F. L. SLACK.

AEROPLANE SIGHTING DEVICE.

APPLICATION FILED FEB. 7, 1911.

1,028,502.

Patented June 4, 1912.

2 SHEETS—SHEET 1.

FIG. 1.

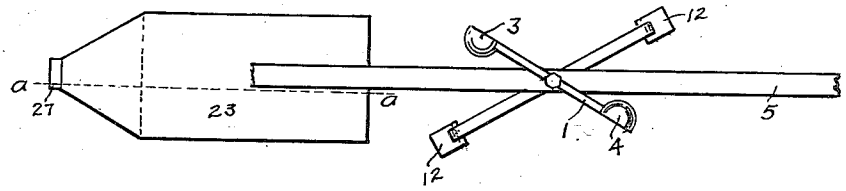
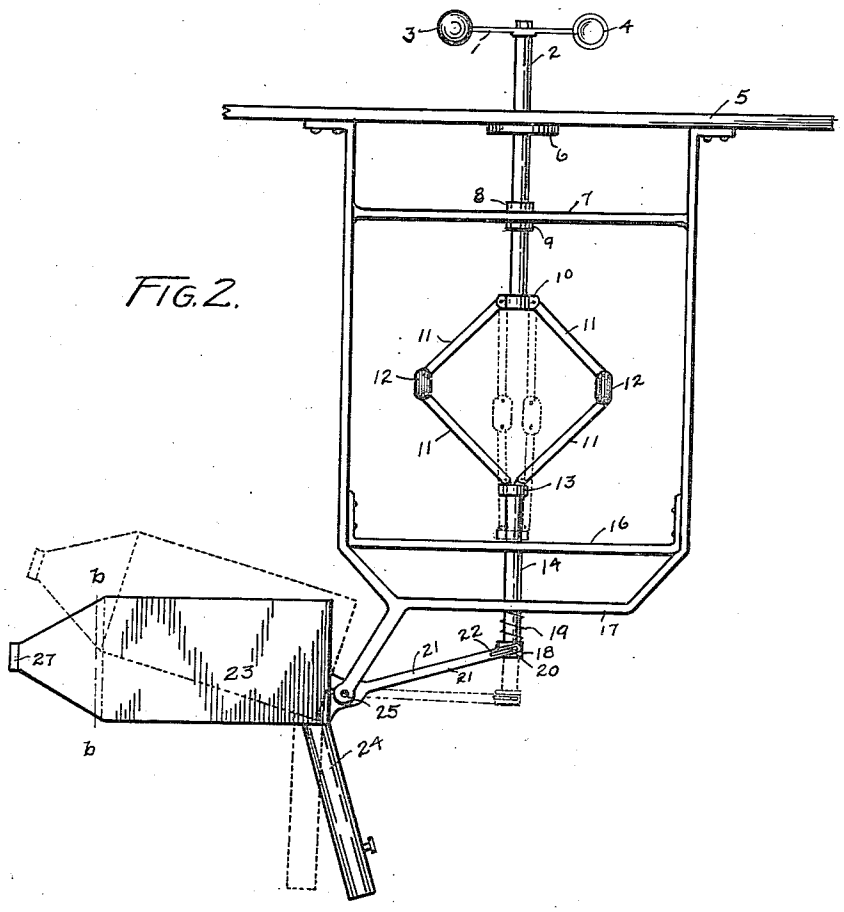


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 3.

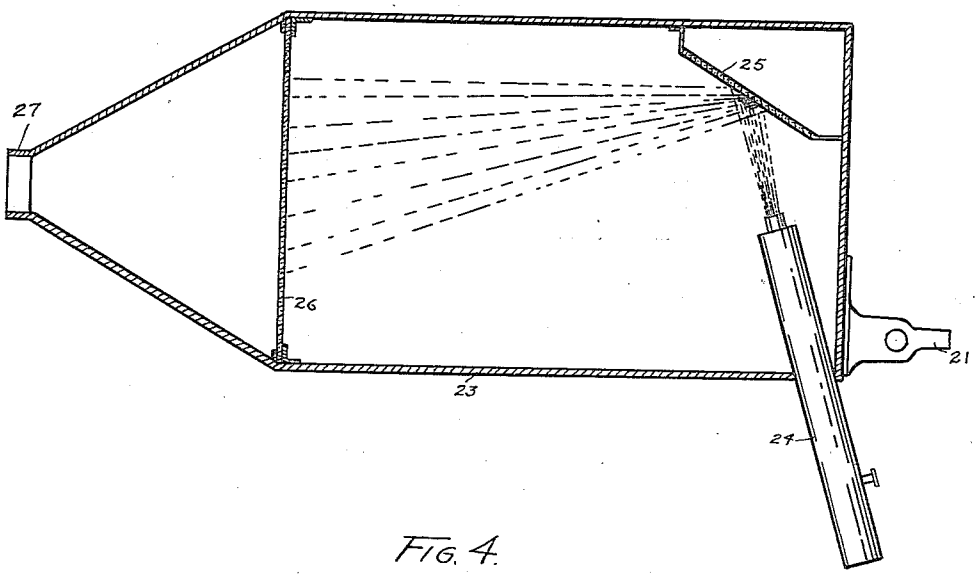
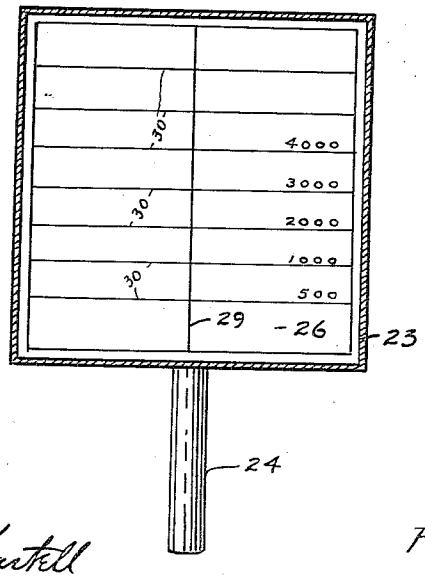


FIG. 4.



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AEROPLANE SIGHTING DEVICE.

1,028,502. Specification of Letters Patent. Patented June 4, 1912.

Application filed February 7, 1911. Serial No. 607,033.

To all whom it may concern:

Be it known that I, FRANK L. SLACK, a citizen of the United States, residing at Inglewood, California, have invented a new and useful Aeroplane Sighting Device, of which the following is a specification.

My invention relates to the construction of an apparatus for the purpose of automatically determining the point on the earth's surface at which a projectile will strike when released from a moving aeroplane or dirigible balloon. The range varies according to the speed of such aeroplane, the speed of the aeroplane being the velocity of the projectile at the instant it is released. By means of my range finder a view of the approximate theoretical landing point is projected on ground glass or mirror within easy access of the operator of the machine. This beneficial result I accomplish by means of the device herein described and shown in the accompanying drawings, in which—

Figure 1 is a top plan view of my range finder attached to a section of the frame of an aeroplane; Fig. 2 is a side elevation of the same parts shown in Fig. 1; Fig. 3 is a longitudinal section of the camera or view box taken on the dotted line *a*—*a* in Fig. 1 and Fig. 4 is a transverse cross sectional view taken on the dotted line *b*—*b* in Fig. 2.

Like characters refer to like parts throughout the drawings.

Referring to the details of construction: 1 is a bar connected with a movable shaft 2; 3 and 4 are cups or wind vanes attached to the ends of the cross bar 1; 5 is a section of the framework of an aeroplane; 6 is a bearing provided in the frame to allow the shaft to rotate freely; 7 is a frame provided to guide the shaft 2 and a circular opening through this guide frame serves for a second bearing for the shaft 2; 8 and 9 are collars above and below the guide frame 7. These serve to prevent longitudinal movement in the shafting 2.

10 and 13 are collars; 11 connecting bars, and 12 weights of an ordinary type of centrifugal governor, connected at one end with the shaft 2 and at the other end with a shaft 14; 16 and 17 refer to sections of the supporting framework through suitable openings in which the shaft 14 operates; 18 is a collar on the extreme end of the shaft 14; 19 is a spiral spring operating between the collar 18 and the frame 17. A pin 20 in the collar 18 engages a slot 22 in the end of the lever 21. The lever 21 operates on the pivot 25 as a fulcrum; 23 is a camera or view box attached to the lever 21; 24 is a telescope which projects the image within its field upon the mirror 25 and thence it is reflected upon the screen or ground glass 26; 27 is an eye-piece through which the operator views the image cast upon the screen 26.

If desired the ground glass may be provided with a vertical line 29 and cross lines 30 marked or cut upon its surface for the purposes hereinafter explained.

From an aeroplane stationary in the air a projectile released would fall to a point directly beneath the aeroplane, but if the aeroplane is in motion the momentum of the projectile would cause it to fall at some point in advance of a point directly under the aeroplane at the instant of release. Therefore, in operation it is assumed that the greater the velocity of the aeroplane the greater will be the distance traversed by the projectile before it reaches the target from any given height.

To be effective as a range finder under ideal atmospheric conditions the angle of line of sight with reference to the aeroplane should be varied from vertical in a stationary position to the angle adapted to the various speeds.

In operation my device comprises principally three separate elements operating together to produce the desired result. These parts in the form of construction shown comprise a wind propelled apparatus consisting of the parts 1, 2, 3 and 4; a centrifugal governor and connecting apparatus composed of the parts 10, 11, 12, 13, 14, 18 and 19 and the telescopic camera or view finder comprising the parts 23, 24, 25, 26 and 27.

In operation the wind causes the vanes or cups to revolve and motion is thus transmitted to the shaft 2. As the speed of the machine increases the speed of the shaft 2 increases in direct proportion. The governor on the end of the shaft 2 also revolves and as its speed increases the centrifugal force causes the weights to separate and through the connecting links 11 a longitudinal force is transmitted to the shafts 2 and 14. The shaft 14 is drawn in toward the governor and the spring 19 is compressed. Through the lever 21 the camera box and its telescope is inclined so that the line

of sight is advanced as the shaft 14 is drawn in toward the governor. By means of the tension of the spring 19 or by a suitable compound system of levers the amount of movement may be varied according to the degree of inclination found to be required for the various speeds.

The camera or view finder is so arranged that an image of the field covered by the lens is projected upon the glass and a vertical line upon the glass indicates the center of the field of vision. The element of altitude also enters into probable range of the projectile and to provide for this the horizontal lines 30 are provided on the screen, inscribed with various altitudes. These lines cut the reflected image into several zones which are covered by the same speed at the various altitudes. The operator being aware of his altitude by means of a barometer or aeronoid may immediately choose the particular zone corresponding to his altitude and by means of the vertical line the point in this zone under his range at any given point.

The means of measuring the speed of the aeroplane or dirigible balloon may consist of a wind gage apparatus similar to the one shown, or any means for connecting the governor with the engines or propeller of the said aerial vehicle. The type of governor may be widely varied along the well known lines and any suitable kind of a camera, telescope or camera obscura may be used and I do not desire to limit myself to the construction shown in any of these details.

What I claim as new and desire to secure by Letters Patent is:

1. In an aeroplane sighting device the combination of a suitable means for observing the surface of the earth beneath the aeroplane and suitable automatic device for shifting the field of vision of the observing apparatus as the speed of the aeroplane is increased or decreased.

2. In an aeroplane sighting device: the combination of a suitable observing instrument for viewing the surface of the earth from an aeroplane; a suitable governor; suitable means for transmitting motion from the governor to the observing instruments and suitable means for increasing and decreasing the speed of the governor as the speed of the aeroplane increases or decreases, all substantially as set forth.

3. In an aeroplane sighting device: the combination of a suitable observing apparatus; a suitable governor; means for transmitting motion from the governor to the observing apparatus; a driving apparatus propelled by air currents; and means for transmitting power from the driving apparatus to the governor.

4. In an aeroplane sighting device: an air propelled apparatus for transmitting motion to a shaft; a suitable governor attached to said shaft; a governor shaft; a suitable observing apparatus; a suitable lever for transmitting motion from the governor shaft to the observing apparatus and thereby varying the position of the observing apparatus.

5. In an aeroplane sighting device: the combination of a suitable air propelled apparatus; suitable means for transmitting motion from the air propelled apparatus to a governor; a suitable governor operated by the air propelled apparatus; suitable apparatus for connecting the said governor with an observing instrument; an observing instrument arranged to be shifted by means of said governor and connecting apparatus and a suitable framework attached to an aeroplane for securing the said parts in their relative positions, all substantially as described and for the uses and purposes set forth.

6. In an aeroplane sighting device: vanes 3 and 4 attached to a revolving arm 1; said arm 1 attached to a vertical shaft 2; collars 8 and 9 for preventing longitudinal motion of the shaft 2; a collar 10, connecting links 11, weights 12 and collar 13 constituting a governor attached to the shaft 2 and to the shaft 14; a shaft 14 which is supported by the governor and which rotates with the governor; a spring 19 for regulating the vertical motion of the shaft 14; a collar 18 and pin 20 on the lower end of the shaft 14; a lever 21 slotted at one end to receive the pin 20; a pivot secured to the framework upon which said lever 21 operates; a suitable framework attached to the aeroplane frame 5 and constructed in such a manner as to retain all the parts in their relative positions; a suitable view box 23 attached to said lever 21; a telescope attached to said box 23 and adapted to throw an image of the field covered by it upon a reflector 25 in said box, a reflector 25 by means of which the image is thrown upon a screen 26; said screen 26 placed in said box 23 and an eye-piece 27 through which said screen may be seen by the operator, all substantially as described.

FRANK L. SLACK.

Witnesses:
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