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PILOT'S KNEE BOARD

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2 Sheets-Sheet 2

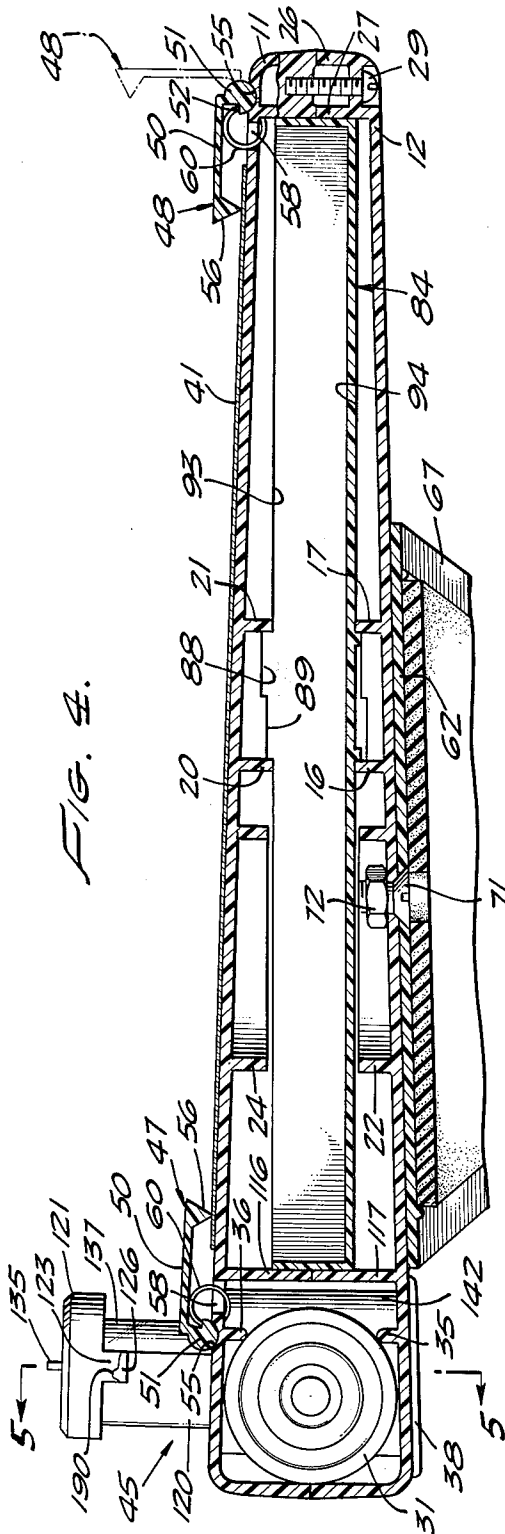


FIG. 4.

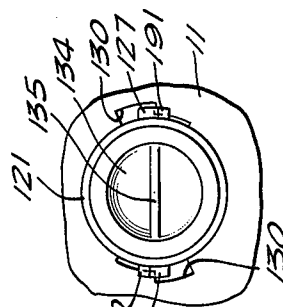


FIG. 6.

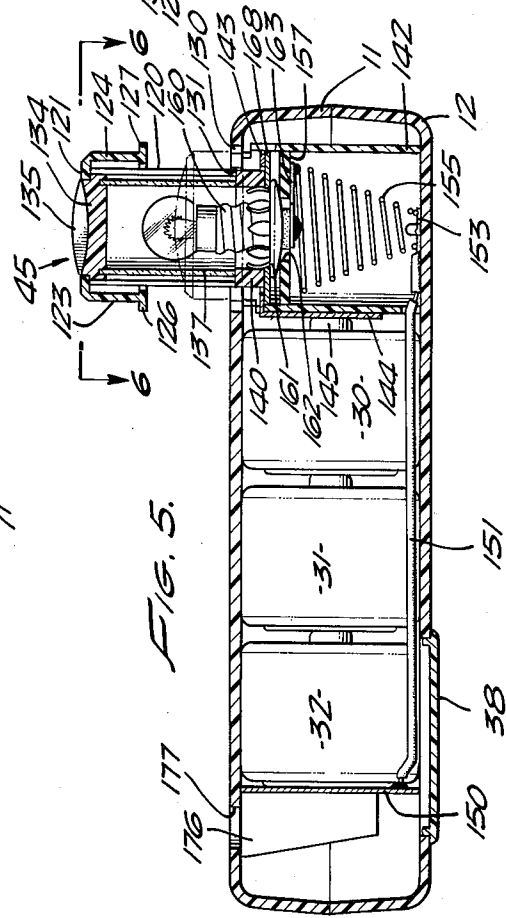


FIG. 5.

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PILOT'S KNEE BOARD

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This invention relates to a chart of plotting board and more particularly a pilot's knee board. This is a type of plotting board in the form of a platform which can be strapped to a pilot's leg to have it in a convenient position for usage while flying.

While in flight it is usually, or often necessary, to perform piloting and navigational computations and to do plotting as well as keeping a flight log. It is necessary to have conveniently at hand a suitable table or platform or board on which to do this work. It is also necessary to have conveniently at hand certain accessories necessary to perform these operations. Boards of this type are usually equipped with means whereby they can be strapped to the pilot's leg so that they are conveniently and handily available. It is, of course, desirable that such boards and the associated accessories be so constructed and arranged that the pilot's attention is diverted and distracted from actual flying as little as possible. The board and its associated accessories should be such as to require a minimum of attention from the pilot and yet the board itself and the accessories should at all times be readily and conveniently available for utilization. The realization of these objectives, of course, requires that the board itself and the arrangement of the associated accessories embody the utmost in simplicity so that the purpose will be realized of not causing the pilot's attention to be unduly diverted from actually flying.

The primary object of this invention is to provide a unique and improved knee board and associated accessories whereby to achieve and realize the foregoing stated purposes in a most efficacious manner.

In a preferred form of the invention the knee board is made of light weight, but durable plastic material and embodies a drawer that can be drawn out laterally in either direction and which is held by detents in the retracted position and also in the extended position. The drawer is formed to hold charts and plotting forms.

Combined with the board and drawer are particular features and arrangements whereby the objectives stated in the foregoing are realized. A self-contained and retractable light and light holder are provided for providing for light while working on the board. The source of power for the light is within the board itself and this may be batteries or preferably alkaline energizers. The retractable and extendible light holder embodies means to automatically turn the light off when the holder is retracted so as thereby to conserve the batteries and substantially reduce the number of battery replacements. The light holder embodies simplified means whereby the illumination emitted may be very simply changed from one color to another such as from white light to a dimmer illumination such as red light.

Novel and simplified one hand clips are provided in combination with the working surface of the board for holding papers on it, the clips being one-handed in the sense that they will retain themselves in the open position if desired so that only one hand is required to operate them either for clipping a paper to the board or for releasing a paper leaving the pilot's other hand free for flying.

Preferably the board has a swivel mount on the means for securing it to the pilot's leg or knee so that it can be conveniently angularly rotated to any desired working or writing position.

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From the foregoing it may be observed that the board embodies a particularized construction, assembly and arrangement of specific parts whereby the maximum of utility, convenience and adaptability are realized in meeting the foregoing stated purposes.

Further objects of the invention and many additional specific advantages thereof will become apparent from the following detailed description and annexed drawings wherein:

FIGURE 1 is a perspective view of a preferred form of the invention;

FIGURE 2 is a sectional view taken along the line 2-2 of FIGURE 1;

FIGURE 2A is a detail view of the underside of one corner of the drawer.

FIGURE 3 is a detail view taken along the line 3-3 of FIGURE 2;

FIGURE 4 is a sectional view taken along the line 4-4 of FIGURE 2;

FIGURE 5 is a sectional view taken along the line 5-5 of FIGURE 4;

FIGURE 6 is a detail view taken along the line 6-6 of FIGURE 5.

Referring now more in detail to the drawings, numeral 10 in FIGURE 1 designates a preferred form of the board itself which is in the form of a housing or casing, preferably made of plastic material in two halves 11 and 12. These two halves may be made virtually identical differing only in certain respects as will be pointed out in detail hereinafter. The configuration of the two halves 11 and 12 may be observed in the cross-sectional views of FIGURES 2, 4 and 5. The board has a slight taper being slightly thicker at the top end as may be seen in the figures. Preferably both halves of the board are provided with longitudinal internal stiffening ribs, as may be seen at 15 in FIGURE 2. Horizontal ribs are provided, as shown at 16 and 17 in the lower half 12 and at 20 and 21 in the upper half, these ribs providing a guideway or trackway for a laterally movable drawer, as will be described presently. Numeral 22 designates a circular flange or rib on the inside of the lower half and numeral 24 designates a similar circular flange or rib on the inside of the upper half 11.

At the thinner end of the board, the halves 11 and 12 are provided with inwardly extending ribs, as shown, for the lower half 12 and at 26 and 27. These ribs of the two halves abut each other and the halves may be held together at that end by screws such as shown at 29.

At the upper end of the board an internal housing is provided for the batteries or energizers as designated at 30, 31 and 32. The batteries or energizers are held in position by ribs 35 and 36 extending inwardly from the two halves of the board or housing. The batteries or energizers may be replaced through an opening in the lower half 12 closed by a clip-on panel 38. The halves may be held together at the upper or thicker end by screws, as shown at 40 in FIGURE 1.

Secured or bonded to the top surface of the upper half 11 is a panel 41 of a roughened material suitable to hold papers or chart forms on the working surface.

The retractable light holder or assembly is designated generally by the numeral 45 and it will be described in detail presently. It retracts into a hole in the top half 11 and is extendible therefrom as will be described.

Hand operated clips are provided for holding papers on the working surface 41. Two of these clips are provided, one at the top as shown at 47 and one at the bottom as shown at 48. These clips are of identical construction so only one of them need be described. Each comprises a clip member, as shown at 50, preferably formed of plastic material. At one edge of the

member 50 is a member 51 which in cross-section is a part of a circle having a square shoulder as shown at 52. The part 51 seats in an arcuate groove 55 formed in the top surface of the half 11. The member or clip 50 has a downwardly extending knife edge part 56 which engages a paper on the working surface 41. Adjacent to the arcuate groove 55 is a hole or opening 58 in the surface of the top half 11. The clip 50 is held in position and biased by a circular interrupted spring clip member 60. One part of this spring clip extends through the hole 58 and clips under the shoulder formed by the edge of this opening which is in the form of a slot. The other end of the spring clip member 60 engages on the shoulder 52 of part 51 of the clip. It can be seen, therefore, that the spring member 60 holds the spring clip 50 in position with the part 51 engaged in the groove 55. Additionally, the member 60 provides a spring hinge biasing the clip 50 in a direction to hold papers against the working surface 41. Furthermore, however, the clip 56 may be turned to an open position slightly past a vertical or upright position in which the force or tension exerted by the spring clip member 60 will hold it in that position. Thus, the clips or holders are one-handed in that they can be manipulated either to a holding or open position with one hand and the clip will stay in that position until moved.

The board as a whole is provided with means for securing it to a pilot's knee or leg. Numeral 62 designates a plastic panel having folds, as shown at 63 and 64, forming hinges and flexible depending side parts 66 and 67. Attached to the inside of the member 62 and its depending parts is a layer of padding material such as polyester. The panel or holder 62 is attached to the bottom of the half 12 in the manner shown in FIGURE 4. Numeral 71 designates a bevel head screw passing through the panel 62 and through the bottom half 12. This screw is held by a nut 72 on the inside of the board within the circular flange or rib 22. The depending part 66 of panel 62 is provided with a snap member 74 cooperable with another snap member 75 on the end of a flexible web strap 76 adapted to go around the pilot's leg. This strap has an adjustable fitting in it and the other end is looped through a holder 79 on the other depending part 67 of the holder or panel 62. As can be seen the saddle adjusts to the contour of the leg. The polyester is a material having friction which assists in holding the saddle in place without excessive tightness of the strap.

The board is provided with a drawer, as designated at 84, which can be withdrawn to either side of the board using a one hand operation. The drawer has sides and on the inside has an upstanding rib 85 to form a pencil trough and a compartment for chart forms or the like 86. On both sides of the drawer there are formed square projections or shoulders as shown at 88 and 89 at the top and 90 and 91 at the bottom. The drawer fits into an opening provided in the board by way of cut-outs as shown at 93 in the upper half and 94 in the lower half, these cut-outs being provided in both sides of the upper half 11 and lower half 12. The shoulders or projections 88 and 89 fit into similarly shaped cut-outs 97 and 98 in the upper half 11 and 100 and 101 in the lower half 12, that is when the drawer is in the inward position. The drawer is guided in its movements by the trackways formed by the transverse ribs 16 and 17 of the lower half 12 previously described and the transverse ribs 20 and 21 of the upper half. The bottom of the drawer has a circular opening 105 in it so that a finger may be inserted through it to push papers upwardly from the compartment formed by the drawer so that they can be easily removed if desired one at a time.

The drawer can be easily moved out in either direction with a one hand operation, although it is restrained by detents in both its retracted position and its withdrawn position. Four of such detents are provided

preferably one at each corner of the drawer and these detents are shown in detail in FIGURE 3. Notches are provided in the bottom and top ends of the drawer 84 adjacent the corners as shown at 110 in FIGURE 3. These notches cooperate with spring detents, as designated at 111. These spring detents are in the form of plates of flexible material, as designated at 112, received in slots in the sidewalls of openings, as shown at 113, in transverse ribs on the inside of the halves 11 and 12. Such ribs are indicated by way of example as at 27 for the half 12, there being transverse ribs at 116 and 117 adjacent the top end of the board, as may be seen at FIGURE 4. The spring detent parts 111 are crimped and are formed by cut-outs from the plates 112. As may be seen, the detents restrain the drawer in the retracted position. If the drawer is withdrawn in either direction, it is restrained in the withdrawn position by the detents engaging in the grooves 110 at the opposite sides of the drawer.

The drawer is reversible as well as being capable of insertion and withdrawal from either side so that hole 105 can be utilized on either side. The drawer also forms a writing surface when withdrawn. This provides for maximum utilization of the materials in the drawer such as approach plates, charts, plotting sheets, etc. Further, the drawer is usable for pre-flight and in-flight material, computer, etc.

On the undersides of the drawer are formed detent shoulders or projections 115, as shown in FIGURE 4, between ribs 116 and 117 which are guides engageable with ribs 16, 17, and 20 and 21. (See FIGURE 4.) Detents 115 engage against projections as shown at 100 (FIGURE 1) on either side to hold the drawer or tray positively in withdrawn positions, but these detents or holders easily release when the outer edge of the drawer is lifted for removal.

The retractable light holder 45 is in the form of a part cylindrical plastic tube 120 having a top cap 121 which has downwardly depending side legs 123 and 124. These legs have outwardly extending lugs 126 and 127 which are adapted to fit through notches such as may be seen at 130 in FIGURE 1 in the peripheral edge of the hole 131 in the top half 11 into which the light holder is retractable. Projections or detents are provided on the top side of lugs 126 and 127 which are held by detent shoulders 190 and 197 on the underside of the top adjacent cut-outs 130.

Rotatably fitting in an opening in the cap 120 is a rotatable knob 134 having a finger piece 135 for grasping. This piece or button is made of plastic also. Attached to it is a part cylindrical translucent screen member 137 which is preferably made of a red plastic material. The lower edges of the screen 137 ride in annular trackway formed in the bottom part 140 of the part 120, the bottom of which is cylindrical.

The tube 120 has an extent of more than 180 degrees to overlap with the part-tube or screen 137.

Upstanding from the bottom and within the bottom half 12 is a cylindrical member or tube 142. At the upper end of this tube is a fixed circular contact member 143 having a downwardly extending contact leg 144 adjacent the side of the member 142. This contact leg contacts with one of the contacts 145 of the battery or energizer 30. Three batteries or energizers 31 and 32 are shown positioned in the board. The battery or energizer 32 contacts a contact member 150 to which is connected a wire 151, which in turn connects to a contact member 153 positioned centrally below the retractable light holder. Engaging this contact is the lower end of a spiral helical spring 155. The upper end of this spring is attached to a reciprocable insulative disc 157 which can reciprocate within the tubular member 142. The bulb or lamp is a flashlight bulb of known type, as designated at 160. Its lower threaded end passes through and is secured to a socket in the form of a disc or button 161,

its lower end extending through an opening 162 in the disc 157 and being attached to a contact member 163 which is attached to the upper end of the spring 155. The socket button 161 has upstanding flexible clip members as designated at 166 which can clip into the inside of the lower circular part 140 of the part or member 120. Attached to the lower end of the part 140 is a circular contact member 168 which engages with the contact member 143 when the retractable holder is in the extended position. This engagement completes the circuit from the batteries through the button 161 which engages the contact 168, the bulb and the spring 155 back to the batteries.

The light holder 45 may be retracted into the board by pushing it down against the force of spring 155. This disengages the contacts 143 and 168 so that the light cannot be turned on when the holder is retracted thereby lengthening the life of the batteries or energizers. The lugs 126 and 127 are moved down through the notches 130 and the holder can then be rotated to hold it in the retracted position without releasing due to the vibration. The figures show the holder in extended position in which position the light automatically comes on. In this position the holder can be rotated by rotating the knob 120 and half cylinder 120 to any desired position in which it is desired to direct the light. Furthermore, the red half cylinder 137 is rotatable to any position within the half cylinder 120, including a position in which the red half cylinder closes the open side of the half cylinder 120. In this position the holder emits a dimmed or subdued red light and such light can, if desired, be the sole lighting of the cockpit of the aircraft. It will be observed that the light, as described, is self-contained within the board; is powered by a source within the board and is fully retractable in which position the light is automatically extinguished, the light automatically coming on when the holder is extended. The light has many possible utilities including pre-flight use, emergency use, emergency panel lighting, survival and signal uses, etc.

Provided with the board is a pencil holder clip as shown at 175 in FIGURE 1, keeping a pencil in convenient position for usage. The pencil holder is unique in construction and strategically positioned. The pilot can orient its position without looking. Simply by placing the pencil against the top of the board and sliding it along the edges it can be engaged in the clip. As shown at 176, there is provided a pencil sharpener within the board access to which may be had by way of a hole 177 in the top half 11 of the board. A compartment is provided also to receive the chips within the board; the chips would otherwise be loose and become scattered around.

Numerical 180 designates a bracket pivotally attached to the top half of the board for mounting a computer such as a circular computer. At the upper end of the bracket member 180 is another pivoted bracket member 181 carrying a snap fitting or fixture 182 to which may be attached a computer by a snap attachment allowing for quick assembly and removal of such a computer. The mounting bracket provides for universal positioning adjustment of the computer to any angle or an out of use position or a position to receive light from unit 45. The pivots are mounted using dished spring washers which provide strain release friction mountings which hold the device in set positions and avoid damage as excessive strain is applied.

From the foregoing, those skilled in the art will observe that the invention achieves and realizes all of the objects as stated in the foregoing as well as having many additional advantages now apparent from the detailed description. The invention provides a simplified, stable, durable and economical knee board attachable to the pilot's leg and which by virtue of the swiveling mounting is angularly adjustable to any desired position. The device is extremely dependable and useful by reason of the particular natures of the features thereof and their as-

sembly. Papers or charts are firmly held to the board and can be secured or removed therefrom with a one hand operation. The drawer moves out to either side and is firm in either of its positions. The light is self-contained with the power source within the board and is retractable and extendible in the manner desired with automatic turning on and off of the light to conserve the batteries. The light holder is conveniently adjustable to direct the illumination as desired, to dim it or otherwise subdue it as desired. The foregoing disclosure is representative of a preferred form of the invention and is to be interpreted in an illustrative rather than a limiting sense the invention to be accorded the full scope of the claims appended hereto.

We claim:

1. A navigation plotting board adapted for use by pilots comprising a frame providing a flat working surface, a drawer provided within said frame and means whereby the drawer may be pulled out from either side of the frame, illuminating means comprising a bulb provided as a part of said frame, means comprising a holder for said bulb and means whereby said holder and bulb are retractable into the frame and extendible therefrom, means for causing the bulb to be lighted upon being extended, said illuminating means being provided in an upper corner of said frame, said frame having included therewith a source of voltage for said illuminating means, and a member having the said frame pivotally attached thereto whereby the frame may be rotated about the pivot and flexible means whereby the said member may be secured to a pilot's leg.

2. A navigation plotting board of the type adapted to be used by pilots comprising a frame providing a flat upper working surface, means carried by said frame providing illumination, said last means comprising a holder for a bulb, means whereby the holder is retractable into the frame and extendible therefrom, means whereby the bulb is automatically lighted upon extension of said holder, a mask associated with said holder and adjustable to different positions to thereby vary the quality of light emitted from the illuminating means, the said holder being in the form of a circular member retractable into a circular opening in said frame and rotatable therein, and electrical contact means engageable to energize the said bulb upon extension of the said holder in a plurality of rotated positions thereof.

3. A device as in claim 2 wherein said mask is in the form of a partial cylindrical, translucent sleeve, movable to a position whereby the sleeve may be adjusted to vary the quality of the illumination.

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