a lid frame at the upper end of the base via a plurality of elongate ratchet mechanisms,
- 10 moving against the action of the ratchet mechanisms the lid frame down onto the base so that it lies substantially flush with the surrounding floor, the ratchet mechanisms being in a state in which they resist movement of the lid frame away from the base, wherein
- 15 each ratchet mechanisms is arranged such that a part of it may be twisted to move it to a state in which it does not resist movement of the lid frame away from the base.

19. A method of removing a lid frame from a service outlet box according to any of claims 1 to 12 or from a service outlet box formed by means of the method of claim 18, the method comprising the following steps

- rotating a part of each ratchet mechanism, and then
- lifting the lid frame away from the base.

25

20. A kit of parts including a plurality of pins and sleeves for use as the ratchet mechanisms of the service outlet box as claimed in any of claims 1 to 12, the kit of parts further including a lid frame suitable for use as the lid frame of the

30 service outlet box.

- 27 -

21. A kit of parts according to claim 20 further including a base suitable for use as the base of the service outlet box as claimed in any of claims 1 to 12.