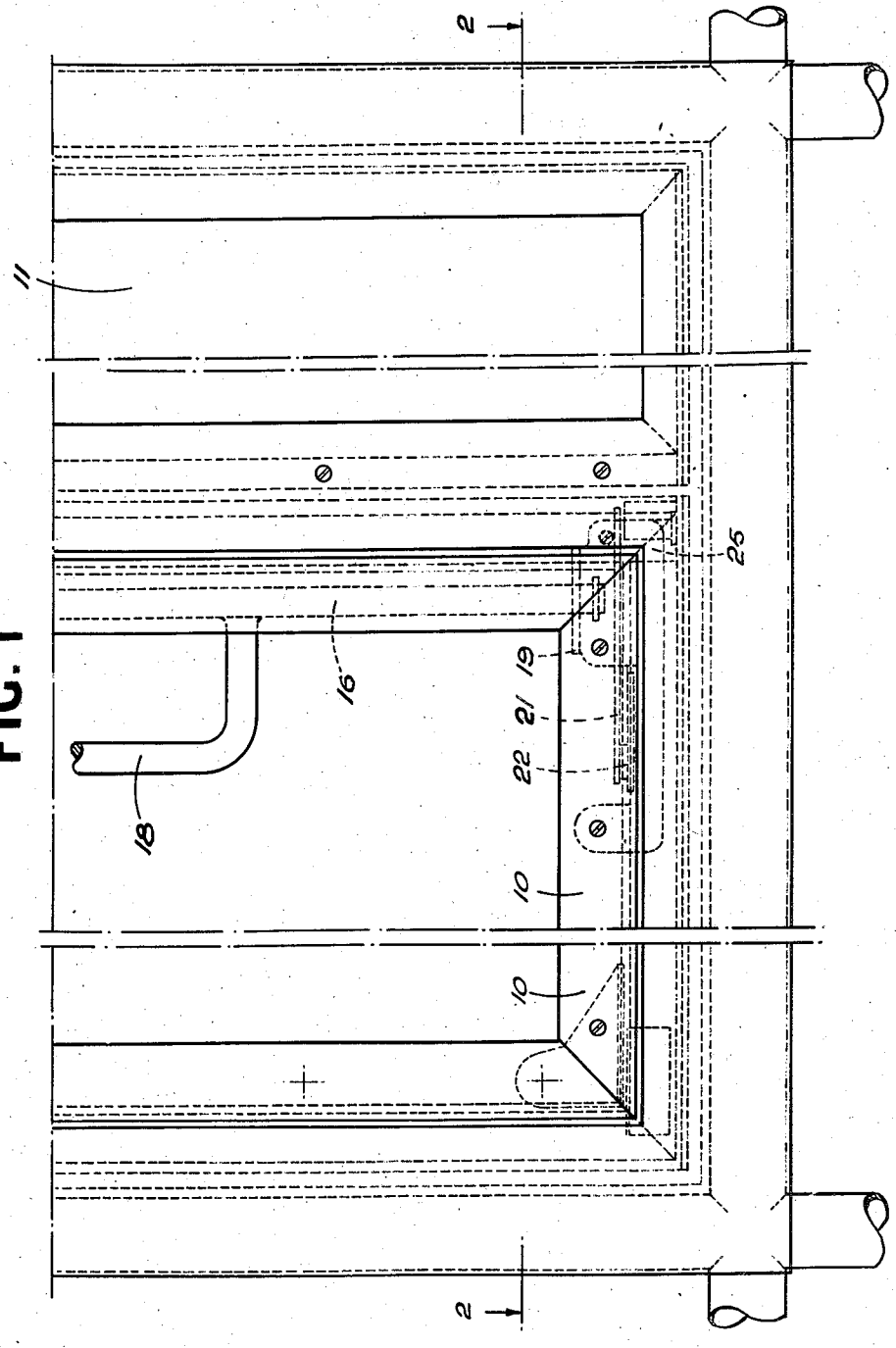
Aug. 14, 1945. W. H. BISHOP ET AL 2,381,966

PANEL AND CONTROL MECHANISM THEREFOR

Filed Feb. 21, 1944 2 Sheets-Sheet 1

FIG. 1



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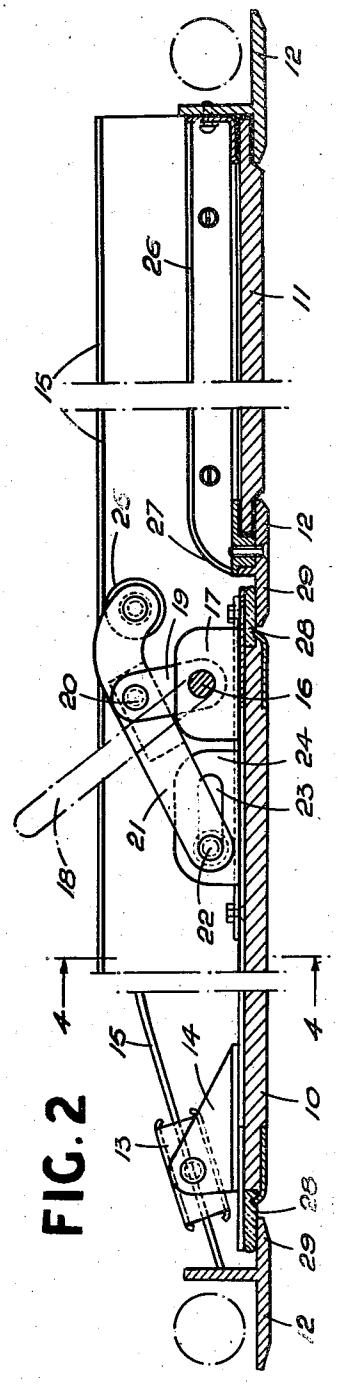


FIG. 2

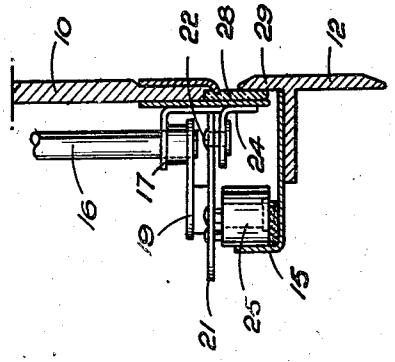


FIG. 4

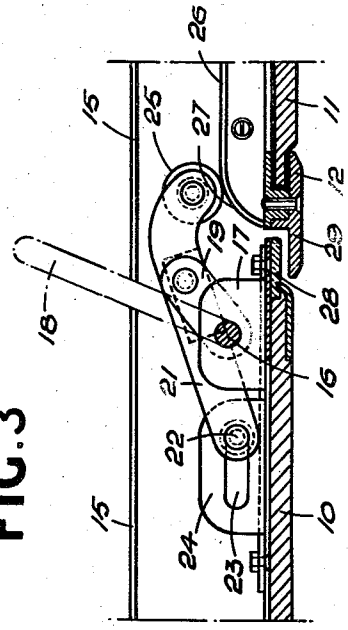


FIG. 3

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PANEL AND CONTROL MECHANISM THEREFOR

William Henry Bishop and Wilfred Edwin Clements, Birmingham, England

Application February 21, 1944, Serial No. 523,332
In Great Britain June 23, 1942

3 Claims. (Cl. 268—46)

This invention relates to improvements in sliding windows or panels for aircraft, road and rail vehicles, and yachts, motor-boats and other vessels.

One object of our invention is to provide operating mechanism for slidably operating a window or panel in such a way that the window or panel is positively seated and locked when closed and is positively moved away from its seating at the commencement of the opening movement, the whole operation being effected by a force applied to a single handle in the direction of opening and closing.

Our improved mechanism is thus particularly applicable to windows or panels on aircraft where there must be no risk of accidental opening of the window or panel and where the window or panel may be iced up at a time when its opening is essential.

Our invention is particularly applicable to windows for aircraft of the type in which the sliding window in the closed position is in alignment with and in the same plane as a fixed window and in opening the sliding window the window or at least that end of next the fixed window is first displaced inwardly and then the window is slid along into a position parallel to and on the inner side of the fixed window.

According to our invention a sliding window or panel for aircraft, vehicles and the like is slidably guided adjacent one edge by means which carry it against a fixed frame in the closing movement and away from the frame in the opening movement, and adjacent the other edge the window or panel carries handle-operated lever mechanism which in the final closing movement positively urges this edge of the panel against the frame and locks it in that position and in the opening movement positively forces it away from the frame. Preferably the sliding window or panel is supported adjacent one edge to slide and rock on a guide curving in towards the end of the frame with which this edge of the window engages in the closed position, and adjacent the other edge the window carries spaced pivoted levers actuated simultaneously by a handle and adapted in one position to be forced against a guiding surface substantially parallel to the window to press this edge of the window against the frame. In the closing movement these levers pass over dead center and are automatically locked so that no external pressure or vibrations can cause any movement of the window.

In opening the window a force is applied to the handle in the direction of opening and the first part of the movement unlocks the levers. Continued movement of the handle causes the levers to engage abutments adjacent this edge of the window and the levers fulcrum on these abutments and cause this edge of the window to be positively forced away from its frame or seat so that any ice or other obstruction to the opening of the window is broken away. These abutments merge into guiding surfaces along which the rollers on the levers travel as the window is moved into the open position, the opposite edge of the window being moved away from its frame or seat by the movement of the guides at that edge along the curved parts of the guides. Thus the opened window is finally in a position parallel to its closed position but displaced laterally therefrom by a distance approximately equal to the width of the window.

Usually the window will slide into a position parallel to and outside or inside a fixed window with which the sliding window is in alignment when closed. The same mechanism can be employed for the actuation of a sliding panel such as a hatch on an aeroplane or yacht or a sliding roof on a road vehicle. In such cases the sliding panel as it is opened will usually slide under an adjacent fixed panel but may slide over the fixed panel.

One practical form of sliding window in accordance with our invention for the cockpit of an aeroplane is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a fragmentary side elevation of the window.

Figure 2 is a sectional plan of the window on the line 2—2 of Figure 1 showing the operating mechanism at the lower edge of the window in the closed and locked position.

Figure 3 is a plan of the operating mechanism in the position in which the window is unlocked preparatory to being opened.

Figure 4 is a vertical section on the line 4—4 of Figure 2.

In the arrangement illustrated a slidable window panel 10 normally lies alongside and in the same vertical plane as a fixed window panel 11, and the whole unit being mounted in a peripheral flanged frame 12 which is adapted to be secured to structural members of the aeroplane fuselage. When opened the sliding panel is adapted to move inwardly and slide rearwardly into a position behind and parallel to the fixed panel. The relative positions of the panels may, of course, be reversed so that the sliding panel moves forwardly to open.

The front edge of the sliding panel is guided by means of felt-lined sliders 13 which are pivotally mounted on brackets 14 projecting inwardly from the panel at the top and bottom and are adapted to slide on guide flanges 15 which curve outwardly at their front ends towards the fixed frame 12 and then merge into straight portions parallel to the window frame and extending rearwardly on the inner side of the fixed panel 11.

A vertical rod 16 is pivoted in brackets 17 at the top and bottom of the sliding panel adjacent its rear edge and a loop handle 18 is welded or otherwise secured to the rod intermediate the brackets, the handle extending forwardly at an angle to the plane of the panel when the panel is in the locked position as shown in Figure 2. The mechanism associated with the rod at the top and bottom is identical so that only that at the bottom need be described. Keyed on the rod is a short arm 19, and the free end of this arm is pivotally connected at 20 to a bell-crank lever 21 of which one arm carries a peg 22 working in a slot 23 in a bracket 24 on the inner face of the sliding panel while the other arm carries a roller 25 adapted to roll either on the guide flange 15 or on a parallel guiding surface 26. The surface 26 lies on the inner side of the fixed panel 11 and at its front end is curved round at 27 to meet the panel frame. The surface 26 may be covered with felt except at the corner 27 where there is preferably a metal shoe or strip.

The action of the mechanism will be readily followed by reference to the drawings.

In the closed position of the sliding panel the panel has been moved forwardly by a forward thrust applied to the handle 18. In this movement the slider 13 slides on the guide flange 15 and the roller 25 rolls on the face of this flange. In the final part of the movement the engagement of the slider 13 with the curved forward end of the flange and the outward pressure of the roller 25 urges the sliding panel outwardly so that a sealing strip 28 around the edge of the panel is forced into sealing contact with a flange 29 on the fixed frame. The final forward pressure on the handle 18 carries it into the position shown in Figure 2 and rocks the arm 19 over centre with respect to the axis of the rod 16 so that the panel is effectively locked in the closed position and cannot be opened by external pressure.

To open the sliding panel the handle 18 is pulled rearwardly to rotate the rod 16 about its axis. The first part of the movement rocks the arm 19 past center again to unlock it and the bell-crank lever 21 is rocked over and moved rearwardly until the roller 25 engages the corner 27 of the guide surface 26. On continued movement of the handle the lever 21 fulcrums about the roller and applies an inward pull to the rear edge of the panel to move it away from the flange 29, as shown in Figure 3. Thus if ice should have formed around the joint of the panel with the frame the ice will be broken and the panel freed. The rear edge of the panel then moves inwardly and the panel as a unit slides rearwardly on the inner side of the fixed panel 11, the roller 25 rolling in the guide surface 26.

The whole of the mechanism and the guides can be very simply and economically made up from metal sheet or rod and for aircraft can be made from aluminium or a light alloy.

While an arrangement has been illustrated in which the fixed and sliding panels lie in a vertical plane, it will be understood that the same mechanism can be used with panels arranged in a horizontal or in any other plane.

We claim:

1. A sliding panel structure for aircraft, vehicles and the like comprising a stationary frame, a movable panel, means for slidably guiding the panel adjacent one edge and carrying it against the frame in the closing movement of the panel and away from the frame in the opening movement, a rod pivoted on the panel adjacent the opposite edge about an axis parallel to the panel, a handle projecting radially from the rod, an arm keyed on the end of the rod, a bell crank lever pivoted on the arm, a pivoted and slidable connection between one arm of the bell crank and the panel, a roller on the face end of the other arm, and two spaced abutments with either of which the roller engages according to the direction of movement of the handle to urge the panel towards and away from the frame.

2. A sliding panel structure as in claim 1 in which the arm on the rod rocks over center with respect to the axis of the rod in the final closing movement of the handle to lock the panel in the closed position.

3. A sliding panel structure for vehicles, aircraft and the like comprising a stationary frame, a movable panel, spaced guides for the panel parallel to the frame for the greater part of this length but each curving in towards the frame at one end, a pivoted slider on the panel adjacent one edge working on the first of said guides to carry that edge of the panel towards and away from the frame in the last part of the closing movement and the first part of the opening movement respectively, a rod pivoted on the panel adjacent the opposite edge with its axis parallel to the panel, a handle projecting radially from the rod, an arm keyed on the rod, a bell crank-lever pivoted on the arm, a pivotal and slidable connection between one arm of the bell-crank and the panel, and a roller on the other arm of the bell crank which co-operates with the guides and which urges the edge of the panel adjacent which the rod is mounted towards the frame as the handle is moved in a direction to close the panel and away from the frame as the handle is moved in a direction to open the panel.

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