F. E. BORKENHAGEN.

BALANCING DEVICE FOR LIFTING BIPLANES.

APPLICATION FILED APR. 10, 1911.

**1,008,888.**

**Patented Nov. 14, 1911.**

3 SHEETS—SHEET 1.

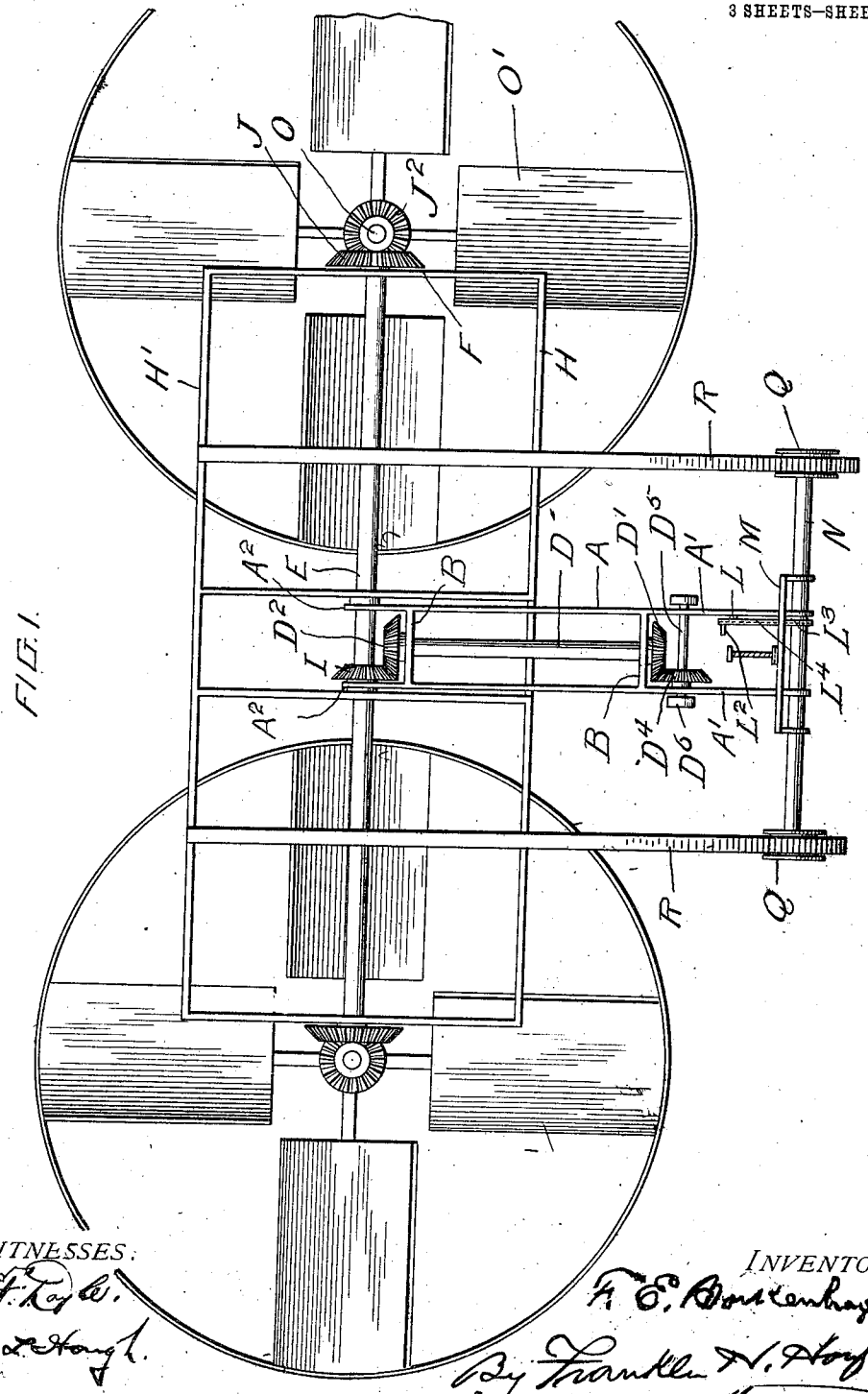


FIG. 1.

WITNESSES:

INVENTOR

F. E. Borkenhagen

By Franklin W. Hough

Attorney

F. E. BORKENHAGEN.

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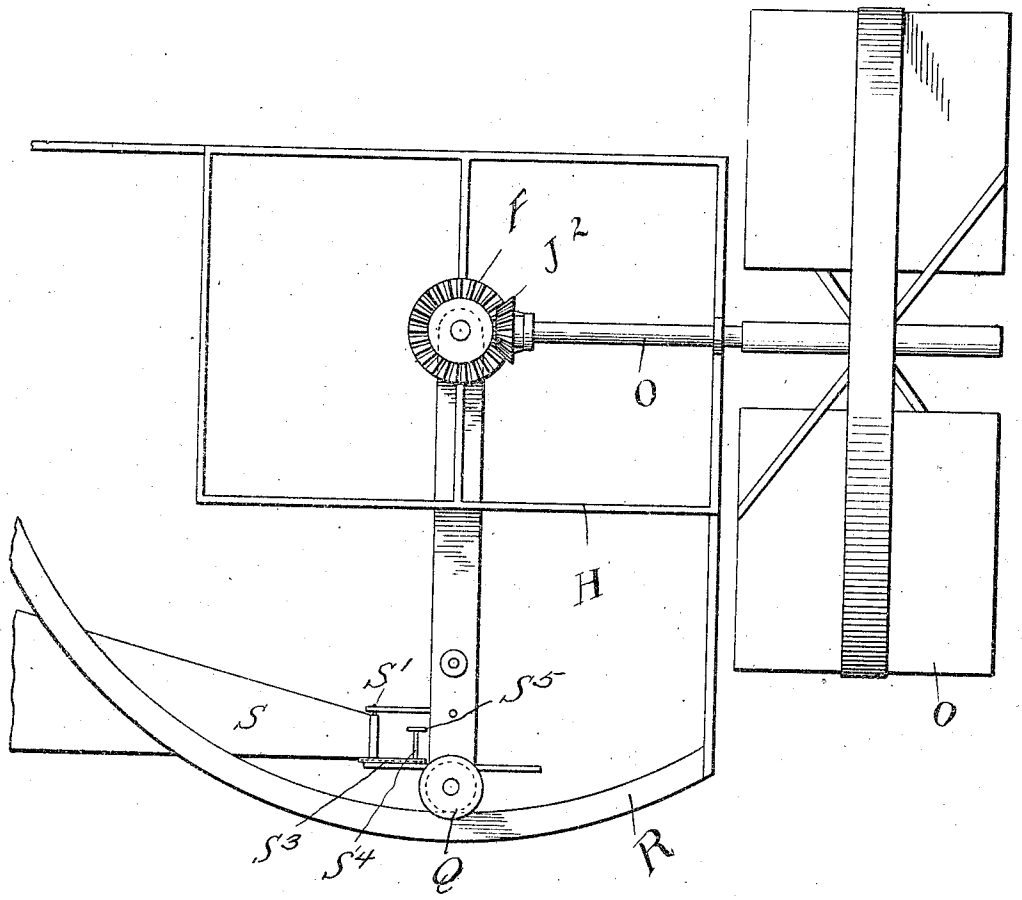
3 SHEETS—SHEET 2.

FIG. 2.




WITNESSES:

H. F. Kayle.

A. E. Hough

F. E. Borkenhagen, INVENTOR

BY Franklin H. Hough

Attorney

F. E. BORKENHAGEN.

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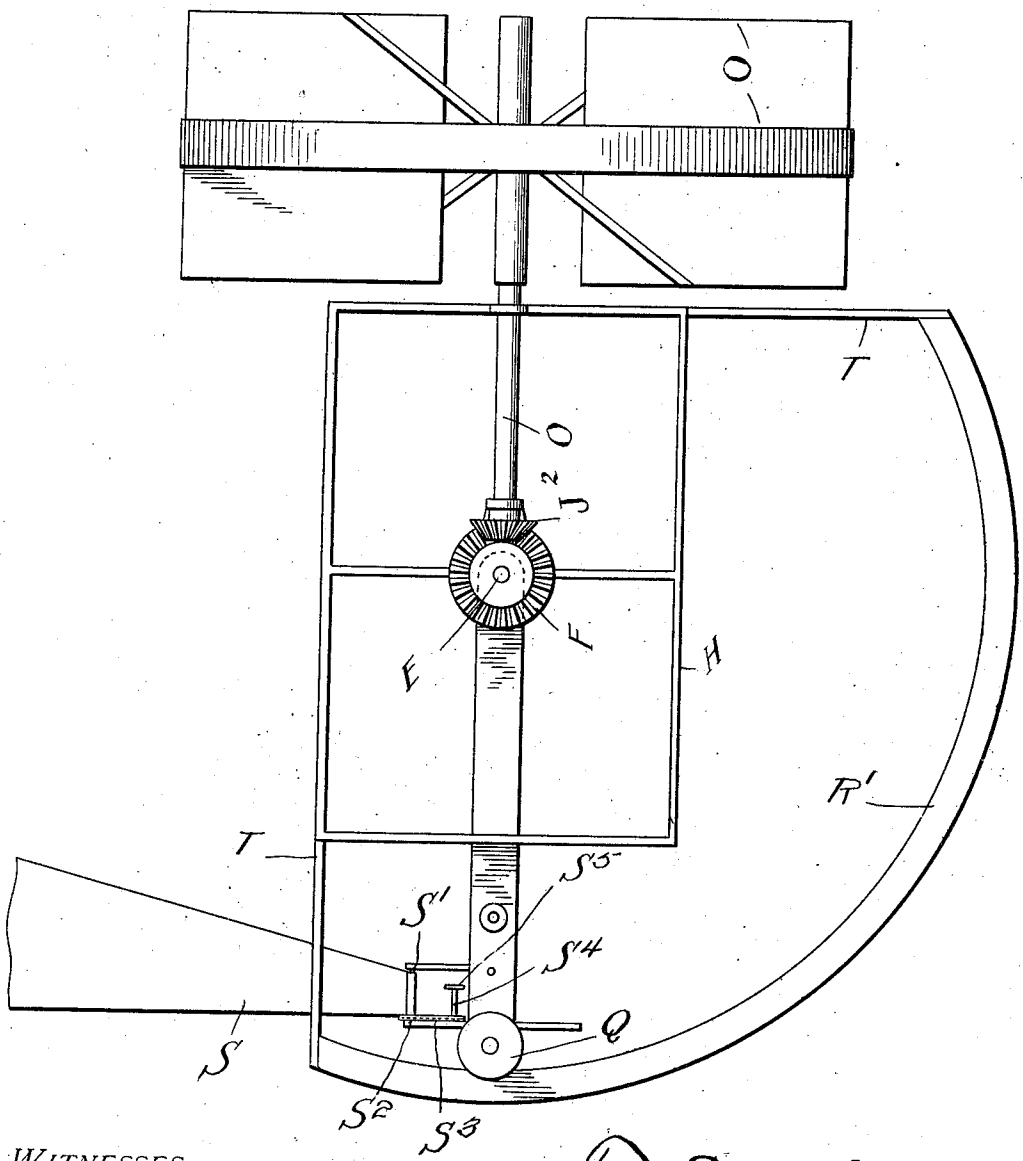
3 SHEETS—SHEET 3.

FIG. 3.




WITNESSES:

W. F. Coyle.

A. E. Hough

INVENTOR

H. E. Borkenhagen,

BY Franklin V. Hough

Attorney

# UNITED STATES PATENT OFFICE.

FRANCIS E. BORKENHAGEN, OF CALDWELL, IDAHO.

## BALANCING DEVICE FOR LIFTING BIPLANES.

1,008,888. Specification of Letters Patent. **Patented Nov. 14, 1911.**

Application filed April 10, 1911. Serial No. 620,026.

*To all whom it may concern:*

Be it known that I, FRANCIS E. BORKENHAGEN, a citizen of the United States, residing at Caldwell, in the county of Canyon and State of Idaho, have invented certain new and useful Improvements in Balancing Devices for Lifting Biplanes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in balancing device to be used in connection with vertical lifting biplanes and comprises various details of construction and combinations and arrangements of parts which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, in which:—

Figure 1 is a rear elevation of the invention. Fig. 2 is a side elevation showing the planes horizontally disposed, and Fig. 3 is a similar view showing the planes in vertical positions.

Reference now being had to the details of the drawings by letter, A designates a rectangular outlined frame having depending arms A′ and reinforced by cross-pieces B. A shaft D is journaled in suitable bearings in said cross-pieces and at one end of the shaft is a beveled gear D′ and at its other end a similar beveled gear wheel $D^2$. The beveled gear D′ meshes with a similar gear wheel $D^4$ which is fixed to the driving shaft $D^5$, journaled in the arms A′ and to which shaft $D^5$ driving pulleys $D^6$ are fixed, through which power from any suitable source, not shown, may be applied for driving the apparatus. At one end of the rectangular outlined frame A are the arms $A^2$ in which the driving shaft E is journaled, which is also journaled in the bearings in the ends F of the planes H and H′. The shaft E has a beveled wheel I fixed thereto which is in mesh with the beveled wheel $D^2$ and at each end of the shaft D is a beveled gear J meshing with a beveled gear $J^2$ fixed to the shaft O upon which the propellers O′ are mounted.

A shaft N is mounted in suitable bearings in the depending arms A′ of the frame and above which is a platform M. Flanged wheels Q are fastened to the ends of the shaft N and are adapted to contact frictionally with the rockers R, shown clearly in side elevation in Figs. 2 and 3 of the drawings, and which rockers are fastened to the extensions T of the frame of the bi-plane.

A rudder S is pivotally mounted upon a shaft S′ carrying a sprocket wheel $S^2$ about which a sprocket chain $S^3$ passes and also about a sprocket wheel keyed to the shaft $S^4$, having a steering wheel $S^5$ fixed thereto.

Mounted upon a stub shaft L, shown in Fig. 1 of the drawings, is a sprocket wheel L′ with a handle $L^2$ fixed thereto and a sprocket wheel $L^3$ is fixed to the shaft N and about which sprocket wheels $L^3$ and L′ a sprocket chain $L^4$ passes, forming means for rotating the shaft N when it is desired to tilt the planes which is effected by the frictional contact of the flanged wheels with the rockers R.

In operation, the weight of the operator upon the platform will have a tendency to hold the shaft N underneath the operating shaft and, when it is desired to tilt the biplanes, it may be done by the operator turning the wheel having the handle $L^2$, thus causing the two flanged wheels to frictionally bear against the rockers and tilt the planes to the desired angle. By the manipulation of the hand wheel $S^5$, the rudder may be swung laterally for the purpose of guiding the craft.

It will be noted that, by the construction shown, the tracks and other parts of the apparatus will allow free swinging movement to the planes and propellers without interference.

What I claim to be new is:—

1. A balancing device for vertical lifting, bi-planes comprising a frame, a power shaft journaled therein, a propeller driving shaft, geared connections between the shafts; biplane frames in which said propeller driving shafts are journaled, rocker members fixed to the frame of the bi-planes, a counter shaft journaled in the frame of the apparatus, flanged wheels fixed to said counter shaft and engaging said rocker members, and means for rotating the counter shaft.

2. A balancing device for vertical lifting, bi-planes comprising a frame, a power shaft journaled therein, a propeller driving shaft, geared connections between the shafts, bi-

plane frames in which said propeller driving shafts are journaled, rocker members fixed to the frame of the bi-planes, a counter shaft journaled in the frame of the apparatus, flanged wheels fixed to said counter shaft and engaging said rocker members, sprocket wheels journaled one upon the frame and the other upon the counter shaft, connections between the sprocket wheels, and a handle for operating one of said sprocket wheels.

3. A balancing device for lifting, bi-planes comprising a frame, a propeller shaft upon which the same hangs, bi-planes having a frame in which said propelling shaft is journaled, rocker members fixed to the frame, a driving shaft mounted in depending arms of the frame, a counter shaft having flanged wheels thereon and journaled in the frame, said flanged wheels designed to engage the rocker members, a rudder pivotally mounted upon the frame, and means for operating the same.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

FRANCIS E. BORKENHAGEN.

Witnesses:

L. C. JACKSON,

T. A. WALTERS.