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W. L. EGY

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INSTRUMENT CASE

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2 Sheets-Sheet 1



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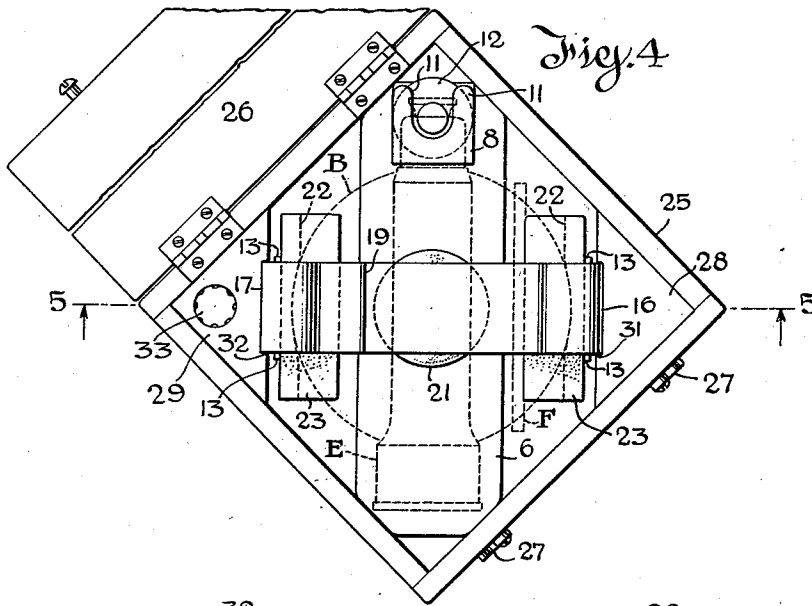
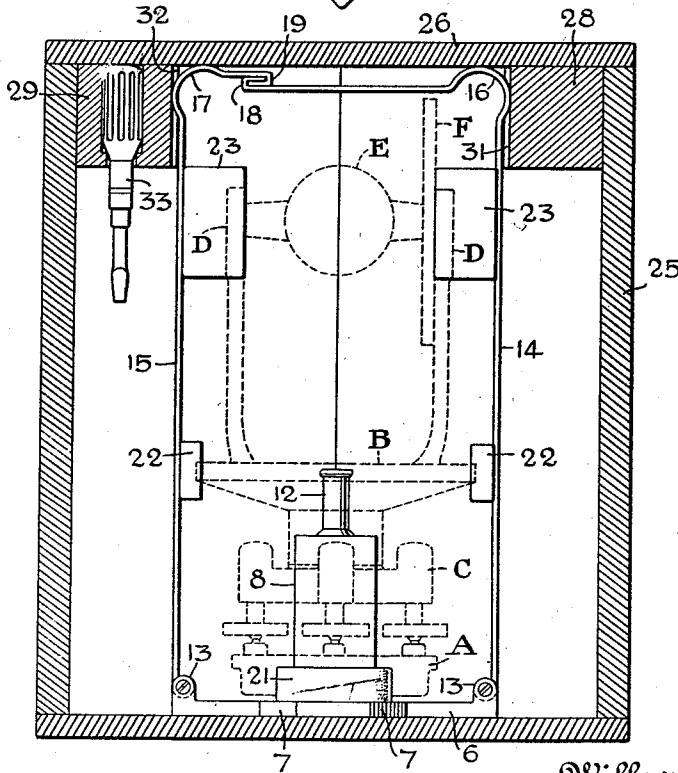


Fig. 5



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UNITED STATES PATENT OFFICE

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INSTRUMENT CASE

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2 Claims. (Cl. 206—1)

This invention relates to means for safely carrying delicate devices, particularly optical instruments having delicate precision bearings; for example, surveyors' instruments. The embodiment of the invention in form for use with a transit has been chosen for illustration because this brings into play a rather large number of important factors.

Heretofore, two methods have been used in casing such instruments. The first is to screw the instrument base on a block, set the clamps, and fasten the block in the case. The second method is to place the instrument in the case with a number of specially formed and precisely located blocks which support it at critical points, so that no clamps are set and the instrument is protected from destructive stresses.

The first method is unsatisfactory because it offers no protection. The second is effective but is expensive and inconvenient. It requires close fitting and careful placement of the blocks. Swelling and shrinkage consequent upon changes of atmospheric humidity are beyond reasonable limits, and the use of sectional blocks with adjusting means or spring expanders has not proved satisfactory.

The present invention provides a simple metal carrying yoke in which the instrument is yieldingly supported by resilient confining pads which engage and support the important components of the instrument. This affords a safe means to carry the instrument uncased. The yoke may readily be so formed as to guide the instrument into a carrying case (of wood or metal) and to fit the case when inserted. Thus, the case positively positions the yoke and the yoke yieldingly supports the instrument at all important points, so that it is protected against stresses which might be occasioned by rough handling.

Application of the yoke and insertion of the yoke into the carrying case can be easily and quickly performed. The instrument is better protected and the expense is less than that of properly fitted blocks.

A typical embodiment for carrying a transit is illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of the complete yoke, latched.

Fig. 2 is a vertical axial section through the yoke of Fig. 1. The instrument is outlined in dotted lines.

Fig. 3 is a fragmentary view, showing the yoke unlatched.

Fig. 4 is a plan view of a carrying case with the

lid open and the yoke in place in the case. The instrument is outlined in dotted lines; and

Fig. 5 is a section on the line 5—5 of Fig. 4.

The yoke shown complete in Fig. 1 is formed of a strong aluminum base alloy with pads of sponge or cellular "neoprene," that being the commercial name of a synthetic rubber substitute having better chemical and physical properties than rubber, for this particular use.

There is a cruciform plate base 6 with one long and one shorter cross element. The longer cross element has chamfered corners 7 at its opposite ends which fit diagonally opposite corners of the carrying case (see Fig. 4). At one end is a clip 8 having socket 9 and spring fingers 11 to hold a plumb-bob 12 (Fig. 2).

The shorter cross element has at each outer end two hinge lugs 13, to pairs of which are hinged the two vertical side members 14 and 15. These are outwardly bowed at 16 and 17 and bent inward. At their ends they have mating hooks 18 and 19. These hooks engage each other closely and rather deeply, so that when the two side members are latched as shown in Fig. 1, they sustain one another against swinging on their hinge lugs.

At the center of the base plate 6 is a pad 21 of cellular neoprene. This enters and rather closely fits the threaded recess in the base A of the instrument (i. e., the lower member of the leveling head). The pad is deeper than the recess and so holds base A above plate 6 (see Fig. 2).

Attached to corresponding side members 14 and 15 are elongated cellular neoprene pads 22 which engage opposite sides of the base plate B of the transit frame. This cushions from lateral shock the vertical axis of the instrument which is carried by the upper member C of the leveling head. Such axis includes the quill which carries the horizontal limb and the vertical spindle on base B.

Higher up on members 14 and 15 are two pads 23 each recessed at 24 to receive and confine a corresponding one of the trunnion bearings D for the telescope E. The pads 23 thus sustain the upper end of the transit frame in all lateral directions, and since the trunnions positively space the horizontal bearings, the pads 23 can be tightly clamped against the bearings. One pad engages the guard F which protects the vertical limb. The ends of the trunnions are exposed and protect beyond their bearings so that the pads exert some frictional restraint in motion of the telescope on the horizontal axis, by their engagement with the ends of the trunnions.

To engage the hooks 18, 19 after the instrument is set on the base, it is necessary merely to spring the side members 14 and 15 toward each other and cause the hooks to ride over each other and engage.

At such time, major structural components of the instrument are resiliently supported in a way that protects the frame structure and, consequently, the bearings and telescope carried thereby from shock. The yoke offers at its top a convenient hand-hold.

Referring to Figs. 4 and 5, the carrying case 25 is shown square in horizontal section and has a hinged lid 26 which may be held closed by hooks 27. In two opposite corners are fixed triangular blocks 28, 29, notched at 31, 32 to confine the bowed upper ends 16, 17 of the side members 14, 15.

The base plate 6 rests on the bottom of the case and the chamfered ends 7 fit the side walls of the case closely near two opposite corners. Hence, it is positively positioned. The lid 26 engages the tops of bows 16 and 17 which are laterally confined in notches 31, 32. Thus, the yoke slides freely to position in the case and closure of the lid confines it positively against motion relatively to the case.

A socket for a screw driver 33 is formed in block 29.

Details of form and dimension can be modified to suit particular instruments, and adaptations can be made to suit instruments such as theodolites, levels and the like. The important thing is that the yoke engage the instrument frame in such a way as to protect bearings from shock, and cushion the entire instrument.

What is claimed is:

1. Transporting means for an optical instrument of the type including a base, a frame supported by said base, and a telescope mounted in the frame on bearings, said transporting means

comprising relatively movable and releasably connected base and side members forming a yoke adapted to be clamped about the instrument; and at least two sets of resilient pads secured to the inner faces of the yoke forming members, one of which sets of pads is positioned on the base of the yoke and cooperates with the base of the instrument to support and laterally confine said base, and the other of which sets of pads comprises a pair which are opposed to each other and recessed on their opposed surfaces, the last named pads being carried by said side members near the upper ends thereof, the recesses serving to receive and confine the bearings against upward and lateral movement.

2. Transporting means for an optical instrument of the type including a base, a frame rotatable thereon on a vertical axis and a telescope mounted on the frame on horizontal trunnion bearings, said transporting means comprising relatively movable and releasably connected base and side members forming a yoke adapted to be clamped about the instrument; and at least three sets of resilient pads secured to the inner faces of the yoke forming members, one of which sets of pads is positioned on the base of the yoke and cooperates with the base of the instrument to support and laterally confine said base, another of which sets of pads is medially positioned on said side members and serves to confine the frame against lateral deflection near the horizontal plane of the upper end of the vertical axis of the instrument, and the third of which sets of pads comprises an opposed pair which are recessed on their opposed surfaces, the last named pads being carried by said side members near the upper ends thereof, the recesses serving to receive and confine the trunnion bearings of the instrument against upward and lateral motion.

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