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H. EASTMAN

2,381,340

CLAMPING DEVICE

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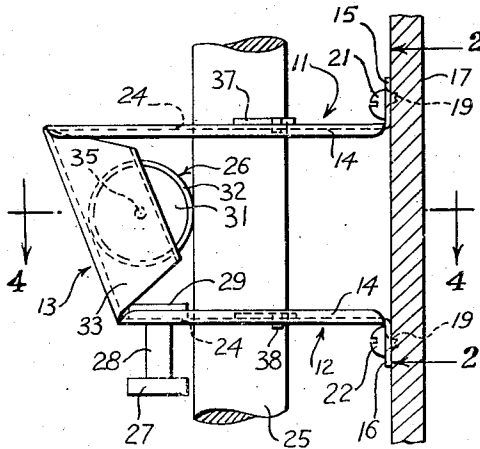


FIG. 1.

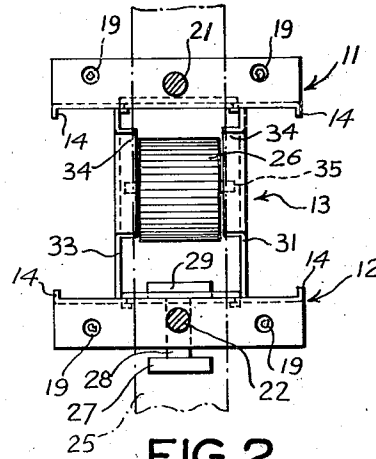


FIG. 2.

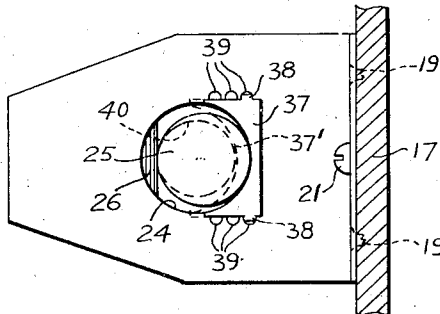


FIG. 3.

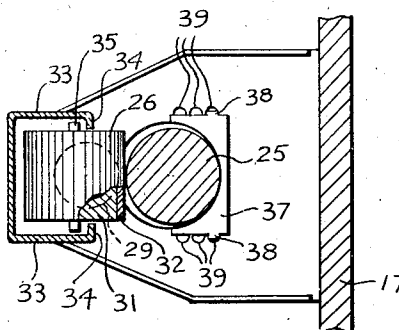


FIG. 4.

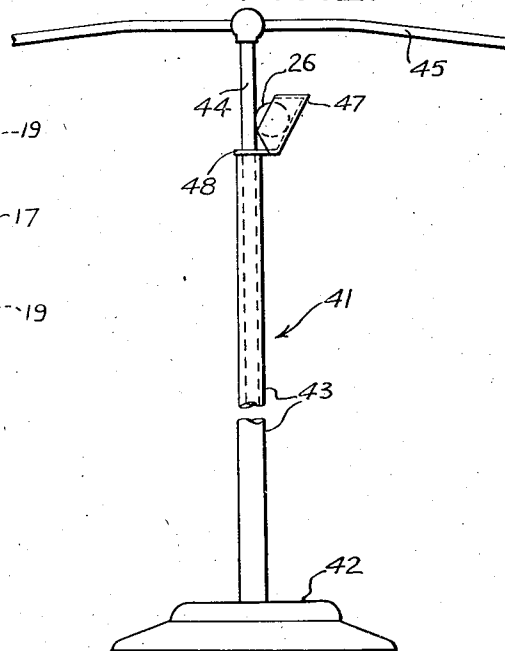


FIG. 5.

INVENTOR
HAROLD EASTMAN
BY *J. P. Brandenberg*
ATTORNEY

UNITED STATES PATENT OFFICE

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CLAMPING DEVICE

Harold Eastman, College Point, N. Y.

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6 Claims. (Cl. 24—244)

This invention relates to clamping devices, and more especially to automatic clamping means.

In its broadest aspects it is an object of the invention to provide an improved clamping device that permits an article to move in one direction, but grips the article fast when it starts to move in the other direction. Such clamping devices are useful for a wide variety of purposes, including clutches in various kinds of feed mechanisms.

The invention will be described, however, as embodied in a clamping device for supporting brooms, mops, and tools, or the like in a hanging position along a wall, door, or bulkhead.

The invention comprises a roller confined between a steeply inclined surface and the handle or other article that is to be clamped. The roller in traveling along the inclined surface is thrust against the article to be clamped and forces it against a fixed bearing or holder. Ordinarily the fixed holder is a part of the clamping device, but sometimes it is a bearing or support to which the roller and the inclined surface are connected as an attachment. The relation of the elements can be reversed so that the clamping device is movable into different positions on a fixed article or support.

Among the advantages of the invention are its simplicity, and the fact that it is economical to manufacture and convenient to use.

Other objects, features and advantages of the invention will appear or be pointed out as the specification proceeds.

In the accompanying drawing, forming a part hereof:

Fig. 1 is a side elevation of a clamping device embodying the invention.

Fig. 2 is an end view of the clamping device viewed from the plane 2—2 of Fig. 1.

Fig. 3 is a top plan view of the device shown in Figs. 1 and 2.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a view, on a reduced scale, showing a modified form of the invention.

The device shown in Figs. 1—4 has a frame that includes an upper portion 11, a lower portion 12, and an inclined connecting part 13. The frame is preferably of integral construction and can be advantageously made of sheet metal. The drawing shows a sheet-metal construction with the edges of the metal bent over to form beads or flanges 14 that stiffen the frame.

The upper portion 11 of the frame has an up-turned end 15, and the lower portion 12 has a

similar but down-turned end 16, for connecting the frame to a wall 17 or other support. The frame can be held with only two screws by punching the metal to form prongs 19 in the ends 15 and 16. These prongs are made sharp enough so that they can be hammered into the wall 17 and will keep the ends 15 and 16 from turning about center screws 21 and 22, respectively, when a single center screw is used to connect each of the ends 15, 16 to the wall. If the frame is made without the prongs 19, two screws can be used to hold each of the ends 15, 16. The advantage of connecting each end 15 or 16 to the wall in such a manner that it cannot turn on the wall, is that the structure will resist distortion with a lighter frame than would otherwise be the case.

There are vertically alined openings 24 in the upper and lower portions of the frame. A broom handle 25, or other article to be held, is put through the openings 24. A roller 26, located between the handle 25 and the steeply-inclined inner face of the connecting part 13, jams the handle 25 against the back wall of each of the openings 24. Downward pull on the handle 25 tends to roll the roller 26 further down the inclined inner face of the connecting part 13, and causes the roller to jam the handle 25 against the back of each of the openings 24 with greater force.

The handle 25 is thus locked against downward movement, but can be pushed up to any desired higher level and it will be automatically locked at such level. The handle 25 can be released at any time by merely pushing the roller 26 up the inclined face. A button 27 is provided for raising the roller to withdraw it from the handle 25 or other article against which it may be clamped. The button 27 is secured to the lower end of a stem 28 that extends through a hole in the lower portion 12 of the frame, and there is a head 29 on the stem 28 for contact with the bottom of the roller.

Various materials are suitable for the roller 26. One important consideration is that it must be strong enough so that it will not collapse or crush under the load imposed upon it when wedged between the inclined face of the connecting part 13 and the handle of a heavy article. On the other hand, the roller should not be so hard as to resist all deformation or its contact with the handle 25 will be too small to obtain sufficient friction to prevent the handle from slipping on the roller. Good results have been obtained with cork rollers, but I prefer to use a

wooden roller with a rubber cover. Fig. 4 shows the roller constructed with a wooden core 31 and a rubber cover 32 that has a corrugated outside surface.

The connecting part 13 between the upper and lower portions of the frame is made with side walls 33 that extend rearwardly for a distance somewhat greater than the radius of the roller 26. The walls 33 have inturned edges 34, and the clearance between the ends of the inturned edges 34 is slightly greater than the length of the roller 26. A pin 35 on the axis of the roller projects for a short distance beyond the ends of the roller 26.

The roller 26 is retained in the clamping device by the projecting ends of the pin 35 that strike against the inturned edges 34 to limit rearward displacement of the roller 26 when there is no handle 25 or other article in the device for the roller 26 to clamp against. Endwise displacement of the roller 26 may be limited by having the ends of the pin 35 strike against the side walls 33, or when a shorter pin is used, by letting the ends of the roller 26 contact with the ends of inturned edges 34, as in the illustrated construction.

With any given size of openings 24, the range of size of handles or other articles that the device can hold is limited by the component of fore and aft (horizontal) movement of the roller 26 during its travel from one end to the other of the inclined inner face of the connecting part 13 of the frame.

In order to increase the range of size of articles for which the clamping device is suitable, the embodiment of the invention illustrated in the drawing is provided with filler plates 37 for reducing the size of the openings 24. Each filler plate 37 preferably has an arcuate recess at one end corresponding with the shape of the opening 24, but other shapes can be used. The plate 37 is somewhat wider than the opening 24 and extends across the rearward side of the opening. There is a tab 38 projecting downward from each end of each of the filler plates 37, and these tabs project into holes 39 and are preferably bent under to secure the filler plate in position. There is a row of holes 39 in the upper and lower portions 11, 12 at each end of the filler plates 37. The tabs 38 of the filler plates are inserted in different ones of these holes 39, depending upon the size of handle with which the device is intended to be used.

Fig. 3 shows in dotted lines 37' the position that the front face of the filler plate 37 would occupy if the tabs 38 of the filler plate had been put one hole further forward in the rows of holes 39. With the filler plate in such a position the clamping device could be used for clamping a handle 40, which is of much smaller diameter than the handle 25.

Fig. 5 shows a modified form of the invention. A T-stand 41 includes a base 42 with an upstanding sleeve 43 in which a stem 44 of the T-stand slides to adjust the height of the cross-bar 45 of the stand. When such a stand is equipped with a set-screw for holding the stem 44 at the desired height, as in the prior art, it has been necessary to release the set-screw every time the height is to be adjusted.

A housing 47, similar in construction to the connecting part 13 of Figs. 1-4, is secured to the top of the sleeve 43 by a bracket 48. The roller 26 jams the stem 44 against the side of the sleeve 43 with enough force to prevent the stem from

sliding in the sleeve. The long bearing in the sleeve 43 takes the place of the bearing surfaces that are provided by the rearward sides of the openings 24 above and below the roller in the form of the invention shown in Figs. 1-4.

Other modifications can be made and the clamping device can be used for various purposes. The position of the parts is inverted when the frame that carries the roller is the vertically movable element on an upright that is fixed, but otherwise similar to the handle 25. Some features of the invention can be used without others.

I claim:

1. A clamping device including a frame having upper and lower portions with aligned openings for receiving the element to be clamped, and having a connecting part joining the forward ends of said upper and lower portions, the upper portion of the frame being longer than the lower portion so that said connecting part provides a surface extending at an incline to the axis of said openings, flanges on the upper and lower portions of the frame constructed and arranged to connect the frame with a wall or other structure, a roller in position to roll up and down the inclined surface, said roller being of such diameter that it extends into the space between the aligned openings when at one end of the inclined surface, and means for holding the roller within the frame.

2. A clamping device comprising a one-piece sheet-metal frame having an upper portion that is generally horizontal and that bends downward at its forward end to form a connecting part of the frame, said connecting part being bent forward at its lower end to form a generally horizontal lower portion of the frame, the upper and lower portions of the frame having aligned openings for receiving an element to be clamped, the upper portion being longer than the lower portion so that the connecting part is inclined and forms acute and obtuse angles with said upper and lower portions respectively, a roller that rolls up and down the inclined surface of the connecting part of the frame, side walls formed by turned-up extensions of said connecting part, and turned-in edges of the side walls for retaining the roller in the frame.

3. A clamping device comprising a one-piece sheet-metal frame having upper and lower portions that are generally parallel and through which are aligned openings for receiving an element to be clamped, a connecting part joining the forward ends of the upper and lower portions of the frame, said connecting part having an inclined wall forming acute and obtuse angles with said upper and lower portions respectively, a cylindrical roller comprising a wooden core, a rubber cover on said core, and axial extensions projecting from either end of the roller, and generally parallel side walls formed by turned-up extensions of said inclined wall positioned just beyond the ends of the axial extensions of the roller, said side walls having turned-in edges with which the axial extensions of the roller contact to limit movement of the roller away from the inclined surface, said upper and lower portions of the frame serving as abutments for limiting the up and down movement of the roller, said roller being of such diameter that it just reaches to the space between the aligned openings when the roller is against the inclined wall and in a position intermediate the ends of said inclined wall, and filler means on the sides of

said openings away from the roller for varying the size of said openings.

4. A clamping device comprising a housing, one wall of which has an inclined surface, a cylindrical roller that moves along the inclined surface, axial extensions projecting from either end of the roller, side walls on the housing extending up from the inclined surface just beyond the ends of the axial extensions for limiting longitudinal displacement of the roller, and rearward walls extending for a limited distance from the rearward ends of the side walls, said rearward walls extending across the back of the axial extensions of the roller to limit movement of the roller away from the inclined surface.

5. A clamping device including a bracket for connection with the upper end of an elongated bearing in which a stem slides, a housing connecting with the bracket and having a wall that extends upward at an incline away from the stem, top and bottom walls at the upper and lower ends respectively of the inclined wall, a

roller that has a diameter greater than the distance from the stem to the lower end of the inclined wall but less than the distance from the stem to the upper end of the inclined wall, and side walls on the housing at opposite ends of the roller for holding the roller against endwise displacement.

6. A clamping device comprising a cylindrical roller, a sheet-metal housing in which the roller is held, said housing having an inclined wall on which the roller rolls up and down, side walls formed by turned-up extensions of the inclined wall for limiting endwise displacement of the roller, upper and lower horizontal walls similarly formed by turned-up extensions of the inclined wall, at least one of said horizontal walls extending rearwardly and forming a connection for holding the roller housing in a definite spaced relation to a bearing through which the article to be clamped extends.

HAROLD EASTMAN.