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DRAWINGS ATTACHED

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(54) CLAMP

(71) We, EMAIL LIMITED, a Company incorporated under the laws of the State of New South Wales, Commonwealth of Australia of Joynton Avenue, Waterloo, New South Wales 2017, Australia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to clamps for releasably securing together two separable components. Such clamps may be used, for example, to connect a so-called "clip-on" refrigeration unit to a shipping container.

It is an object of this invention to provide such a clamp which is simple yet effective in operation and is capable of rapid clamping and unclamping of the two components. Other preferred objects and advantages of the invention will be apparent from the following description.

According to the invention, a clamp for releasably securing together two separable components comprises,

(a) a body portion adapted to be mounted on one of the components,

(b) an elongate clamping member having an offset clamp pad, the member being supported by the body portion in such a manner as to be rotatable about its longitudinal axis as well as slideable movable in the direction of its axis between a retracted position at which the clamp pad is engageable with the other component to clamp the two components together and an extended position which permits release of the components from one another,

(c) biassing means operative when the clamping member is in the retracted position to exert a force on the clamping member so as to ensure that the clamp pad securely engages the other component,

(d) means for moving the clamping member between its retracted and extended positions and to render the biassing means operative when the clamping member is in the retracted position, and

(e) a projection on the clamping member for rotating the member and the body portion having a recess adapted to receive the projection when the clamping member is in the retracted position so as to prevent rotation of the clamp pad.

In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings in which:—

Figure 1 is a perspective view of a clamp according to one embodiment of the invention,

Figure 2 is a side elevational view of the clamp shown in Figure 1, and

Figure 3 is a partly sectioned plan view of the clamp shown in Figures 2 and 3.

In the drawings, the clamp 10 includes a body portion 11 having a substantially rectangular base 12 by means of which the clamp 10 may be secured to, for example, a refrigeration unit. The base 12 has a planar abutment surface 13 provided with spaced apart threaded apertures 14a for receiving bolts that secure the clamp 10 to the unit.

At one end, the front end, of the body portion 11 there is a mounting head 14 which extends outwardly from the side of the base 12 remote from the abutment surface 13 and at the other or rear end of the body there is a support head 15 which extends in the same direction as the mounting head 14, the purpose of which will be hereinafter apparent.

The mounting head 14 has a circular bore 16 therethrough the axis of which extends substantially parallel to the longitudinal axis of the base 12 and which supports an elongate clamping member 17 by means of a circular shaft portion 18 thereof which is slidable in the mounting head bore 16. An internal circumferential groove 19 is provided in the bore 16 to receive grease fed through a grease channel 20 through the outer portion of the mounting head 14 and which is closed by a known grease nipple 21.

Extending forwardly of the mounting head is a support channel 22 the inner shape of which corresponds to the bore 16 of the mounting head 14 so as to provide additional support for the shaft 18 of the clamping

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member 17, the shaft 18 terminating at its outer end with an offset clamp pad 23 which extends in a plane parallel to that of the mounting head 14. Adjacent the mounting head 14 and extending in the same direction is a locking head 24 which is bored to receive the clamping member shaft 18 therethrough, the bore being aligned with that of the mounting head. In this instance, the locking head 24 and mounting head 14 are joined together at the base-side periphery of their bores, the join 25 being contoured to provide additional support for the clamping member shaft 18. The locking head 24 is recessed at 26 to receive a turning pin 27 secured in a threaded recess in the clamping member shaft 18.

The rearward portion of the clamping member shaft 18 is positioned within a biasing means housing 28 located between the locking head 24 and the support head 15. The housing 28, is of hollow cylindrical form and its axis extends parallel to that of the clamping member shaft 18, the front end of the housing 28, that is, the end adjacent the locking head 24, is closed save for a central aperture through which the clamping member 18 closely fits. The rearward end 29 of the clamping member shaft 18 is of reduced diameter to provide a shoulder against which a retaining disc 31 bears and is held in position by a spring washer 32*a* and a pair of lock-nuts 30 engaged in a threaded portion of the end of the shaft 18, the shaft terminating short of the rearward end of the housing 28. Between the retaining disc 31 and the front end of the housing 28, a plurality of cupped spring washers 32 of the "BELLEVILLE" type are mounted on the clamping member shaft 18, adjacent washers being oppositely disposed so as to provide a spring biasing means as is clearly shown in Figure 3.

The rear end of the housing 28 is closed by a cylindrical plug 33 which is held in position by a link pin 34 which passes through aligned apertures 35 in the plug and diametrically opposed wall portions of the housing 28. The external wall portions surrounding the aligned apertures in the housing 28 are machined flat to provide respective bearing faces 36 for washers 37 interposed between the housing and respective connecting links 38 pivotally mounted on the outer ends of the link pin 34. The connecting links 38 extend rearwardly of the housing 28 and are pivotally connected to an operating means 39 for the clamp 10 which, in this instance, consists of a handle 40 pivotally mounted by one end to the support head 15 on the base 11 for movement about an axis 41 transverse to that of the clamping member shaft 18 and substantially parallel to the transverse axis of the base and also the axis of the link pin 34.

It is preferred that the lever portion 42 of the handle 40 is curved backwardly from the handle pivot 41 and inwardly towards the base 12 of the body portion 11. In this arrangement, the connecting links are pivotally connected to the respective sides of the handle rearwardly of the hande pivot 41. Adjacent and rearward of the connecting link pivot 41A is a trigger 43 pivotally mounted on the handle 40 about an axis 44 substantially parallel to that of the handle. The trigger 43 has a catch portion 45 urged into engagement with a retaining lip 46 on the support head 15 by spring means positioned between the handle 40 and the other end of the trigger 43.

With particular reference to Figure 1, the clamp 10 is shown mounted on the top corner of a refrigeration unit 47 and is employed to clamp the unit 47 to a container 48; there is a clamp 10 at each corner of the unit 47. In order to effect clamping, the safety triggers 43 of the various clamps are released and the handles 40 are moved outwardly so as to drive the clamp pads 23 to the outer position. The turning pins 27 are then rotated in the space between the locking head and mounting so as to turn the clamp pads through ninety degrees.

The unit 47 is then lifited and located against the container 48 so that the pads 23 may be located in the clamping holes 49. When the pads are properly located, the turning pins are returned to their original position — that is, in line with recesses 26.

The components of the clamp 10 are arranged in such a manner that when the free end of the lever portion of handle 40 is depressed towards the base 12, the connecting links move the housing 28 to a rearward position which in turn, through the action of the cupped spring washers 32, moves the clamping member 17 rearwardly to a retracted position at which the clamp pad 23 engages the container 48, to clamp the unit 47 and container 48 together, the bias spring means 32 ensuring that sufficient clamping force is provided by the clamp pad 23. When the clamping member 18 is in the retracted position, the trigger catch 43 engages the retaining lip 46 to lock the clamp in its clamped attitude.

Various modifications may be made in details of construction and design without departing from the scope of the invention, as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A clamp for releasably securing together two separable components comprising:

(a) a body portion adapted to be mounted on one of the components,

(b) an elongate clamping member having an offset clamp pad, the member being sup-

member 17, the shaft 18 terminating at its outer end with an offset clamp pad 23 which extends in a plane parallel to that of the mounting head 14. Adjacent the mounting head 14 and extending in the same direction is a locking head 24 which is bored to receive the clamping member shaft 18 therethrough, the bore being aligned with that of the mounting head. In this instance, the locking head 24 and mounting head 14 are joined together at the base-side periphery of their bores, the join 25 being contoured to provide additional support for the clamping member shaft 18. The locking head 24 is recessed at 26 to receive a turning pin 27 secured in a threaded recess in the clamping member shaft 18.

The rearward portion of the clamping member shaft 18 is positioned within a biasing means housing 28 located between the locking head 24 and the support head 15. The housing 28, is of hollow cylindrical form and its axis extends parallel to that of the clamping member shaft 18, the front end of the housing 28, that is, the end adjacent the locking head 24, is closed save for a central aperture through which the clamping member 18 closely fits. The rearward end 29 of the clamping member shaft 18 is of reduced diameter to provide a shoulder against which a retaining disc 31 bears and is held in position by a spring washer 32*a* and a pair of lock-nuts 30 engaged in a threaded portion of the end of the shaft 18, the shaft terminating short of the rearward end of the housing 28. Between the retaining disc 31 and the front end of the housing 28, a plurality of cupped spring washers 32 of the "BELLEVILLE" type are mounted on the clamping member shaft 18, adjacent washers being oppositely disposed so as to provide a spring biasing means as is clearly shown in Figure 3.

The rear end of the housing 28 is closed by a cylindrical plug 33 which is held in position by a link pin 34 which passes through aligned apertures 35 in the plug and diametrically opposed wall portions of the housing 28. The external wall portions surrounding the aligned apertures in the housing 28 are machined flat to provide respective bearing faces 36 for washers 37 interposed between the housing and respective connecting links 38 pivotally mounted on the outer ends of the link pin 34. The connecting links 38 extend rearwardly of the housing 28 and are pivotally connected to an operating means 39 for the clamp 10 which, in this instance, consists of a handle 40 pivotally mounted by one end to the support head 15 on the base 11 for movement about an axis 41 transverse to that of the clamping member shaft 18 and substantially parallel to the transverse axis of the base and also the axis of the link pin 34.

It is preferred that the lever portion 42 of the handle 40 is curved backwardly from the handle pivot 41 and inwardly towards the base 12 of the body portion 11. In this arrangement, the connecting links are pivotally connected to the respective sides of the handle rearwardly of the hande pivot 41. Adjacent and rearward of the connecting link pivot 41A is a trigger 43 pivotally mounted on the handle 40 about an axis 44 substantially parallel to that of the handle. The trigger 43 has a catch portion 45 urged into engagement with a retaining lip 46 on the support head 15 by spring means positioned between the handle 40 and the other end of the trigger 43.

With particular reference to Figure 1, the clamp 10 is shown mounted on the top corner of a refrigeration unit 47 and is employed to clamp the unit 47 to a container 48; there is a clamp 10 at each corner of the unit 47. In order to effect clamping, the safety triggers 43 of the various clamps are released and the handles 40 are moved outwardly so as to drive the clamp pads 23 to the outer position. The turning pins 27 are then rotated in the space between the locking head and mounting so as to turn the clamp pads through ninety degrees.

The unit 47 is then lifited and located against the container 48 so that the pads 23 may be located in the clamping holes 49. When the pads are properly located, the turning pins are returned to their original position — that is, in line with recesses 26.

The components of the clamp 10 are arranged in such a manner that when the free end of the lever portion of handle 40 is depressed towards the base 12, the connecting links move the housing 28 to a rearward position which in turn, through the action of the cupped spring washers 32, moves the clamping member 17 rearwardly to a retracted position at which the clamp pad 23 engages the container 48, to clamp the unit 47 and container 48 together, the bias spring means 32 ensuring that sufficient clamping force is provided by the clamp pad 23. When the clamping member 18 is in the retracted position, the trigger catch 43 engages the retaining lip 46 to lock the clamp in its clamped attitude.

Various modifications may be made in details of construction and design without departing from the scope of the invention, as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A clamp for releasably securing together two separable components comprising:

(a) a body portion adapted to be mounted on one of the components,

(b) an elongate clamping member having an offset clamp pad, the member being sup-

ported by the body portion in such a manner as to be rotatable about its longitudinal axis as well as slidably movable in the direction of its axis between a retracted position at which the clamp pad is engageable with the other component to clamp the two components together and an extended position which permits release of the components from one another,

(c) biassing means operative when the clamping member is in the retracted position to exert a force on the clamping member so as to ensure that the clamp pad securely engages the other component,

(d) means for moving the clamping member between its retracted and extended positions and to render the biassing means operative when the clamping member is in the retracted position, and

(e) a projection on the clamping member for rotating the member and the body portion having a recess adapted to receive the projection when the clamping member is in the retracted position so as to prevent rotation of the clamp pad.

2. A clamp as claimed in claim 1 wherein the projection on the clamping member comprises a turning pin extending radially outwardly thereof, and the body portion including a locking head which is recessed to receive the turning pin.

3. A clamp as claimed in claim 1 or 2 wherein the biassing means includes a housing around the end of the clamping member remote from the clamp pad and which is coupled thereto by spring means adapted to act on the clamping member so as to provide the clamping force.

4. A clamp as claimed in claim 3 wherein the spring means is constituted by a plurality of spring waashers positioned between the housing and a keeper on the clamping member.

5. A clamp as claimed in claim 3 or 4 wherein the means for moving the clamping member and rendering the biassing means operative is constituted by a handle pivotally mounted on the body portion and linked to the housing so that movement thereof causes movement of the housing which in turn moves the clamping member and when the clamp pad is held renders the biassing means operative to provide the clamping force.

6. A clamp as claimed in claim 5 and further including a safety catch for maintaining the handle in its clamping position.

7. A clamp for releasably securing together two separable components substantially as hereinbefore described with reference to the accompanying drawings.

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