

Oct. 7, 1958

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2,855,167

AXIALLY OPERATING CLAMP

Filed Oct. 3, 1955

2 Sheets-Sheet 1

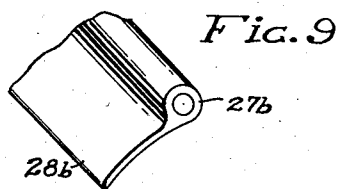
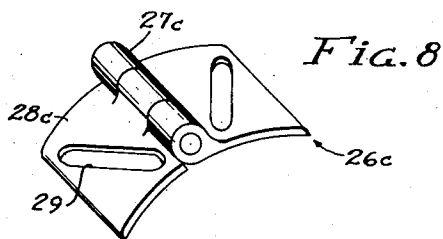
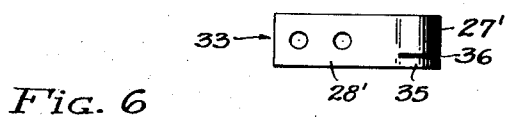
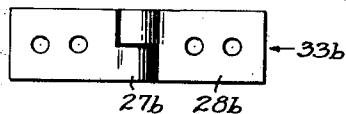
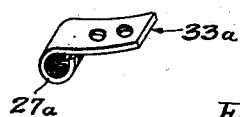
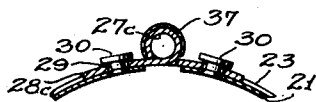
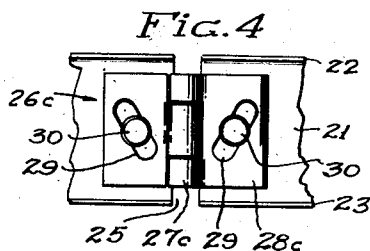
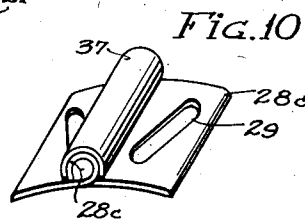
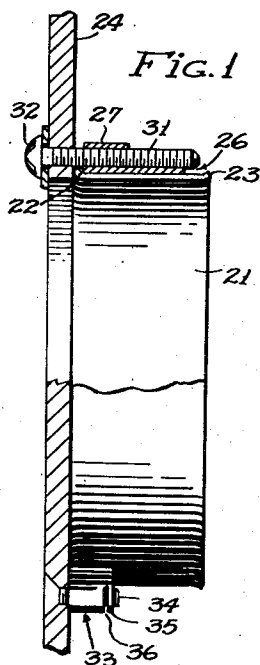
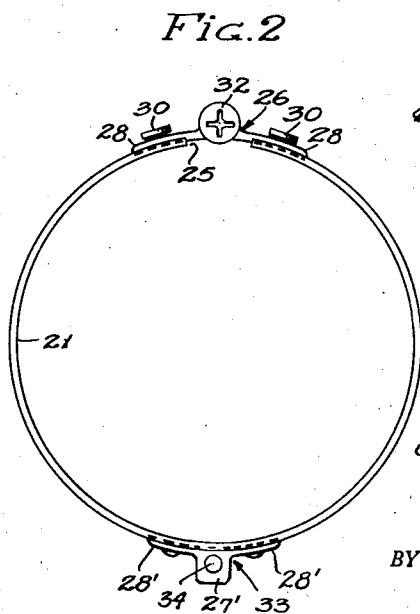
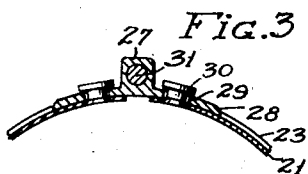


Fig. 5

Fig. 7



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Fig. 12

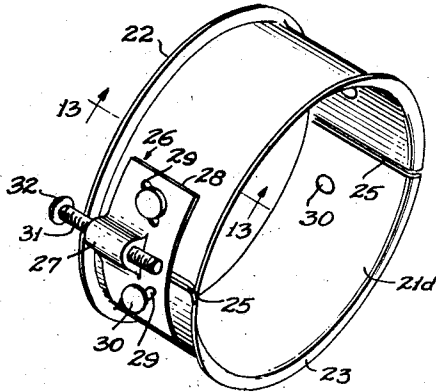


Fig. 13

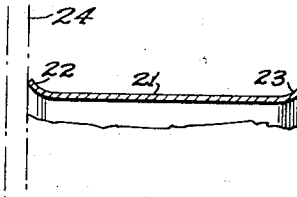


Fig. 15

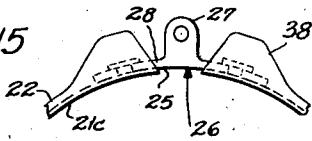
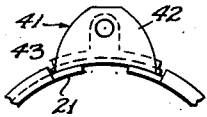


Fig. 17

Fig. 15a

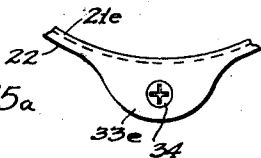


Fig. 19

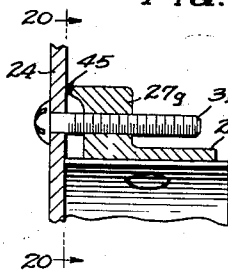


Fig. 20

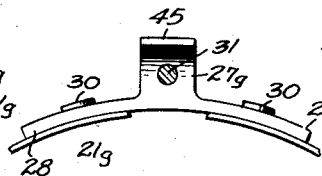


Fig. 14

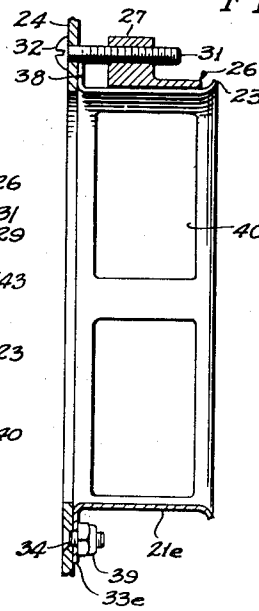


Fig. 16

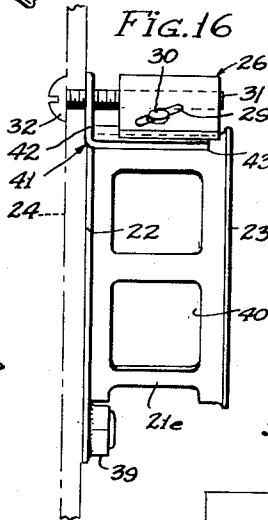
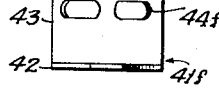
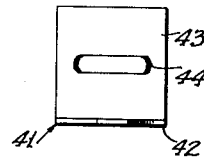


Fig. 18a

Fig. 18



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2,855,167

AXIALLY OPERATING CLAMP

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Application October 3, 1955, Serial No. 538,130

2 Claims. (Cl. 248—27)

This invention relates to band clamps of the axially-operable type, suitable particularly for use as instrument clamps for mounting instruments and other objects on a panel (e. g. an instrument panel). The general object of the invention is to provide an improved instrument clamp of extremely simple yet effective construction and operation.

Specifically, the invention contemplates an instrument clamp comprising simply a band having one side margin adapted to bear against the mounting panel while an arcuate connector shoe is drawn axially against the gapping ends of the clamp with a camming action operable to draw them together, such axial movement being developed by an actuator screw which has a head bearing against the opposite side of the panel and a shank extending through the panel and threaded into the connector shoe.

Other objects will become apparent in the ensuing specifications and appended drawing in which:

Fig. 1 is a sectional view of an instrument panel, mounting a clamp, shown partly broken away and in section, embodying the invention;

Fig. 2 is a front side view of the clamp;

Fig. 3 is a fragmentary sectional view thereof, taken in the plane of the clamp band;

Fig. 4 is a fragmentary plan view of a modified form of the invention;

Fig. 5 is a detail plan view of the anchor fitting of the clamp;

Fig. 6 is a detail perspective view of a modified form of the actuator fitting;

Fig. 7 is a plan view of another modified form of the anchor fitting;

Fig. 8 is a perspective view of a modified form of the connector shoe;

Fig. 9 is a fragmentary sectional view of an extruded section employed in fabricating the shoe of Fig. 8;

Fig. 10 is a perspective view of another modified form of the connector shoe;

Fig. 11 is a fragmentary sectional view of a clamp embodying the connector shoe of Fig. 10;

Fig. 12 is a perspective view of an instrument clamp embodying the invention;

Fig. 13 is a fragmentary sectional view thereof;

Fig. 14 is a vertical axial sectional view of a mounted clamp embodying a further modified form of the invention;

Figs. 15 and 15a are fragmentary portions of a front side view of the same;

Fig. 16 is a sectional view of another modified form of the invention;

Fig. 17 is a fragmentary front view thereof;

Fig. 18 is a plan view of the fulcrum yoke of Fig. 16;

Fig. 18a is a plan view of a fulcrum yoke of modified form;

Fig. 19 is a front side view of another modified form of the clamp with the actuator screw shown in section; and

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Fig. 20 is a front side view of another modified form of the invention.

The invention as shown broadly in Figs. 1-3 and 5

Referring now to the drawings in detail, I have shown in Figs. 1-3 and 5, as an example of a form in which the invention in its broader aspects may be embodied, an instrument clamp comprising a generally cylindrical band 21 of shallow rolled channel section, having front and back side flanges 22 and 23 projecting radially outwardly. Front side flange 22 is adapted to bear against the rear face of a mounting panel 24. The cross-sectional shape of band 21 is shown in enlarged detail in Fig. 13.

The ends of band 21 are separated by a gap 25 which is bridged by a connector shoe 26. Shoe 26 comprises a central sleeve 27 having a threaded bore, and a pair of wings 28 extending circumferentially therefrom and provided with respective diagonal slots 29. The shoe 26 of Figs. 1-3 may be the same as the shoe 26 disclosed in Fig. 12. Connector buttons 30, each having a neck extending through a respective slot 29 and riveted into a respective end portion of the clamp band 21, and a head bearing against a respective wing 28 of the connector shoe, provide camming connections between the connector shoe and the ends of band 21 such that, as the shoe is drawn toward the panel 24, the ends of the band will be drawn together.

An actuator screw 31 is threaded into sleeve 27, passes through an aperture in panel 24, and has a head 32 bearing against the forward face of panel 24 whereby, as the screw is rotated in the advancing direction, the respective connector shoe 26 will be drawn toward flange 22 which bears against the rear face of the mounting panel. The camming action of the edges of slots 29 against buttons 30 will then close the gap between the ends of band segments 21, thus tightening the clamp around the instrument or other object that is to be mounted to the panel.

The shoe 26 is easily and inexpensively fabricated as a part cut from a length of extruded section, with the slots 29 and the bore in sleeve 27 being subsequently machined by routing, boring and tapping, and the end of sleeve 27 being optionally milled off to effect the shortened form shown. One of the shoes 26 is shown in perspective in Fig. 12.

Diametrically opposite gap 25 and connector 26, an anchor fitting 33 is attached (e. g. by rivets extending through circumferential ears 28' thereof) to band 21 over flange 22, with one end flush with flange 22 so as to bear against panel 24. Fitting 33 provides an anchor connection by insertion of a screw 34 through the panel and threading the same into a threaded bore provided in its sleeve body portion 27'. Thus the clamp remains attached to the panel when actuator screw 31 is backed off to loosen the split side of the clamp. Fitting 33 has, adjacent its other end, an integral locking tab 35, defined by a slot 36 cut through sleeve body 27' to the full diameter of its bore. Tab 35 will lock against the thread of screw 34 when the latter is drawn tight.

Fitting 33 may be of the same cross-sectional shape as connector 26, so that both parts may be fabricated from the same extruded section. The fitting 33 is shown in plane in Fig. 5.

Modified form—Fig. 6

Fig. 6 discloses how the anchor fitting 33a may be fabricated by rolling an eye 27a on one end of a short length of strap metal, then tapping the opening formed in the eye.

Modified form—Fig. 7

As shown in Fig. 7, the anchor fitting 33b may comprise two complementary sections, each having an eye 27b extending half the width of the ear part 28b and de-

fining a notch in which the eye of the complementary section is received so that the two eyes are aligned to both receive the anchor screw 34.

Modified form—Figs. 4 and 8

Figs. 4 and 8 show how the connector shoe 26c may likewise be fabricated in mating sections, with aligned sleeve sections 27c to receive actuator screw 31.

Fig. 9 illustrates an extruded section (e. g. of aluminum) from which the sections of anchor fittings 33, 33b and connector shoe 26c may be fabricated by cut-off, milling, tapping and routing operations.

Modified form—Figs. 10, 11

A sectional connector shoe such as that shown in Fig. 8, or one similar except for being fabricated by curling from strap material, may have its sections clipped together by a clip 37 of channel section, of cylindrical form through approximately 210°, as shown in Figs. 10 and 11. The clip 37 holds the operable side of the clamp in assembly prior to insertion of actuator screw 31, or after its removal, for better handling of the clamp when it is being mounted on or detached from panel 24.

Modified form—Fig. 12

As shown in Fig. 12, the clamp may comprise two separate band segments 21d, each of approximately 180° arcuate extent, and two of the connector shoes 26 may be employed for attaching the clamp to a panel, and for drawing the clamp tight around an object mounted therein. The anchor fitting 33 is replaced by one of the connector shoes 26.

Modified form—Figs. 14, 15, 15a

Figs. 14, 15, 15a disclose an improvement in the clamp, embodied in fulcrum pads 38 formed as radial extensions of marginal flange 22 on opposite sides of gap 25 in clamp band 21e. Pads 38 extend the same radius from the clamp axis, as actuator screw 31, and balance out the couple set up by the opposing forces acting at the screw axis and at flange 22, between the clamp and the panel 24, when actuator screw 31 is tightened.

Pads 38, bearing against panel 24 on opposite sides of screw 31, minimize distortion in the clamp and in the panel, as axial loads are imposed in the tightening of actuator screw 31.

In this form of the invention is another modification. An apertured anchor ear 33e, projecting radially as an integral extension of flange 22 at a point diametrically opposite gap 25, is substituted for anchor fitting 33. To the rear face of ear 33e, coaxial with the aperture therein, is secured, as by brazing, a nut 39 into which anchor screw 34 is threaded.

As shown in Fig. 14, band 21e may be of lattice form, with circumferentially spaced apertures 40 therein, to reduce weight without reducing strength.

Modified form—Figs. 16-18

Fig. 16 illustrates another improvement utilizing a separate fulcrum bracket 41 (instead of ears 38) including a radial ear 42 and an arcuate yoke portion 43 (Fig. 18) having a slot 44 extending circumferentially. Yoke 43 bears against the opposed end portions of band 21, and is interposed between the band and the connector shoe 26.

Buttons 39, engaged in slot 44, position ear 42 in the plane of flange 22 and connect the bracket 41 to band 21e in a manner restraining relative axial movement be-

tween the parts while allowing the band ends to freely move toward and from one another circumferentially. The bracket 41 thus transmits to panel 24 the reaction load developed in drawing connector shoe 26 toward the panel to tighten the clamp.

Fig. 18a shows a modified fulcrum bracket 41f having two slots 44f instead of the single slot 44.

Bracket 41 functions to reinforce and stiffen the clamp and at the same time, prevents distortion of either the clamp or the instrument panel when the clamp is tightened.

Modified form—Figs. 19, 20

Figs. 19 and 20 disclose how the reaction load may be distributed radially between the edge of clamp band 21g and a finger 45 projecting axially from sleeve body 27g of connector shoe 26g.

I claim:

1. A clamp for mounting an object to a panel, comprising a band having two ends and two substantially parallel side edges which define the band as being of substantially uniform width, one of said edges being a forward edge for engagement with one face of the panel, the band being disposed in generally cylindrical form for encircling the object with the ends of the band being separated to provide a gap, and means for drawing said ends toward each other to constrict the band around the object, said means comprising a connector shoe disposed to span said gap, the shoe comprising a nut portion having a threaded bore formed therein and extending parallel to the clamp axis, and a pair of wings extending oppositely to each other from the nut portion, each wing having a face in slidable engagement with portions of the surface of the band adjacent said band ends respectively, each wing having an elongated slot formed therein, the slots each having a forward end and a rearward end, the slots being spaced apart a greater distance at their forward ends than at their rearward ends, said means further comprising a pair of connector buttons anchored to the band adjacent the band ends respectively, and extending from the surface of the band and through said slots respectively, the slots being of a length sufficient that the shoe may move forwardly of the band but not substantially forwardly of the plane of the forward edge of the band, and an actuator screw having a shank and a head, the shank being threadably received in said bore and of sufficient length to extend forwardly of said forward edge, said head being on the forward end of said shank whereby when the shank is passed through the panel into the bore, rotation of the screw will cause engagement of the screw head against that face of the panel opposite said band engaging face and will draw the connector shoe in a direction toward the panel engaging edge thereby to effect a camming action between the wing slots and the connector buttons to draw the band ends toward each other.

2. A clamp as defined in claim 1 wherein said wings slidably engage the outer surface of said band.

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