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HANDLE FOR PILOT'S LEVER

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Fig. 1

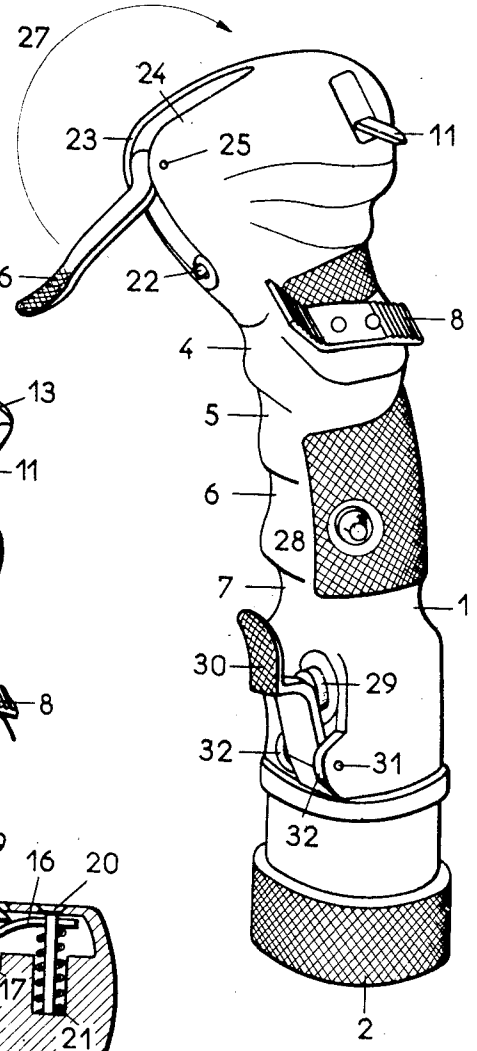


Fig. 2

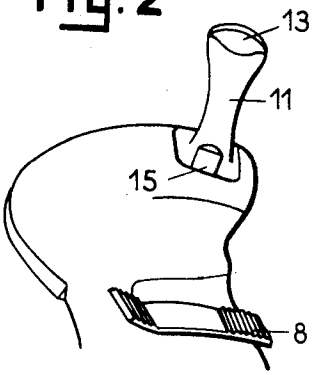
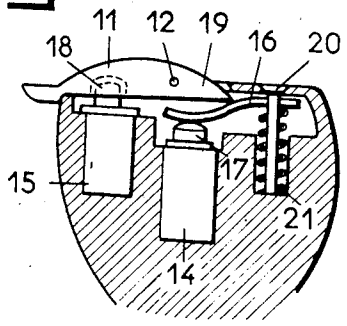


Fig. 3



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HANDLE FOR PILOT'S LEVER

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My invention has for its object a handle for a piloting lever or joy-stick chiefly adapted for use on board of pursuit planes and light bombers carrying stationary guns.

The pilot's handle according to my invention is designed chiefly so that it may be held in the pilot's right hand in a position for which the pilot's forearm may be substantially horizontal while it allows the movement of the joy-stick which is normally located between the pilot's legs.

The handle is shaped so as to match as accurately as possible the shape of the pilot's hand when said hand grasps the handle. As an auxiliary feature, the handle may include a bearing surface which keeps the hand in position and prevents it from dropping.

The handle according to my invention carries the different circuit-breakers or push-buttons for the latter in a manner such that at least four of them may be accessible for or controlled by the pilot's thumb in different positions of the latter, the thumb being assumed to be shifted independently with reference to the remainder of the hand which continues clasping, normally the handle. More specifically these four push-buttons are grouped in the following manner: two are associated for control by a rocking lever and two others are grouped under a protecting cover adapted to be raised by a shifting of the thumb, away from their inoperative positions, so that one of the circuit-breakers may be actuated first by the raising movement of the cover while the other circuit-breaker is accessible only by the thumb which is caused to slide underneath the raised cover.

A fifth circuit-breaker according to my invention is located in a manner such that it may be controlled by a movement of the forefinger such as will not shift the four other fingers nor the general position of the hand. Preferably said fifth circuit-breaker cannot be reached directly and can be controlled only through the agency of a trigger adapted to assume three positions, to wit a safety position, a ready-to-operate position and a releasing position.

A sixth push-button is located on the handle in a position such that it lies underneath the end of the ring finger or of the middle finger when these fingers are folded over the handle.

A seventh push-button is located on the handle so as to be controlled when required by the small finger, while requiring preferably a shifting of the latter without however said shifting leading to a movement of any of the other fingers nor to any modification in the position of the hand. Said seventh push-button may be controlled through the agency of a lever or even directly by the small finger.

I will now disclose a preferred embodiment of my invention, reference being made to accompanying drawings without however the claimed structure being by any means limited by the special features disclosed in said embodiment. In accompanying drawings:

Fig. 1 is a general perspective view of the handle;

Figs. 2 and 3 are detailed views thereof.

As illustrated, the body 1 of the handle includes a bracket or carrier surface which is not shown and on which the first finger-joint or knuckle of the little finger may rest.

The body of the handle may include four recessed sections 4, 5, 6, 7 defining the normal position of rest of the four fingers folded over the handle body. When the hand is clasped over the handle, the thumb remains independent.

Laterally of the handle and on the side which remains free of the clasping fingers is located a rocking lever 8 extending in substantial register with the location of the forefinger grasping the handle, said lever assuming the shape of the thumb so that the latter may normally rest thereon.

The lever 8 actuates when it is rocked two circuit-breakers located underneath said lever and which have not been illustrated or else a double switch such as that disclosed in my copending specification Ser. No. 358,874 filed on June 1, 1953.

The two above-mentioned circuit-breakers control the correcting flaps which act so as to correct or brake the dive or noselift of the aircraft.

According to a main feature of my invention, the location of the lever 8 and that of the two circuit-breakers underneath the latter are selected in a manner such that the reaction of the pilot's arms opposing the movement of the joy-stick is made use of. This reaction, which twists slightly the pilot's wrist in either direction, has for its result a shifting of the thumb while the four last fingers remain in position on the handle and the natural shifting of the thumb thus produced allows the thumb to act more readily on that push-button which controls the correction of the movement of the aircraft, which movement is repeated by the joy-stick, while the pilot's arm opposes such a movement of the joy-stick.

At the upper end of the handle is provided a cover 11 rocking round an axis 12 and terminating with a nose 13 (Fig. 2) projecting outwardly of the handle so that said nose lies in the path of the pilot's thumb when the latter moves out of its inoperative position next to the lever 8. Said cover 11 when it has been raised by the movement of the thumb rocks so as to actuate a circuit-breaker 14 (Fig. 3) concealed inside the handle and the part played by which consists for instance in locking the aiming gyroscope. The nose of the cover being thus raised, the thumb may then slide underneath said nose and hold it raised so as to reach the current-breaker 15 controlling the release of the bombs and rockets (Fig. 2).

When the thumb releases the nose 13, the cover 11 returns into its inoperative safety position under the action of a spring and releases simultaneously the aiming gyroscope through action on the above-mentioned circuit-breaker 14.

It is essential that in no case the switch 15 may be allowed to be actuated by the thumb before the circuit-breaker 14 has been operated so as to lock the aiming gyroscope.

Fig. 3 shows an arrangement disclosing a novel manner of solving said problem by resorting to a floating lever 16 assuming preferably the shape of a blade. In Fig. 3, the circuit-breakers 14 and 15 are shown only diagrammatically by their casings out of which the push buttons 17 and 18 project. The cover 11 acts through its inner nose 19 on the blade 16 which rests in a floating manner on the push-button 17 of the circuit-breaker 14.

As a matter of fact, the blade 16 is held solely at its end opposed to the circuit-breaker 14, by means of a rod or tenon 20 passing freely through the blade which rests on the spring 21 wound round the rod 20.

The operation of the arrangement is as follows: the

cover 11 as it is raised by the pilot's thumb engages the blade 16 which depresses the push-button 17 which is consequently actuated before the pilot's thumb can engage the underside of the cover 11. The end of the blade 16 bearing on the spring 21 plays the part of a stationary point during the first part of the movement of the blade during which the spring 21 is compressed only to a slight extent provided its power has been suitably selected.

The pilot's thumb continues then its movement and reaches the push-button 18, while the push 17 forms in its turn the bearing point for the blade 16 which now compresses the spring 21. When the action exerted by the thumb is released, the cover 11 is returned into its closed position by the blade 16 by reason of the co-operating action of the compressed spring 21 and of the push-button 17 which is submitted to the action of a return spring that is not illustrated. By reason of this arrangement and of this closing of the cover 11, the circuit-breakers are operated in the desired sequence 15—14, which is of considerable importance, the operation of the circuit-breaker 14 being prevented until the cover 11 is almost completely closed and consequently the push 18 is out of reach of the pilot's thumb.

The circuit-breaker 22 controlling the firing of the stationary guns is housed inside a recess formed by the two flanges 23 and 24 of the handle, which flanges have for their object to prevent the forefinger from actually reaching the circuit-breaker. In the gap between said flanges is mounted the preferably tubular spindle 25 carrying the trigger 26 which is adapted to rock round the axis of the spindle and is normally folded back into its inoperative safety position, also inside said gap. Said trigger is illustrated in Fig. 1 in its ready-to-operate position and may be returned into its safety position by a movement in the direction of the arrow 27. The movement between the two positions considered makes the trigger pass through the neutral point of a locking spring engaging the trigger or again the two positions of the lever may be defined by balls in a conventional manner or by any other equivalent means. The trigger-locking spring may be located inside the tubular spindle 25 to which the trigger is pivotally secured, said spring not being illustrated in the drawings.

Lastly, the trigger may be shifted by the pilot's forefinger from its ready-to-operate position into its firing position, possibly through an intermediate position which corresponds to a mere engagement on the head of the corresponding circuit breaker. It is of advantage to brake the passage between the ready-to-operate position and the firing position by means of an antagonistic spring so as to make the pilot exert a definite effort when firing.

It is also possible to make the spring located inside the tubular spindle 25 act in the opposite direction urging the trigger into its firing position. In this case, it is locked in its safety position, i. e. it is folded back in the direction of the arrow 27 and the action of the pilot's thumb on its outer end is sufficient for releasing it and allowing it to return into its firing position.

A further circuit-breaker 28 controls the listening circuit of the wireless set on board. It extends in a direction such that it may be actuated by the last phalanx or knuckle of the ring finger or of the middle finger without it being necessary to take any special care for protecting said circuit-breaker since an untimely operation of the set would not lead to any danger whatever.

The push-button 29 controlling the locking of the front wheel of the landing gear is controlled either directly or else more advantageously through the lever 30 pivoting round the spindle 31 carried by the flanges 32 on the handle. Said lever 30 is of interest because it constrains the pilot to shift purposely his little finger so as to make it act over the end of said lever after turning round the latter. It is possible to insert between said lever 30 and the push-button 29 a spring blade which has for object to cut out all vibrations and to allow said push-button to be submitted solely to the action of the spring, whereby it is protected against the action of a too sudden operation of the lever 30.

What I claim is:

1. In combination with a pilot's handle shaped so as to match the inner shape of the pilot's hand grasping the same, at least one pair of operationally correlated switches disposed at said handle, a lever for actuation of one of said switches located within the range of the mobility of the pilot's thumb so as to be reached by the same without shifting the other fingers from their grasp, said tilting lever being pivotally mounted on the handle and associated with and disposed relatively to said switches so that operation of said lever to actuate said one switch is necessary to make the other of said switches accessible whereby sequential actuation of said switches is ensured.

2. In combination with a pilot's handle shaped so as to match the inner shape of the last four fingers of a pilot's hand grasping the handle, at least one pair of operationally correlated switches disposed at said handle, a lever in the form of a thumb rest within the range of the mobility of the pilot's thumb so as to be reached by the same without shifting the other fingers from their grasp, said lever being disposed at said handle and associated with and disposed relatively to said switches so as to require operation of one of said switches in order to make the other switch available for operation.

3. In combination with a pilot's handle shaped so as to match the inner shape of the last four fingers of a pilot's hand grasping the handle, a hollow provided within said handle, a cover substantially shaped so as to form part of the wall of the handle being disposed above said hollow and hingedly secured to said wall, a pair of operationally correlated push button switches being disposed within said hollow and underneath said cover, said cover being disposed within the range of the mobility of the pilot's thumb so as to be reached by the same without shifting the other fingers from their grasp and to be pivoted by the thumb into the raised, open position thereof, and subsequently to be closed again; mechanism being provided at said cover and associated therewith and with the one of said push buttons for operatively coupling the movement of the push button with that of the cover, thereby to depress and hold depressed said push button when the cover is in said raised, open position, and to release the push button when the cover is closed; the other one of said push buttons being located so as to be accessible to the pilot's thumb for operation thereby when the cover is raised; actuation of the two push buttons in predetermined sequence thus being ensured.

4. In combination with a pilot's handle shaped so as to match the inner shape of the last four fingers of a pilot's hand grasping the handle, two pairs of operationally correlated circuit breakers disposed at said handle, the circuit breakers of each pair in close proximity to each other and all within the range of the mobility of the pilot's thumb so as to be reached by the same without shifting the other fingers from their grasp; an actuating lever in form of a thumb rest, associated with both circuit breakers of the one pair for operating the same, being rockably mounted at said handle, said actuating lever being further disposed relatively to the circuit breakers of said one pair so that, on rocking of the actuating lever in either direction, the actuating lever operates the two circuit breakers alternatively; the other pair of circuit breakers being constituted by two push button switches disposed within a hollow of the handle, a cover substantially shaped so as to form part of the wall of said handle being hingedly secured to said wall and disposed within said range of the thumb and above said hollow and said pair of push button switches so as to cover the same; mechanism being provided at said cover and associated therewith and with one of the push buttons for operatively coupling the movement of said one push button with that of the cover, thereby to depress and hold depressed said

one push button when the cover is raised by the thumb into the open position, and to release the push button when the cover is closed; the other one of said push buttons being disposed for direct operation by the pilot's thumb; actuation of the two push buttons in predetermined sequence thus being ensured.

5. A pilot's handle as set forth in claim 4 wherein the circuit breakers of the first one of said pairs are for controlling the flaps of the air craft, and the push button switches of the second one are for locking the gyroscope and releasing the bombs.

6. A pilot's handle as set forth in claim 4 wherein said handle is provided in addition to at least one of said pairs of circuit breakers with a trigger and a push button operable thereby for firing the gun, said trigger being disposed at said handle within the range of the mobility of the pilot's forefinger.

7. A pilot's handle as set forth in claim 6 wherein furthermore a push button switch for controlling the wireless set is provided at the handle within the range of the mobility of the pilot's ring-finger.

8. A pilot's handle as set forth in claim 6 wherein furthermore a push button switch for controlling the

landing gear is provided at the handle within the range of the mobility of the pilot's little finger.

9. A pilot's handle as set forth in claim 6 wherein a push button switch for controlling the wireless set and a push button switch for controlling the landing gear are provided at the handle within the reach of the pilot's fingers.

10. In combination with a pilot's handle shaped so as to match the inner shape of the last four fingers of a pilot's hand grasping the handle, at least one pair of operationally correlated switches disposed at said handle, a lever in the form of a thumb rest within the range of the mobility of the pilot's thumb so as to lie against the pilot's thumb when in normal handle grasping position, said lever being pivoted to said handle at its mid point so as to selectively operate said switches by the pilot's thumb following the reaction of the pilot's arm opposing movement of said handle.

References Cited in the file of this patent

UNITED STATES PATENTS

2,330,646	Voigt et al.	Sept. 28, 1943
2,641,629	Bennett	June 9, 1953
2,677,730	Weidenman	May 4, 1954