June 7, 1949. R. L. DUNCAN 2,472,098

NAVIGATIONAL MAP PROJECTION DEVICE

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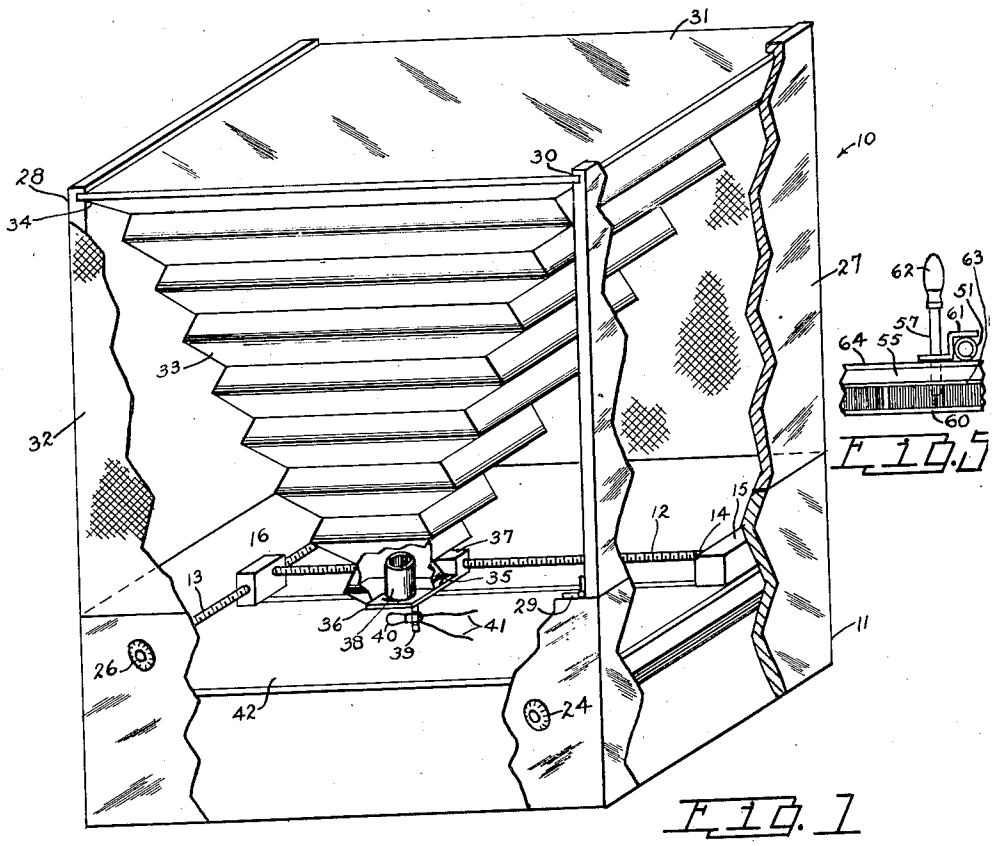


FIG. 1

FIG. 5

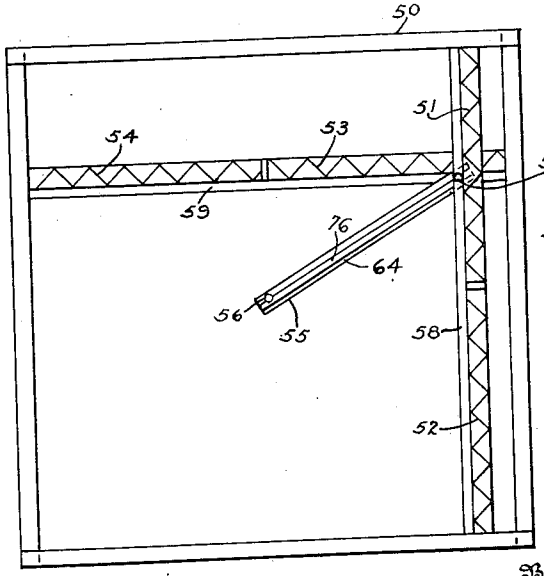


FIG. 2

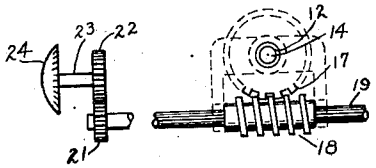


FIG. 3

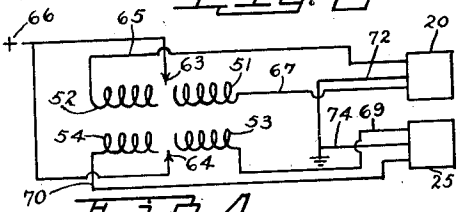


FIG. 4

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NAVIGATIONAL MAP PROJECTION DEVICE

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2 Claims. (Cl. 88—24)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The present invention relates to a navigational device that is compact and one that may be folded into a carrying kit.

An object of the present invention is the provision of a navigational device in which the pilot is able to navigate a ship without a large map in the cockpit.

Another object of the present invention is the provision of a device that will indicate at all times the direct reading position without tracing on a map.

A still further object of the present invention is the provision of a micro-film map of a composite airways chart showing the complete United States.

A still further object of the present invention is the provision of means for projecting the map on a screen.

A still further object of the present invention is the provision of means for locating a lens over any desired position, and means for causing the lens to travel in a direction desired and at a speed proportional to the ground speed desired.

A still further object of the present invention is the provision of means for electrically controlling the lens.

Other objects and advantages of the invention will become apparent during the course of the following detailed description, when taken in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic perspective view of the device with portions broken away;

Fig. 2 is a schematic view of the switch device;

Fig. 3 is a side elevational view of the latitude drive mechanism and geared setting dial;

Fig. 4 is a plan view of the wiring diagram for the switch shown in Fig. 2, and means for controlling the drive screws; and

Fig. 5 is a fragmentary view of the switch contact portion.

In the drawings, the numeral 10 represents a navigational device in the form of a collapsible cabinet which comprises a base 11, the base 11 housing lens control elements that comprise a screw drive 12 calibrated in latitude, and a screw drive 13 disposed at right angles to the screw 12 and calibrated in longitude. The latitude shaft has one end portion 14 passing through a block 15, the opposite end being housed in block 16 which is threaded and receives the longitudinal screw drive 13. The latitude drive is driven by a gear 17 which is secured to the end portion 14 of shaft 12, and this gear meshes with a slidable worm gear 18 on a spline shaft 19. One end of the

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spline shaft 19 is connected to motor 20 shown in Fig. 4. The opposite end of shaft 19 is provided with a gear 21 which meshes with a gear 22 that is secured to one end of shaft 23, the opposite end of shaft 23 having a calibrated dial 24. One end of the longitudinal screw drive 13 is connected to motor 25, the opposite end being provided with a dial 26.

The sides 27 and 28 of the cabinet are rigid and are hingedly mounted to the base 11 by hinges 29, the upper inner face of the sides 27 and 28 being provided with groove 30 which receives a glass viewing screen 31. The front and back of the cabinet at the hinge line to the top are closed in by cloth material 32 which may be detachably secured to the side members 27 and 28 by any suitable means well known in the art, such as snap-on hooks.

Within the cabinet 10 there is provided a bellows 33, the upper end 34 being secured to the sides 27 and 28 adjacent the top edge by any suitable means. The bellows 33 tapers downwardly, the lower end 35 being secured by any suitable means to a plate 36, the plate having a block 37 that is integral with the plate 36, the block being provided with a threaded bore that receives the screw drive 12. The plate 36 is provided with an aperture that receives a portion of a lens housing 38. To the plate 36 is secured a bracket 39 that supports an electric light 40, the light having wires 41 that connect with a source of current. Below the light and the lens and housed in the base of the cabinet, is a micro-film map 42 of composite airways charts showing the entire United States.

In Fig. 2 I have shown a schematic view of my novel switch device that comprises a frame 50 within which there is mounted resistance elements 51 for controlling the clockwise movement of motor 20, and resistance element 52 for controlling the counterclockwise movement of motor 20. Resistance element 53 controls the clockwise movement of motor 25, and resistance element 54 controls the counterclockwise movement of motor 25. The frame 50 is provided with a bar 55 having conducting strips 63 and 64, the strip 63 being in sliding contact with resistance elements 53 and 54 that are mounted on the supporting bar 60, the upper strip 64 being in sliding contact with resistances 51 and 52 which are mounted on a supporting bar 61, each bar having a longitudinal slot 58 and 59 respectively, the arm 55 also having a longitudinal slot 76 which always intersects at a common point by means of the common pin 57 passing through all of the

slots. As the pin 57 is moved by its handle 62 to any point of the slot 76 in the arm 55 in accordance with the flight speed of the aircraft and the arm 55 turned in any direction about the center 56 in accordance with the direction of flight path, the strips 63 and 64 make contact with the corresponding resistances at the proper point to control the motors 20 and 25 by means of circuit connections shown in Fig. 4 to drive screws 12 and 13 at proper speeds to reproduce the path of the aircraft by moving the lens over the corresponding path on the micro-film map, thus producing an image on the screen 31 which continually moves and presents the actual image of the actual terrain flown over by the aircraft when once set properly at any given starting point. The switch device may be remotely located and connected to the cabinet 10 by electric cable shown as power leads 65, 67, 69 and 70 in Fig. 4.

In Fig. 4 in the schematic wiring diagram, each motor 20 and 25 has power leads for forward and reverse operation 67, 65, 70 and 69 respectively and a common ground 72 and 74. The forward power line 67 is connected to and through the resistance 51 to contact strip 63 which is connected to the power source 66. The power line 65 is connected in the same way through resistance 52, the power lines 69 and 70 are connected in like manner through resistances 53 and 54 respectively to the contact strip 64 which is also connected to the power source 66.

In the operation of the device, the lens 38 is positioned over the point on the micro-film map representing the local position of the aircraft by moving the calibrated dials, then the switch is positioned by handle 62 in accordance with the flight path that is in accordance with direction and speed of flight, whereupon the motor 20 and 25 will continuously move the lens so as to move the image on the screen 31 at the same rate in the opposite direction reproducing the motion of the actual terrain over which the aircraft is travelling so that the flight path may be checked with the map.

It is to be understood that while the embodiment of the invention which has been described is to be preferred, changes may be made in the construction and arrangement of parts without departing from the spirit and scope of the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A navigational device comprising a housing, a translucent screen secured at one end of said housing, a micro-film positioned parallel to said screen near the other end of said housing, a screw shaft journaled in said housing along one side thereof, a variable speed reversible motor adapted to rotate said screw shaft, a splined shaft

driven by a similar motor and journaled in said housing at the other side thereof parallel to said screw shaft, a worm gear slidable on said splined shaft and rotatable therewith, a second screw shaft journaled at one end on an internally threaded block threadably engaged with the first-named screw shaft and drivably connected by gear at the other end to said worm gear, a second internally threaded block movable on said second screw shaft, two adjustable dials calibrated one each in longitude and in latitude secured one each to the end of said first named screw shaft and to said splined shaft, a lens system mounted on said second internally threaded block and movably positioned between said micro-film and said screen, a light source secured to said lens system and movable therewith, and remote switch means for controlling the speed and direction of rotation of said motors whereby said lens system moves between said micro-film and said screen projecting filmed data thereon.

2. The device as set forth in claim 1 in which the switch means comprises two resistance bars connected one to each of the two motors and mounted at right angles to each other, said bars adapted to slide across a square space in adjacent planes, each of said bars being composed of a forward and reverse operating control rheostat coil, said rheostats having their zero speed ends at the middle of each bar and providing for similar gradual increases in speed toward their outer ends, a contact bar swiveled at the center of said square space and having strips on opposite sides for sliding contact with said rheostat coils, axial slots one each in said contact bar and each of said rheostat bars, a pin for simultaneous sliding operation in said three slots, a handle secured to said pin for moving said pin over any point in said square space, said point determining the speed and direction of movement of said lens system across said micro-film in accordance with the distance and direction of said pin from the center of said square space, whereby an image of said course terrain is progressively projected from said micro-film on said screen.

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