May 16, 1933. W. M. LANAGAN 1,909,182

HAND LEVER

Filed March 10, 1932

FIG. 1.

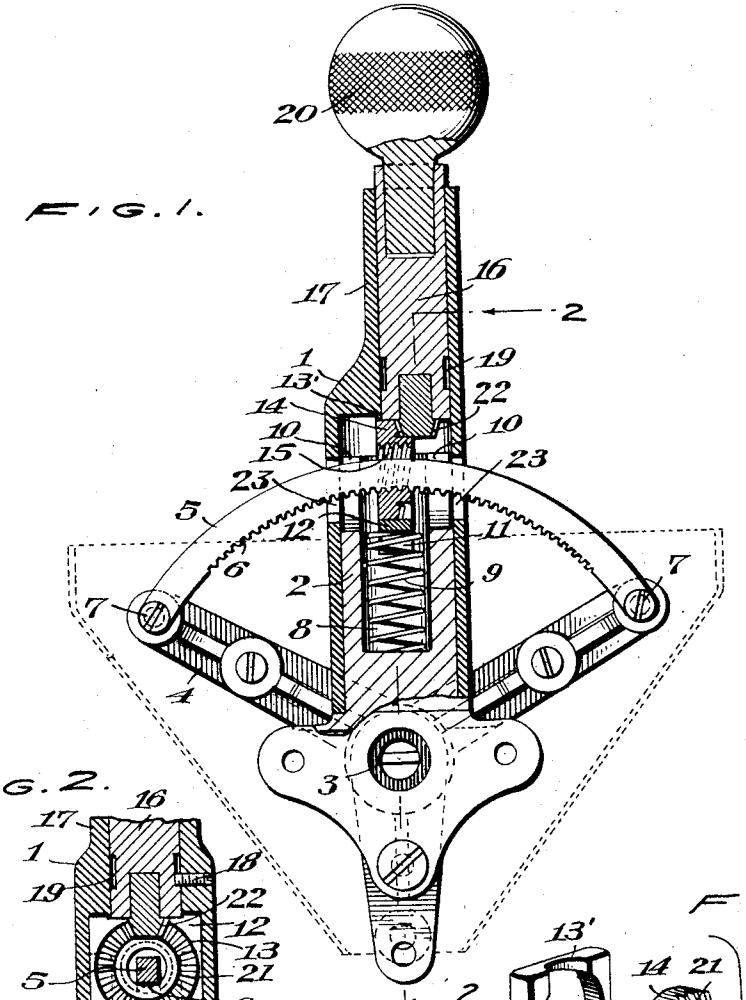


FIG. 2.

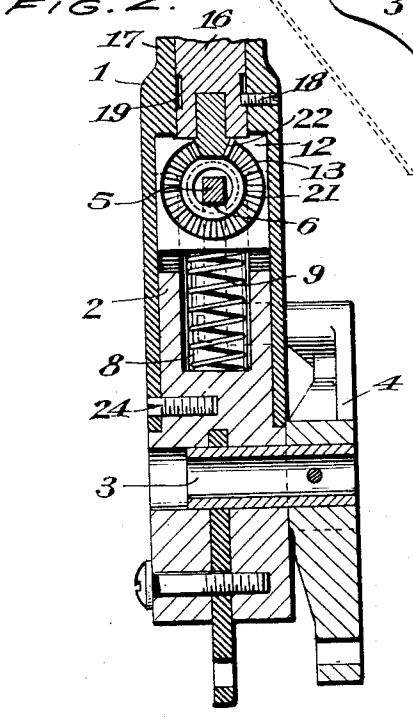
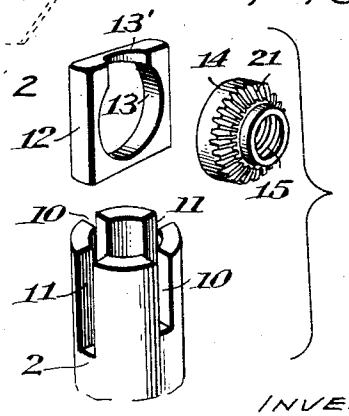


FIG. 3.



INVENTOR
WILLIAM M. LANAGAN
Francis H. Vanderworker
and
BY Wade Woontz
ATTORNEYS

Patented May 16, 1933

1,909,182

UNITED STATES PATENT OFFICE

WILLIAM M. LANAGAN, OF WASHINGTON, DISTRICT OF COLUMBIA

HAND LEVER

Application filed March 10, 1932. Serial No. 597,986.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to improvements in hand levers and has for its primary object to provide a manually operated lever having a vernier attachment insuring positive and minute adjustment whereby it is particularly adapted for aeronautical use.

A further object of the invention is to provide a manually operated control lever in which the adjustment mechanism is substantially housed within the lever proper so that all moving parts thereof are protected and at the same time concealed from view.

An additional object is to provide a lever of simple and light construction embodying a minimum number of parts adapted to be conveniently and readily assembled or separated.

With the above objects in view, the invention resides in the novel construction, arrangement, and combination of parts hereinafter referred to and described in detail, with reference to the accompanying drawing, wherein:

Figure 1 is a vertical longitudinal sectional view of a lever assembly constructed in accordance with the invention;

Figure 2 is a transverse vertical section on line 2—2 of Fig. 1, and

Figure 3 is a detail view of the worm assembly.

The lever is composed of two separable sections 1 and 2, the upper section 1 being tubular and telescoping the substantially solid lower section 2 pivotally supported on the stub shaft 3 of a Y-bracket 4 which also supports the arched quadrant 5. The under edge of the quadrant is provided with teeth 6 and the ends of the quadrant are releasably fastened to the bracket 4 by screws 7.

Lever section 2 is recessed inwardly of its upper end to provide a pocket 8 for a helical spring 9, and open slots 10 are provided above the pocket to accommodate the quadrant 5. Additional open slots 11 are provided, in a plane at right angles to the plane of slots 10, and these additional slots are of greater depth than slots 10, being designed as guides for a vertically slidable worm-carrier 12. As illustrated in Fig. 3, the carrier may consist of a rectangular block, of metal, adapted when inserted in the slots 11 to span the spring pocket 8 with its lower edge engaged by the upper end of spring 9. The center of the block is cut out to form a large circular opening 13 interrupted tangentially of its upper portion by a horizontal disposed semi-circular opening 13′.

Fitting snugly within the opening 13 of the worm-carrier 12 and freely rotatable therein is a circular annulus 14 having an internal thread or worm 15 to match the teeth 6 of the quadrant. The inside diameter of the worm 15 exceeds the outside dimensions of the quadrant 5 to an extent permitting disengagement of the worm from the teeth of the quadrant by a movement of the worm transversely of the quadrant. In the normal position of the parts, the worm is held engaged with a toothed portion of the quadrant by the upward thrust of the spring 9.

The upper lever section 1 has associated therewith an operating handle including a shank or stem 16 slidably and rotatably mounted in a restricted upper portion 17 of the lever and limited in its sliding movement by a stop screw 18, the inner end of which projects into a groove 19 of the shank. Attached to the upper end of the handle-shank is a hand-knob 20 by means of which the shank may be either rotated about its longitudinal axis or moved inwardly or outwardly of the lever. The lower end of the shank is operatively connected with the worm 15 for causing the latter to be rotated when the handle is turned about its axis. For this purpose, the worm is provided with a gear 21, held in mesh by the upward thrust of spring 9, with a pinion 22 fixed to the lower end of the handle shank 16 and extending within the opening 13′ of the carrier block 12.

When the parts are assembled, as shown in Figs. 1 and 2, the spring 9, block 12, nut 14, gear 21, pinion 22, and shank 16 are completely housed within the telescoped lever sections 1 and 2, and, hence, concealed from view. The lever and quadrant are intercon-

nected by reason of the quadrant extending through the lever rather than laterally thereof as in existing structures, the upper lever section 1 having closed slots 23 in alignment with the open slots 10 of lever section 2 to accommodate the quadrant. The upper and lower sections of the lever are releasably fastened together by any suitable means, such as a cap screw 24.

By rotating the knob 16 in either direction, the lever assembly can be moved gradually to any position on the quadrant; the internal thread of the worm or nut by its engagement with the teeth of the rack insuring positive and minute adjustment. When it is desired to move the lever assembly freely and rapidly through its full range of adjustment, the knob 20 is pushed down, with a corresponding movement of the worm or nut against the action of spring 9, causing the worm to become disengaged from the teeth of the quadrant and thus allowing the lever assembly to be freely shifted. In the absence of any counter pressure on the knob, the spring 9 will maintain the contact between the worm and the quadrant.

The quadrant and lever assembly may be disconnected from the bracket 4 by the removal of screws 7 and the removal of screws 18 and 24 enables the lever assembly to be easily taken apart and broken up into its several component units.

Having thus described the invention, what is claimed is:

1. A manually operated control device including a lever, a toothed quadrant, a worm, yieldable means normally holding the worm in engagement with the quadrant, and worm-rotating means being movable in opposition to the yieldable means for shifting the said worm out of engagement with said quadrant.

2. A manually operated control device including a lever, a toothed quadrant, a worm, yieldable means normally holding the worm in engagement with the quadrant, and worm-rotating means movable in opposition to the yieldable means for shifting the said worm out of engagement with said quadrant, said worm, yieldable means, and worm-rotating means being enclosed within said lever.

3. A manually operated control including a lever, a toothed quadrant, a worm, elastic means normally holding the worm in engagement with the said quadrant, and a rotatable handle slidably mounted on said lever and geared to said worm for turning same, said handle being depressible against said worm for moving same out of contact with said quadrant against the action of said elastic means.

4. A manually operated control including a quadrant, a lever having a substantially enclosed quadrant-encircling portion, quadrant engaging means within the quadrant encircling portion of the lever for obtaining a fine adjustment of the lever, and means for engaging and disengaging said adjustment means with respect to the quadrant, said latter means being also operatively connected to the said adjustment means to actuate the latter when the same is in engagement with the quadrant.

5. A manually operated control device comprising a lever, a toothed quadrant, an internally threaded nut loosely encircling said quadrant and supported in said lever for movement transversely of the quadrant, elastic means normally positioning the nut in threaded engagement with the teeth of the quadrant, and means for turning the nut, said means being movable to shift the nut out of contact with the said quadrant.

6. A manually operated control device comprising a lever, a toothed quadrant, an internally threaded nut encircling said quadrant, means carried by the lever for supporting the nut and including an elastic element normally holding the nut in threaded engagement with the teeth of the quadrant, a rotatable handle carried by the lever and geared to the nut for turning same, said handle being movable relatively to the lever for shifting the nut out of contact with said quadrant.

7. A control lever comprising a pivoted lever, a toothed quadrant extending through the lever, an internally threaded member within the lever and loosely encircling said quadrant, elastic means normally holding said member in threaded engagement with the teeth of the quadrant, a gear on said member, a rotatable handle in said lever, a pinion on said handle in mesh with said gear, said handle being movable relative to the lever for positioning the gear out of threaded contact with said quadrant.

8. A manually operated control device comprising a lever having a transverse opening therein, a toothed quadrant extending through said transverse opening, a spring mounted in said lever below said transverse opening, a handle slidably and rotatably mounted in the lever above said transverse opening and projecting above the lever, an internally threaded nut loosely encircling said quadrant and confined between the said spring and the said handle, said nut being normally held in threaded engagement with the quadrant by the upward thrust of the spring, and means operatively connecting the said handle and the said nut and imparting rotation to the latter when the handle is rotated.

In testimony whereof I affix my signature.

WILLIAM M. LANAGAN.