ELECTRICAL APPLIANCE TO BE FIXED BY SNAPPING ONTO A HORIZONTAL SUPPORT RAIL

ABSTRACT OF THE DISCLOSURE

An- appliance that comprises a claw with a service position for fixing the appliance to a rail and a retracted position for releasing the appliance from said rail, in which the claw (35) is lowered with respect to the service position.

This claw (35) comprises:

a carriage (36) in a single piece comprising a chassis and a catch; and

- a slider (37) distinct from the carriage (36), mounted slidably in said carriage (36), the top end of said slider (37) forming a bottom nose for holding on the rail.

(See figure 7)

CLAIMS

1. Electrical appliance to be fixed by snapping onto a horizontal support rail (20) having a top flange (27) and a bottom flange (28), said appliance (10; 10') having on a rear face (12) a top nose (30) and a bottom nose (31; 31') opposite each other, said appliance (10; 10') being configured so as to be fixed to said rail (20) with said top flange (27) engaged between the top nose (30) and the body of the appliance (10; 10') and with said bottom flange (28) engaged between the bottom nose (31; 31') and the body of the appliance (10; 10'), said bottom nose (31; 31') being elastically retractable to enable the appliance (10; 10') to be fixed to the rail (20) by snapping on, said bottom nose (31; 31') forming part of a claw (35; 35') having a service position for fixing the appliance (10; 10') to the rail (20) and a retracted position, for releasing the appliance (10; 10') from said rail (20), in which the claw (35; 35') is lowered with respect to the service position;

characterised in that said claw (35; 35') comprises:

- a carriage (36; 36') in a single piece comprising a chassis (50; 50') and a catch (51; 51A, 51B) having, in the absence of any force, an idle position from which it can flex elastically, said carriage (36; 36') being mounted, by means of said chassis (50; 50'), slidably on the body of

the appliance (10; 10') between a top position in which the claw (35, 35') is in the service position and a bottom position in which the claw is in the retracted position, said catch (51; 51A, 51B) and the body of the appliance (10; 10') being configured so that the carriage (36; 36') is locked vis-a-vis the body of the appliance (10; 10') in the top position when the catch (51; 51A, 51B) is in the idle position and so that the carriage (36; 36') is released vis-a-vis the body of the appliance (10; 10') when the carriage (36; 36') is in the top position and the catch (51; 51A, 51B) is in a flexed position, the carriage (36; 36') then being able to be lowered to its bottom position; and

- a slider (37; 37') distinct from the carriage (36; 36'), mounted slidably in said carriage, the top end of said slider (37; 37') forming said bottom nose (31; 31').

2. Appliance according to claim 1, characterised in that it comprises a spring (39; 39') distinct from the carriage (36; 36') and slider (37; 37'), disposed between said slider (37; 37') and said catch (51; 51A) of the carriage (36; 36').

3. Appliance according to claim 2, characterised in that said slider (37; 37') comprises a longitudinal bar (61) to which said bottom nose (31) belongs and comprises a central rod (63) projecting downwards from the side of the longitudinal bar (61) opposite to said bottom nose (31); said chassis (50; 50') comprises a top crossmember (53; 53A) having a passage (68) for said central rod (63) of the slider (37; 37'); said catch (51; 51A) is rooted on said top crossmember (53; 53A), from which it extends downwards; said catch (51; 51A) comprises a plate (57; 57A) and two cheeks (58) each having a bottom end that is connected to a top end of said plate (57; 57A); and said spring (39; 39') is disposed between said cheeks (58) and bears at its top end on said central rod (63) of the slider (37; 37') and at its bottom end on said plate (57; 57A) of the catch (51; 51A).

4. Appliance according to claim 3, characterised in that said catch (51; 51A) comprises a hinge (59) between the top end of each said cheek (58) and said top crossmember (53; 53A).

5. Appliance according to any one of claims 1 to 4, characterised in that said slider (37; 37') comprises a longitudinal bar (61) to which said bottom nose (31; 31') belongs and comprises two lateral arms (62) projecting downwards from the side of the longitudinal bar (61) opposite to said bottom nose (31; 31'); and said chassis (50; 50') comprises two lateral members (52; 52', 120) and a top crossmember (53; 53A) extending from one to the other of the lateral members (52; 52', 120) at the top end (53; 53A) thereof, said top crossmember having a passage (69) for each said lateral arm (62) of the slider (37; 37').

6. Appliance according to claim 5, characterised in that the top crossmember (53; 53A) comprises a plate (64) situated at the rear and two angle members (65) each comprising a first branch (66) rooted on the plate (64) and a second branch (67) extending between the first branch (66) and the closest lateral member (52; 52', 120), each said passage (69) for a respective lateral arm (62) being formed by the space surrounded by a respective angle member (65), by the corresponding lateral member (52; 52', 120) and by the plate (64).

7. Appliance according to claim 6, characterised in that said slider (37; 37') comprises a central rod (63) projecting downwards from the side of the longitudinal member opposite to said bottom nose (31; 31'); and a space existing between the two angle members (65) forming a passage (68) for said central rod (63).

8. Appliance according to any one of claims 1 to 7, characterised in that the body of the appliance (10; 10') comprises a surface (43) from which an elongate tab (48; 48A, 48B) projects in the horizontal direction; and the catch (51; 51A, 51B) has at least one tappet (60) in

contact with said tab (48; 48A, 48B) in order to lock said carriage (36; 36') vis-a-vis the body of the appliance (10; 10') in the top position when the catch (51; 51A, 51B) is in the idle position.

9. Appliance according claim 8, characterised in that a lug (49; 49A, 49B) projects towards the rear of said tab (48; 48A, 48B) ; and said claw (35; 35') comprises at least one flexible tab (90; 90A) having a pawl (91) in contact with said lug (49; 49A, 49B) when the carriage is in the bottom position.

10. Appliance according to claim 9, characterised in that said flexible tab (90) belongs to said slider (37).

11. Appliance according to claim 9, characterised in that said flexible tab (90B) belongs to said chassis (50').

12. Appliance according to any one of claims 1 to 11, characterised in that said chassis (50; 50') comprises two lateral shields (52; 52') each having an end forming a rib (55; 55') running along a groove (56; 56'); the rib (55; 55') of each lateral shield (52; 52') being received in a groove (45; 45') in the body of the appliance (10) while the groove (56; 56') in each lateral shield (52; 52') receives a rib (46; 46') on the body of the appliance (10; 10').

13. Appliance according to any one of claims 1 to 12, characterised in that said chassis (50) comprises two lateral shields (52) with which said slider (37) is in contact.

14. Appliance according to any one of claims 1 to 12, characterised in that said chassis (50') comprises two lateral shields (52') and a longitudinal member (120) halfway between the lateral shields (52'), with said slider (37') in contact with the longitudinal member and one of the lateral shields (52').

15. Appliance according to any one of claims 1 to 14, characterised in that said catch (51; 51A, 51B) comprises at the bottom part a control key (38; 38') situated under

the body (10; 10') of the device when the claw (35; 35') is in the service position.

16. Appliance according to any one of claims 1 to 15, characterised in that said carriage (36; 36') is made from moulded plastics material.

Dated this 07/03/2012 /

OFREMFRY&JUGAR
ATTORNEY FOR THE APPLICANTS

ELECTRICAL APPLIANCE, TO BE FIXED BY SNAPPING ONTO A HORIZONTAL SUPPORT RAIL

Field of the invention

The invention relates to electrical appliances to be fixed by snapping onto a horizontal support rail having a top flange and bottom flange.

Technological background

In general, such electrical appliances have, on a rear face, a top nose and a bottom nose opposite each other and are configured to be fixed to the rail with the top flange engaged between the top nose and the body of the appliance and with the bottom flange engaged between the bottom nose and the body of the appliance, the bottom nose being elastically retractable to enable the appliance to be fixed to the rail by snapping on.

Such appliances, in which the bottom nose forms part of a claw allowing a service position for fixing the appliance to the rail and a retracted position for releasing the appliance from said rail, a retracted position in which the claw is lowered with respect to the service position, is already known, in particular through German patent application DE 41 07 075, through German patent application DE 44 39 672 and through European patent application EP 1 058 360.

The retracted position of the claw is particularly useful in countries, such as Germany, in which the practice is to supply the various appliances fixed side by side to the rail by a comb distributing the electrical energy, disposed horizontally under the appliances with the teeth of the comb each engaged in a narrow slot formed in the bottom face of the appliances to join a connection terminal internal to the appliance.

Such a comb is in general rigid so that, in order to release one of the appliances from the row, without removing the comb it is necessary to be able to raise the appliance with respect to the comb by the height of the teeth.

Because the orifice through which each tooth on the comb enters the apparatus is a narrow slot the width of which corresponds to the width of the teeth of the comb, it is not possible to move the appliance forward in order to release it from the bottom flange of the rail when the claw is in the service position.

The lowered position of the claw makes it possible to lift the appliance by the required quantity without being interfered with by the fixing rail.

Subject matter of the invention

The invention aims to provide a similar appliance the claw of which is reliable while being simple, convenient and economical.

The invention proposes for this purpose an electrical appliance to be fixed by snapping onto a horizontal support rail having a top flange and a bottom flange, said appliance having on a rear face a top nose and a bottom nose opposite each other, said appliance being configured so as to be fixed to said rail with said top flange engaged between the top nose and the body of the appliance and with said bottom flange engaged between the bottom nose and the body of the appliance, said bottom nose being elastically

retractable to enable the appliance to be fixed to the rail by snapping on, said bottom nose forming part of a claw having a service position for fixing the appliance to the rail and a retracted position, for releasing the appliance from said rail, in which the claw is lowered with respect to the service position;

characterised in that said claw comprises:

- a carriage in a single piece comprising a chassis and a catch having, in the absence of any force, an idle position from which it can flex elastically, said carriage being mounted, by means of said chassis, slidably on the body of the appliance between a top position in which the claw is in the service position and a bottom position in which the claw is in the retracted position, said catch and the body of the appliance being configured so that the carriage is locked vis-a-vis the body of the appliance in the top position when the catch is in the idle position and so that the carriage is released vis-a-vis the body of the appliance when the carriage is in the top position and the catch is in a flexed position, the carriage then being able to be lowered to its bottom position; and

a slider distinct from the carriage, mounted slidably in said carriage, the top end of said slider forming said bottom nose.

The carriage that the claw of the appliance according to the invention is provided with, has, in a single piece, a chassis by means of which the carriage is mounted slidably on the body of the appliance and a catch for locking the claw in the service position and releasing it so that it can be lowered to the retracted position.

Because the chassis serving for the slidable mounting on the body of the apparatus and the catch form part of the same piece, the position of the catch with respect to the body of the apparatus is particularly precise, to the benefit of the quality and reliability of the cooperation between the body of the appliance and the carriage.

Finally, in general terms, the claw of the appliance according to the invention has an arrangement enabling it to be used in a simple, convenient and economical fashion.

According to preferred features, the appliance comprises a spring distinct from the carriage and slider, disposed between said slider and said catch of the carriage.

Because the slider is distinct from the carriage and the spring is distinct from the carriage and slider, the carriage and slider can each fulfil their role completely independently, to the benefit of the quality and reliability of functioning.

In addition, because the spring is distinct from the carriage and slider, it can be made from a different material.

In particular, the carriage and slider can be made from plastics material whereas the spring is made from metal, to the benefit of the durability of the action thereof (a spring made from plastics material - becomes fragile over time).

According to preferred features of the claw of the appliance according to the invention:

- said slider comprises a longitudinal bar to which said bottom nose belongs and comprises a central rod projecting downwards from the side of the longitudinal bar opposite to said bottom nose, said chassis comprises a top crossmember having a passage for said central rod of the slider; said catch is rooted on said top crossmember, from which it extends downwards; said catch comprises a plate and two cheeks each having a bottom end that is connected to a top end of said plate; and said spring is disposed between said cheeks and bears at its top end on said central rod of the slider and at its bottom end on said plate of the catch;

- said catch comprises a hinge between the top end of each said cheek and said top crossmember;

- said slider comprises a longitudinal bar to which said bottom nose belongs and comprises two lateral arms projecting downwards from the side of the longitudinal bar opposite to said bottom nose; and said chassis comprises two lateral members and a top crossmember extending from one to the other of the lateral members at the top end thereof, said top crossmember having a passage for each said lateral arm of the slider;

- the top crossmember comprises a plate situated at the rear and two angle members each comprising a first branch rooted on the plate and a second branch extending between the first branch and the closest lateral member, each said passage for a respective lateral arm being formed by the space surrounded by a respective angle member, by the corresponding lateral member and by the plate;

said slider comprises a central rod projecting downwards from the side of the longitudinal member opposite to said bottom nose; and a space existing between the two angle members forming a passage for said central rod;

- the body of the appliance comprises a surface from which an elongate tab projects in the horizontal direction; and the catch has at least one tappet in contact with said tab in order to lock said carriage vis-a-vis the body of the appliance in the top position when the catch is in the idle position;

- a lug projects towards the rear of said tab; and said claw comprises at least one flexible tab having a pawl in contact with said lug when the carriage is in the bottom position;

- said flexible tab belongs to said slider;

- said flexible tab belongs to said chassis;

said chassis comprises two lateral shields each having an end forming a rib running along a groove; the rib of each lateral shield being received in a groove in the body of the appliance while the groove in each lateral shield receives a rib on the body of the appliance;

said chassis comprises two lateral shields in contact with said slider;

- said chassis comprises two lateral shields and a longitudinal member halfway between the lateral shields, with said slider in contact with the longitudinal member and one of the lateral shields;

- said catch comprises at the bottom part a control key situated under the body of the device when the claw is in the service position; and/or

- said carriage is made from moulded plastics material.

Brief description of the drawings

The disclosure of the invention will now be continued with the detailed description of example embodiments given below by way of illustration and non-limitatively, with reference to the accompanying drawings, in which:

- figure 1 is a view in side elevation showing an appliance according the invention fixed to a support rail;

- figure 2 is a view similar to figure 1 but with the fixing claw in the retracted position and the appliance released from the support rail and from the electrical energy distribution comb;

- figure 3 is a perspective view showing the part of the electrical appliance that can be seen at bottom right in figure 2, in particular the fixing claw;

- figure 4 is a similar perspective view but showing the appliance without the fixing claw;

- figure 5 is a view similar to figure 4 but in side elevation;

- figure 6 is a view in section of the part of the appliance that can be seen at bottom right in figure 1, showing the fixing claw in the service position;

- figure 7 is a perspective view showing in isolation the fixing claw, this view being taken at an angle different from the view in figure 3;

- figures 8 and 9 are perspective views taken at an angle similar to that in figure 7, showing respectively the slider and the carriage that the fixing claw has;

- figure 10 is another perspective view of the fixing claw, taken at yet another angle;

- figure 11 is a perspective view, taken at the same angle as figure 10, showing in isolation the carriage of the fixing claw;

figures 12 and 13 are perspective views similar respectively to figure 3 and to figure 4 but for a variant of the electrical appliance twice as large;and

figures 14 and 15 are perspective views similar respectively to figure 7 and to figure 9 but for the claw that the variant of the electrical appliance has.

Detailed description of example embodiments

The electrical appliance 10 illustrated in figure 1 has a roughly parallelepipedal shape.

It has two main faces 11 and lateral faces extending from one of the main faces 11 to the other, namely a rear face 12, a bottom face 13, a front face 14 and a top face 15.

The rear face 12 has a scallop 16 for mounting the appliance 1 on a standard support rail with a Q profile such as the rail 20.

The bottom face 13 has access orifices (not shown) to a connecting terminal 21. Here the terminal 21 accepts a tooth 22 of a comb 23 for distributing electrical energy.

The orifice on the front face 13 through which the tooth 22 is introduced into the appliance 10 is a narrow slot the width of which (the dimension in the front-rear direction) is slightly greater than the thickness of the tooth 22.

The bottom face 13 has, at the rear of the orifice through which the tooth 22 is introduced, another orifice for access to the terminal 21, relatively extended in the

front-rear direction, making it possible to accept the bared end of an electric cable.

The front face 14 has, in the central position, over approximately half the length thereof, a nose 24 having a manoeuvring lever 25. Under the nose 24 is situated an orifice for accessing the head of the screw of the terminal 21.

The top face 15 has an orifice (not shown) giving access to a connection terminal (not shown) similar to the terminal 21. Here this terminal accepts the bared end of an electric cable (not shown) leading to a subsidiary circuit such as a lighting circuit or a socket circuit.

The orifice in the top face 15 through which the bared end of the outgoing electric cable is introduced into the appliance 10 is relatively extended in the front-rear direction.

Here the appliance 10 is of the modular type, that is to say, apart from the roughly parallelepipedal shape thereof, the width thereof (the distance between the two main faces 11) is a multiple of a standard value, known by the term "module", which is around 18 mm.

More precisely, here, the appliance 10 is a single-pole circuit breaker with a width of one module.

The rail 20 has a central portion 26 in the form of a channel as well as a flange 27 and a flange 28 that each projects from respective end of the central portion 26, outwards. The flanges 27 and 28 are roughly oriented in the same plane.

The rail 20 is designed to be fixed horizontally to a wall, belonging for example to an enclosure such as an electrical cabinet or an electrical cubicle. In the fixed state, the flanges 27 and 28 are designed to be oriented vertically, with the central portion 26 at the rear of the flanges 27 and 28 and in abutment on the support wall. In figures 1 and 2, the flange 27 is the top flange and the flange 28 is the bottom flange.

For fixing the appliance 10 to the support rail 20, the appliance 10 has two noses 30 and 31.

The nose 30 is formed by one of the ends of a heel 32, the other end of which projects from the top face 15 of the appliance 10. As is well known (see for example French patent application 2 652 205), the heel 32 has a service position (the position illustrated in figures 1 and 2) where it is immobilised with respect to the body of the appliance 10 with the nose 30 projecting from the top edge 33 of the scallop 16; and it is possible to put the heel 32, by exerting an upwardly directed force on the portion of the heel 32 that projects above the top face 15, in a retracted position where the nose 30 is retracted into the body of the appliance 10.

The nose 31 belongs to a claw 35.

The claw 35 comprises a carriage 36 slidably mounted on the body of the appliance 10, a slider 37 slidably mounted in the carriage 36 and a spring 39 (figures 6, 7 and 10) for urging the slider 37 towards a deployed position in which one end of the slider 37, forming the nose 31, projects from the top edge 34 of the carriage 36. The slider 37 is retractable, counter to the spring 39, into the carriage 36.

The claw 35 has a service position, illustrated in figure 1, in which the carriage 36 is immobilised with respect to the body of the appliance 10 with the top edge 34 of the carriage 36 forming the bottom edge of the scallop 16.

The claw 35 also has a retracted position, illustrated in figure 2, in which the claw 35 is lowered with respect to the service position thereof.

The claw 35 comprises at the bottom part a key 38 making it possible, when the claw 35 is in the service position, to release the carriage 36 vis-a-vis the body of the appliance 10. Once released, the carriage 36 can slide vis-a-vis the body of the appliance 10 as far as the

retracted position illustrated in figure 2, which is an end-of-travel position of the carriage 36.

To return the claw 35 to the service position, it suffices to slide it vis-a-vis the body of the appliance 10 upwards, the carriage 10 automatically locking vis-a-vis the body of the appliance 10 when the service position is reached.

As can be seen in figure 1, the appliance 10 is configured so as to be fixed to the rail 20 with the heel 32 and the claw 35 in the service position, the top flange 27 being engaged between the nose 30 and the body of the appliance 10; and the bottom flange 28 engaged between the nose 31 and the body of the appliance 10.

More precisely, the top flange 27 is sandwiched between the nose 30 and the surface 40 of the body of the appliance 10 that delimits the bottom of scallop 16, the edge of the top flange 27 is opposite the top edge 33 of the scallop 16, the bottom flange 28 is sandwiched between the nose 31 and the bottom surface 40, and the edge of the top flange 28 is opposite the bottom edge of the scallop 16, here formed by the top edge 34 of the carriage 36.

The appliance 10 is then fixed to the rail 20 by snapping on.

More precisely, the appliance 10 is configured so as to be fixed to the support rail 20 by engaging the top flange 27 between the body of the appliance 10 and the nose 30 while the appliance 10 is inclined so that the nose 31 is away from the bottom flange 28, and then by tilting the appliance 10 about the top flange 27 in order to move the nose 31 closer to the bottom flange 28, the then nose 31 retracting in contact with the bottom flange 28 to enable the bottom flange 28 to pass the nose 31 and then the nose 31 deploys so that the bottom flange 28 is held between the body of the appliance 10 and the nose 31.

The appliance 10 is designed to be disposed with other modular electrical appliances on the support rail 20 in order to form a row of electrical appliances side by side.

The comb 23 for the horizontal distribution of electrical energy serves to supply the appliance 10 and the other appliances in the row.

To do this, the comb 23 has a plurality of teeth such as the tooth 22 each engaged in an appliance such as the appliance 10.

To extract the appliance 10, it is necessary to release it from the rail 20 and comb 23.

The retraction of one or other or both of the two noses 30 and 31 releases the appliance 10 from the rail 20 but, in view of the length of the tooth 22 and the narrow character of the orifice through which the tooth 22 is introduced into the appliance 10, this is not sufficient to release the appliance 10 from the comb 23 because of the rigidity of such a comb and the fixing of this comb to the other appliances in the row.

By virtue of the retractable character of the claw 35 to which the nose 31 belongs, the appliance 10 can be removed from the row of appliances without its being necessary to remove the comb 23 from the row of appliances.

In the retracted position of the claw 35 (figure 2), the separation between the noses 30 and 31 is such that the appliance 10 can be sufficiently raised, with respect to the comb 23, so that the tooth 22 is entirely removed from the appliance 10 and consequently the appliance 10 is released both from the rail 20 and from the comb 23, as shown in figure 2.

In detail, the operations to be performed in order to be able to remove the appliance 10 from the row of appliances are as follows:

loosening the connecting terminal 21 and the connecting terminal (not shown) situated under the top face 15;

- extracting out of the appliance 10 the electric cable that was connected to the terminal situated under the top face 15 (the deformable character of an electric cable allows such extraction);

- pressing on the key 38 of the claw 35 and moving the claw 35 in order to bring it to its retracted position illustrated in figure 2; and

- lifting the appliance 10 while inclining it slightly so as to release it both from the rail 20 and from the comb 23.

It should be noted that the supply to the row of appliances by a comb such as the comb 23 situated under the appliances, with a narrow slot provided in each appliance for receiving a tooth such as the tooth 22, is used in certain countries such as Germany.

In other countries, such as France, the appliances in the row are supplied by a comb situated above the appliances with each tooth on this comb engaged in an appliance through an orifice relatively extended in the front-rear direction enabling both a comb tooth and the bared end of an electric cable to access the connecting terminal situated under the top face 15.

The electrical appliance 10 can also be used in these countries, with a comb tooth that accesses the terminal situated under the top face 15 through the relatively extended orifice provided in the top face 15, and with the outgoing electric cable accessing the terminal 21 through the relatively extended orifice provided in the bottom face 13.

When the appliance 10 is used in countries such as France, in order to remove the appliance 10 from the row of appliances, the heel 32 is acted on in order to make it pass to the retracted position and the claw 35 is released by exerting on the key 38 a force directed towards the rear.

Because the orifice provided in the top face 15 is sized to allow access both of a comb tooth and of the bared

end of an electric cable, this orifice is much more extensive in the front-rear direction than the thickness of a comb tooth.

The relatively great extension of this orifice makes it possible, when the heel 32 is in the retracted position (nose 30 retracted into the body of the appliance 10) and the connecting terminal situated under the top face 15 has been loosened, to incline the appliance 10 until the top flange 27 is out of the scallop 16.

If the electric cable connected to the terminal 21 has previously been removed, it is then possible to lower the electrical apparatus 10 in order to release it from the tooth of the comb situated above the appliances in the row and to release it from the flange 28 so that the electrical apparatus 10 is then released from this comb and from the rail 20.

In a variant of the appliance 1 that is not illustrated, designed to be used solely in the countries where the comb distributing electrical energy is situated under the appliances, the nose 30 is not retractable into the body of the appliance 10 but is fixed, being for example in a single piece with the body of the appliance 10.

The fixing claw 35 and the part of the electrical appliance 10 with which the claw 35 cooperates will now be described in detail.

As can be seen in figures 2 to 5, the surface 40 of the body of the appliance 10 that forms the bottom of the scallop 16 is extended by a surface 43 that extends from the surface 40 as far as the bottom face 13.

In each of the main faces 11, along the surface 43, a groove 45 is provided, emerging in the bottom face 13.

Between each groove 45 and the surface 43 there exists a rib 46, the edge 47 of which is recessed with respect to the main face 11.

As can be seen more particularly in figure 3, the separation between the edge 47 and the main face 11 enables

the lateral faces of the carriage 36 to be slightly recessed with respect to the main face 11. This enables the carriage 36 to slide, including when the appliance 10 forms part of a row of appliances with each main face 11 of the appliance 10 against a main face of an adjacent appliance.

Close to the bottom face 13, a tab 48 projects from the surface 43.

The tab 48 is elongate in the horizontal direction.

In the middle of the tab 48 a lug 49 projects towards the rear.

The carriage 36 is made from pastics mateial moulded in a single piece. It comprises a chassis 50 and a catch 51.

The chassis 50 comprises two lateral shields 52, a top crossmember 53 extending from one of the lateral shields 52 to the other at the top ends thereof and a bottom crossmember 54 extending from one of the lateral shields 52 to the other at the bottom ends thereof.

The front end of each shield 52 forms a rib 55 running along a groove 56.

For each lateral shield 52, the rib 55 is configured so as to be received in the groove 45 of the body of the appliance 10 while the groove 56 is configured to receive the rib 46 of the body of the appliance 10.

The grooves and ribs 45, 46, 55 and 56 procure guidance for sliding of the carriage 36 vis-a-vis the body of the appliance 10.

For each of the main faces 11, the top end of the groove 45 forms an end-of-travel stop for the carriage 36, and more precisely for the top edge of the rib 55.

The catch 51 is rooted on the top crossmember 53, from which it extends downwards. The distal end of the catch 51 (the end opposite to the one by means of which the catch 51 is rooted on the top crossmember 53) forms the bottom end of the key 38.

Between the key 38 and the top crossmember 53, the catch 51 comprises successively a plate 57, two cheeks 58 and two hinges 59.

The bottom end of the plate 57 is connected to the top end of the key 38. The bottom end of each cheek 58 is connected to the top end of the plate 57. The bottom end of each hinge 59 is connected to the top end of a respective one of the cheeks 58. The top end of each hinge 59 is connected to the top crossmember 53.

The hinges 59 are formed by portions of plastics material with a smaller cross section than the other areas of the catch 51.

When a force is exerted on the key 38 towards the rear (towards the right in figure 6), the catch 51 flexes while deforming mainly at the hinges 59.

The flexing of the catch 51 enables the key 38 to move towards the rear until it encounters the bottom crossmember 54, which forms an end-of-travel stop.

The flexing of the catch 51 is elastic, that is to say, when a force is no longer exerted, the catch 51 returns to the idle position thereof illustrated in the drawings.

At the junction between the plate 57 and each cheek 58, the catch 51 comprises a forwardly projecting tappet 60.

As can be seen in figure 6, in the service position of the claw 35 (figures 1 and 6), each tappet 60 is in engagement with the tab 48. Thus the claw 35 is locked in the service position.

If, as has just been explained, a rearwardly directed force is exerted on the key 38, the flexing of the catch 51 that results therefrom releases the tappets 60 from the tab 48, and the claw 35 is no longer locked in the service position and can be lowered to its retracted position (figures 2 and 3).

The slider 37 comprises a longitudinal bar 61, one end of which forms the nose 31. On the side of the longitudinal

bar 61 opposite the end forming the nose 31, two lateral arms 62 and a central rod 63 project.

The top crossmember 53 comprises passages 68 and 69 respectively for the central rod 63 and for the lateral arms 62.

Under the top crossmember 53, the lateral arms 62 are each housed between a lateral shield 52 and a cheek 58 while the central rod 63 is housed between the cheeks 58.

The spring 39 is in engagement respectively with the bottom end of the central rod 63 and with the top end of the plate 57.

The presence of the slider 37 and the spring 39 in the carriage 36 does not interfere with the capacity for bending and elastic return of the catch 51.

This is because the spring 39 is capable of deforming in order to accompany the bending and elastic return movements of the catch 51; while it is mainly the chassis 50 (rather than the catch 51) that guides the slider 37 in the carriage 36.

The top crossmember 53 comprises a plate 64 situated at the rear and two angle members 65 each comprising a first branch 66 rooted on the plate 64 and a second branch 67 extending between the first branch 66 and the closest lateral shield 52.

The two angle members 65 are disposed in mirror images of each other.

Between the two angle members 65 there exists a space 68 forming a passage for the central rod 63 of the slider 37.

Each space 69, surrounded by a respective angle member 65, the corresponding lateral shield 52 and the plate 64, forms a passage for a respective one of the lateral arms 62 of the slider 37.

As can be seen more particularly in figures 7 and 9, each of the angle members 65 is below the top edge 34 of the carriage 36 (the top edge of the chassis 50).

Each of the hinges 59 is rooted on the top crossmember 53 through the front face of the first branch 66 of a respective angle member 65.

In the slider 37, each lateral arm 62 comprises, at the distal end thereof (the end opposite to the longitudinal bar 61) a forwardly projecting pawl 70. The rear face of each arm 62 is flat and likewise with regard to the front face of the portion of each arm 62 situated between the pawl 70 and the longitudinal bar 61.

Each pawl 70 has a horizontal face 71 looking towards the longitudinal bar 61t that is to say upwards, and an inclined face 72 forming a ramp between the horizontal face 71 and the bottom edge of the arm 62.

In line with each lateral arm 62, the longitudinal bar 61 has a forwardly projecting rib 75. Each rib 75 has a horizontal face 76 opposite the horizontal face 71 of the pawl 70. In other words, the horizontal face 76 faces downwards.

The front face of the longitudinal bar 61 has, as from the top edge, a vertical face 77 that is connected to a face 78 inclined forwards and downwards. The top face of the rib 75 belongs to the inclined face 78.

As can be seen in figure 3, the longitudinal bar 61 comprises three rearwardly projecting ribs, respectively a central rib 79 and two lateral ribs 80. The central rib 79 projects more than the lateral ribs 80.

The rear face of the longitudinal bar 61 has, as from the top edge, a face 81 inclined downwards and rearwards. The top face of the ribs 79 and 80 belongs to the inclined face 81.

The central rod 63 of the slider 37 comprises a fork 85 comprising two arms 86, a crossmember 87 and an end finger 88.

The arms 86 project downwards from the longitudinal bar 61. The bottom end of each arm 86 is connected to a respective end of the crossmember 87.

The end finger 88 projects downwards from the centre of the crossmember 87.

The central rod 63 has, in addition to the fork 85, a flexible tab 90 that projects upwards from the crossmember 87.

Here, the flexible tab 90 is rooted on the front face of the crossmember 87 and is more generally in front of the fork 85. More precisely, apart from the bottom end of the flexible tab 90 that is connected to the crossmember 87, the flexible tab 90 is in front of the space framed by the arms 86, the crossmember 87 and the longitudinal bar 61. The flexible tab 90 can thus flex in this space, without the bending thereof being interfered with by the longitudinal bar 61 and the arms 86.

The flexible tab 90 comprises, at the distal end thereof (the end opposite to the crossmember 87), a forwardly projecting pawl 91.

The pawl 91 has a horizontal face 92 and an inclined face 93 forming a ramp between the horizontal face 92 and the top edge of the flexible tab 90.

Under the pawl 91, the flexible tab 90 has a rib 94 projecting less than the pawl 91. The rib 94 has a face 95 inclined downwards and towards the rear and a face 96 inclined upwards and towards the rear. The top edge of the face 95 is connected to the bottom edge of the face 96. The face 96 is less inclined than the face 95.

As explained subsequently, the pawl 91 and the rib 94 are configured so as to cooperate with the lug 49 projecting at the middle of the tab 48.

The plate 64 has, in front of each angle member 65, a groove 100 for housing a respective lateral rib 80 of the longitudinal bar 61.

The plate 64 has, between the grooves 100, a recess 101 for housing the central rib 79 of the longitudinal bar 61.

For each of the angle members 65, the second branch 67 has a horizontal face 102 (figure 11) that faces downwards.

The rear edge of each face 102 is connected to a face (not visible in the drawings) inclined upwards and forwards. Thus the thickness (the front-rear dimension) of the second branch 67 of the angle member 65 increases from top to bottom until it is at its maximum level with the face 102.

The catch 51 comprises, between the two cheeks 58, at the rear, a wall 105. The tappets 60 have a portion projecting above the top edge of the plate 64. The wall 105 and the projecting portions of the. tappets 60 serve to hold the spring 39.

In a variant that is not illustrated, the wall 105 and the projecting portions of the tappets 60 are replaced by a stud projecting towards the top of the top edge of the plate 57, the bottom end of the spring 39 surrounding this stud.

The claw 35 is assembled by disposing the spring 39 between the cheeks 58 with the bottom end of the spring 39 against the top edge of the plate 57. The slider 37 is then engaged in the top crossmember 53 with the central rod 63 entering by means of the end finger 88 into the space 68 and with each lateral arm 62 entering by means of its pawl 70 into a respective space 69.

During the pushing-in movement, the inclined face 72 of each pawl 70 encounters the inclined face (not visible in the drawings) of the second branch 67 of the corresponding angle member 65, so that each lateral arm 62 flexes until the pawl 70 has passed the second branch 67. Each arm 62 then relaxes and the horizontal face 71 of the pawl 70 comes opposite the horizontal face 102 of the corresponding second branch 67.

During the pushing-in movement of the slider 37 into the carriage 36, the end finger 88 engages in the top end of the spring 39 and the spring 39 compresses in contact with the bottom face of the crossmember 87.

When a force of pushing the slider 37 into the carriage 36 is not longer exerted, the spring 39 relaxes and returns the slider 37 to the position in which the nose 31 is deployed.

The coming into contact of the horizontal face 71 of the pawl 70 and the horizontal face 102 of the second branch 67, on each side, fixes the end of upward travel of the slider 37.

The end of downward travel (the retracted position of the slider 37) is fixed by the coming into contact of the horizontal face 76 of the rib 75 of the. longitudinal bar 61 against the second branch 67 of the angle member 65, on each side.

Each of the angle members 65 comprises, projecting towards the other angle member 65, to the front, a rib 106.

The flexible tab 90 is housed between the ribs 106.

Each arm 8 6 has the front edge thereof facing the rear face of a respective rib 106.

When the appliance 10 is fixed on the rail 20, the rear face of the bottom flange 28 is in contact with the front face of the longitudinal bar 61, mainly through the inclined face 78, with the exercising of a rearwardly directed force on the nose 31 forming the top end of the slider 37.

This force is mainly taken up by the plate 64 and the ribs 106.

The ribs 75 give the inclined face 78 a certain extension.

When the appliance 10 is snapped on the rail 20, the front face of the bottom flange 28 comes into contact with the inclined face 81 of the rear face of the longitudinal bar 61.

The downward and rearward inclination of the face 81 has the effect that the slider 37 is urged downwards, so that the slider 37 retracts into the carriage 36, while the spring 39 compresses.

When the bottom flange 28 has passed the top end of the slider 37 (the nose 31), the spring 39 relaxes and raises the slider 37 so that the nose 31 is returned to the deployed position. The lateral ribs 80 and especially the central rib 79 procure a certain extension for the face 81 favourable to good cooperation with the bottom flange 28.

It should be noted that the lateral arms 62 of the slider 37, which are relatively long, participate in the quality of the sliding guidance between the chassis 50 and the slider 37, the surface of each arm 62 situated furthest to the right or furthest to the left sliding against the facing surface of the corresponding lateral shield 52.

The claw 35 and the body of the appliance 10 are assembled by engaging, on each side, the rib 55 of the carriage 36 in the groove 45 of the body of the appliance 10 and the rib 46 of this body in the groove 56 of the carriage 36 through the bottom of the body of appliance 10, and then by raising the claw 35 with respect to the body of the appliance 10.

During the raising movement, the pawl 91 of the flexible tab 90 of the slider 37 encounters the lug 49, which projects in the middle of the tab 48. In contact with the lug, the tab 90 flexes towards the rear and, when the lug 49 is passed, the tab 90 relaxes, returning to the idle position thereof illustrated in the drawings. The rib 94 in its turn comes up against the lug 49. In contact with the lug 49, the flexible tab flexes once again towards the rear and, when the lug 49 is passed by the rib 94, the tab 90 relaxes and resumes the idle position thereof. Next, the tappets 60 encounter the tab 48. In contact with the tab 48 and the tappets 60, the catch 51 flexes towards the rear and, when the tappets 60 have passed the tab 48, the catch 51 relaxes and resumes the idle position thereof illustrated in the drawings while the carriage 36 arrives at the end of upward travel, through the coming into

contact of the top edge of the rib 55 with the top end of the groove 45.

The claw 35 is then in the service position illustrated in figures 1 to 6.

In the service position of the claw 35, the bottom face 107 of each tappet 60 and the top face 108 of the tab 48 are opposite each other, which locks the claw 35 vis-a-vis the body of the appliance 10.

For each of the tappets 60, the bottom face 107 is a horizontal face that faces downwards. Each tappet 60 has a top face 109 inclined upwards and towards the rear.

The top face 108 of the tab 48 is a horizontal face that faces upwards. The tab 48 also comprises an inclined face forming a ramp between the top face 108 and its bottom face.

The lug 49 has a top face 111 that is a horizontal face facing upwards. The top face 111 of the lug 49 and the top face 108 of the tab 48 are level with each other.

The lug 49 has a inclined face 112 that forms a ramp between the top face 111 and its bottom face. The bottom face of the lug 49 is level with the bottom face of the lug 48.

In the service position of the claw 35, because the faces in contact 107 and 108 respectively of the tappets 60 and of the tab 48 are horizontal, exercising a lowering force does not flex the catch 51.

The orientation of the top face 109 of the tappets 60 and the orientation of the inclined face 110 of the tab 48 are such that the catch 51 flexes when the claw 35 is raised with respect to the body of the appliance 10.

In the service position of the claw 35, the lug 49 is housed between the tappets 60.

As explained above, in order to release the carriage 36 vis-a-vis the body of the appliance 10, the catch 51 is flexed by exerting on the key 38 a force directed towards the rear.

The flexing of the catch 51 enables the tappets 60 to be situated behind the tab 48 and therefore to be released from this tab.

The claw 35 can then be lowered. During the lowering movement, the rib 94 of the flexible tab 90 comes up against the lug 49. When the bottom inclined face 95 of the rib 94 comes into contact with the top face 111 of the lug 49, the tab 90 flexes towards the rear, so that the rib 94 can pass the lug 49. Next the horizontal bottom face 92 of the pawl 91 comes up against the horizontal top face 111 of the lug 49. The faces 92 and 111 being horizontal, the tab 90 does not flex and the claw 35 cannot drop further.

This is then the end of travel, in the retracted position illustrated in figures 2 and 3.

The rib 94 enables the user, who feels a certain resistance when the rib 94 passes the lug 49, to be warned of the proximity of the end of downward travel of the claw 35.

The rib 94 also makes it possible to hold the claw 35 in the retracted position since, to enable the claw 35 to rise with respect to the body of the appliance 10, it is necessary to exert a certain force so that the rib 94 can pass the lug 49.

To return the claw to the service position, as indicated above, it suffices to slide the claw 35 vis-a-vis the body of the appliance 10 upwards, the catch 51 flexing towards the rear when the tappets 60 contact the tab 48 and then relax in order to lock the claw 35 in the service position.

It will be observed in figures 1 and 6 that, in the service position, the key 38 is situated under the body of the appliance 1. This enables it to be easily accessible.

It will also be observed that the bottom crossmember 54 is just behind the key 38. As explained above, the bottom crossmember 54 procures an end-of-travel stop for the key 38, limiting the rearward flexion of the catch 51.

As can be seen more particularly in figure 3, the bottom crossmember 54 is formed by a plate disposed at the rear, under the lateral shields 52.

In a variant that is not illustrated, the bottom crossmember also comprises a panel situated in front of the key 38 and connected by arms situated on either side of the key 38, to a plate similar to the bottom crossmember 54. A central window for accessing the key 38 is provided in the panel. Such a panel prevents accidentally pressing on the key 38 since it is necessary to pass through the window in the panel to act on the key 38.

As explained above, in the service position, the edge of the bottom flange 28 is opposite the top edge 34 of the carriage 36.

When the terminals of the appliance 10 are tightened, for example the terminal 21, the force exerted on the top edge 34 may be very high.

The locking in the service position procured by the catch 51 is particular secure and makes it possible to withstand extremely high forces, without the tappets 60 escaping from the tab 48, in particular by virtue of the arrangement of the cheeks 58, the hinges 59 and the top crossmember 53.

A variant 10' of the appliance 10 will now be described with the help of figures 12 to 15. For similar elements the same numerical references have been used, but with an exponent '.

In general terms the appliance 10' is similar to the appliance 10, except the width thereof (the distance between the two main faces 11') is twice the width of the appliance 10, that is to say the appliance 10' has a width of two modules.

The surface 43' of the body of the appliance 10 comprises two tabs 48A and 48B each similar to the tab 48 of the appliance 10. In the middle of the tab 48A a lug 49A projects towards the rear. At the middle of the tab 48B a

lug 49B projects towards the rear. The lugs 49A and 49B are similar to the lug 49.

The carriage 36', just like the carriage 36, is made from plastics material moulded in a single piece. The chassis 50' of the carriage 36' is twice as wide as the chassis 50 of the carriage 36.

The chassis 50' comprises two lateral shields 52' similar to the shield 52 of the chassis 50.

In particular, the front end of each of shields 52' forms a rib 55' running along a groove 56', with the rib 55' configured so as to be received in the groove 45' in the body of the appliance 10' while the groove 56' is configured to receive the rib 46' on the body of the appliance 10'.

Halfway between the lateral shields 52', the chassis 50' comprises a longitudinal member 120.

In general terms, the portion 50A of the chassis 50 situated between the longitudinal member 120 and the lateral shield 52' that can be seen on the left in figure 12 (on the right in figures 14 and 15) is arranged like the portion of the chassis 50 situated between the lateral shields 52.

The portion 50B of the chassis 50 situated between the longitudinal member 120 and the lateral shield 52' that can be seen on the right in figure 12 (on the left in figures 14 and 15) is arranged like the chassis 50 except that this portion does not receive a slider.

The portion 50A of the chassis 50' comprises, between the longitudinal member 120 and the corresponding lateral shield 52', a top crossmember 53A similar to the crossmember 53 of the chassis 50.

The carriage 36' comprises, in the portion 50A of the chassis 50' a catch 51A similar to the catch 51 of the carriage 36 with the exception of the plate 57 and the key 38, as explained below. The portion of the carriage 36' formed by the portion 50A of the chassis 50' and by the

catch 51A receives a slider 37' and a spring 39' identical to the slider 37 and spring 39 of the claw 35.

The portion 50B of the chassis 50' comprises, between the longitudinal member 120 and the corresponding lateral shield 52', a top crossmember 53B extending from one to the other of the longitudinal member 120 and the corresponding lateral shield 52' .

The carriage 36' comprises, in the portion 50B of the chassis 50' a catch 51B similar to the catch 51 of the carriage 36, with the exception of the plate 57 and the key 38 while the catch 51B also comprises a flexible tab 90B similar to the flexible tab 90 of the slider 37. The flexible tab 90B is rooted on the front face of a wall 105B of the catch 51B disposed between the two cheeks 58B of the catch 51B.

The top crossmember 53B is configured so as to leave, behind the flexible tab 90B, a space 121 enabling the flexible tab 90B to flex towards the rear like the flexible tab 90 of the slider 37.

In general terms, the flexible tab 90B is disposed in the portion 50B of the chassis 50' at the same location as the flexible tab of the slider 37' in the portion 50A of the chassis 50', when the slider 37' is in the deployed position (see figure 14).

The key 38' is common to the catches 51A and 51B: the key 38' is centred on the longitudinal member 120 and is connected on a first side to the plate 57A of the catch 51A and on the second side to the plate 57B of the catch 51A.

The bottom crossmember 54' of the chassis 50' comprises a central plate 122 projecting towards the bottom of the bottom end of the longitudinal member 120 and extending on either side of the longitudinal member 120 towards to the respective lateral shields 52' over a certain distance. On each side, the plate 122 is connected to the corresponding lateral shield 52' by an angle member 123.

The plate 122 is disposed opposite the key 38'.

Just as the bottom crossmember 54 of the chassis 50 serves as an end-of-travel stop for the key 38 of the chassis 50, the plate 122 serves as an end-of-travel stop for the key 38'.

Exerting a rearwardly directed force on the key 38' conjointly flexes the catches 51A and 51B.

In general terms, the claw 35' is used like the claw 35, the tappets of the catch 51A and the flexible tab of the slider 37' cooperating with the tab 48A and the lug 49A while the tappets of the catch 51B and the flexible tab 90B of the catch 51B cooperate with the tab 48B and the lug 49B.

The locking in the service position procured by the catches 51A and 51B is particularly secure and makes it possible to withstand extremely high forces when the terminals of the appliance 10' are tightened; in particular by virtue of the presence of the two catches 51A and 51B.

It is advantageous, in order to simplify the claw 35', to use only one slider 37'.

In a variant that is not illustrated, the portions situated on either side of the central longitudinal member are identical and each receives a slider similar to the slider 37.

In another variant that is not illustrated, the portion of the claw such as 35 situated between the longitudinal member such as 120 and one of the lateral shields 52' is a simple strut (there is no catch such as the catch 51B).

The fact that the key 38' is common to the catches 51A and 51B simplifies control of the claw 35'.

In a variant that is not illustrated, each of the catches 51A and 51B has its own control key.

In a variant that is not illustrated, the chassis such as 50 or 50' of the claw such as 35 or 35' does not have a bottom crossmember such as 54 or 54'.

In a variant that is not illustrated, the carriage such as 36 or 36' is made not from moulded plastics material but another material, for example a folded metal strip, like the claw described in German patent application DE 44 39 672.

In other variants that are not illustrated, the appliance such as 10 or 10' is not a single-pole circuit breaker but a phase-neutral circuit breaker or even a three-phase circuit breaker or a modular appliance other than a circuit breaker, for example a differential switch or an appliance other than a protection appliance, for example a trip switch.

Numerous other variants are possible according to circumstances, and it should be stated in this regard that the invention is not limited to the examples described and depicted.