

E. H. EICHENFELS.
TOY FLYING MACHINE.

APPLICATION FILED JAN. 20, 1908. RENEWED DEC. 5, 1908.

911,538.

Patented Feb. 2, 1909.

2 SHEETS—SHEET 1.

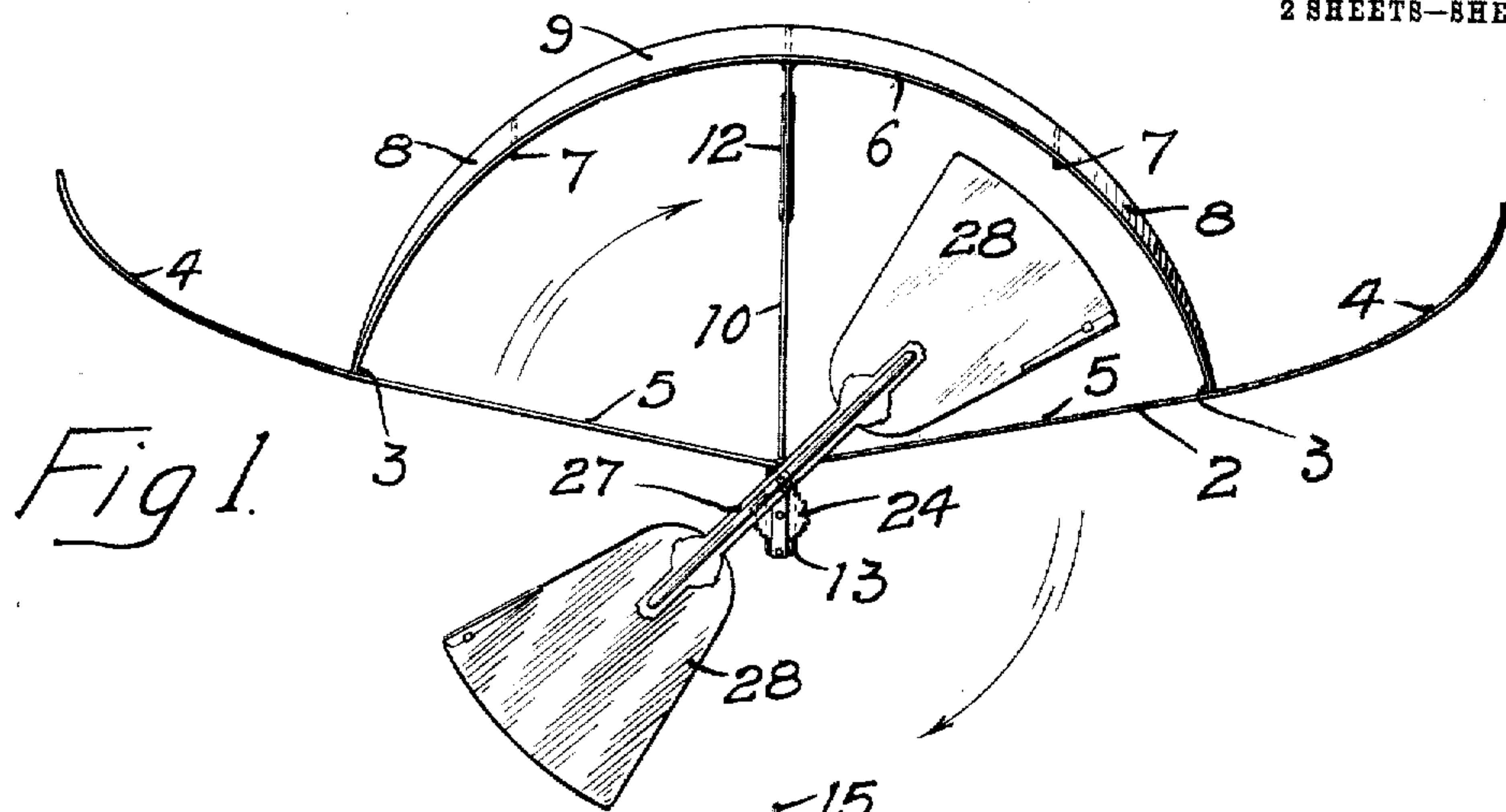


Fig 1.

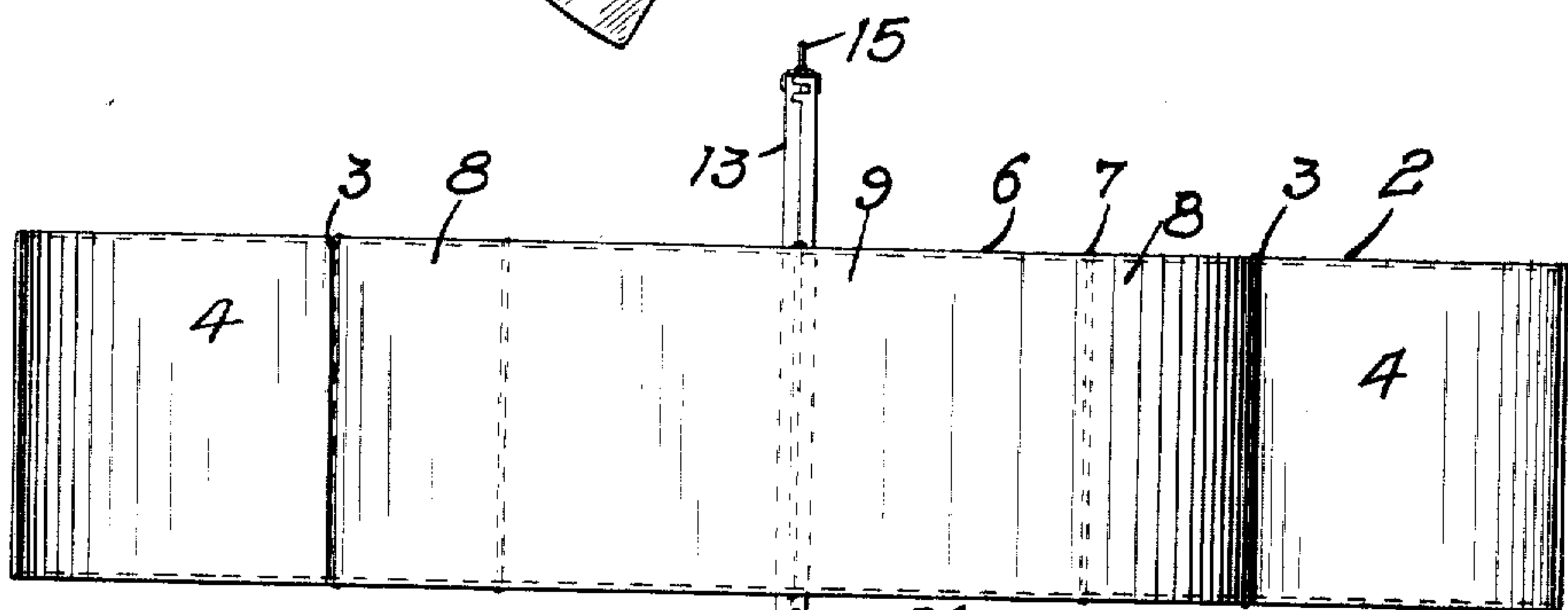


Fig 2.

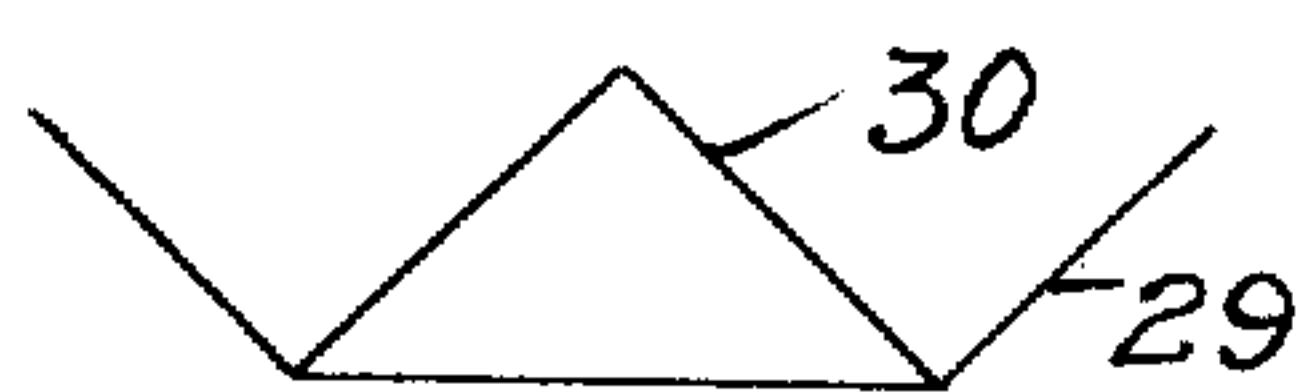
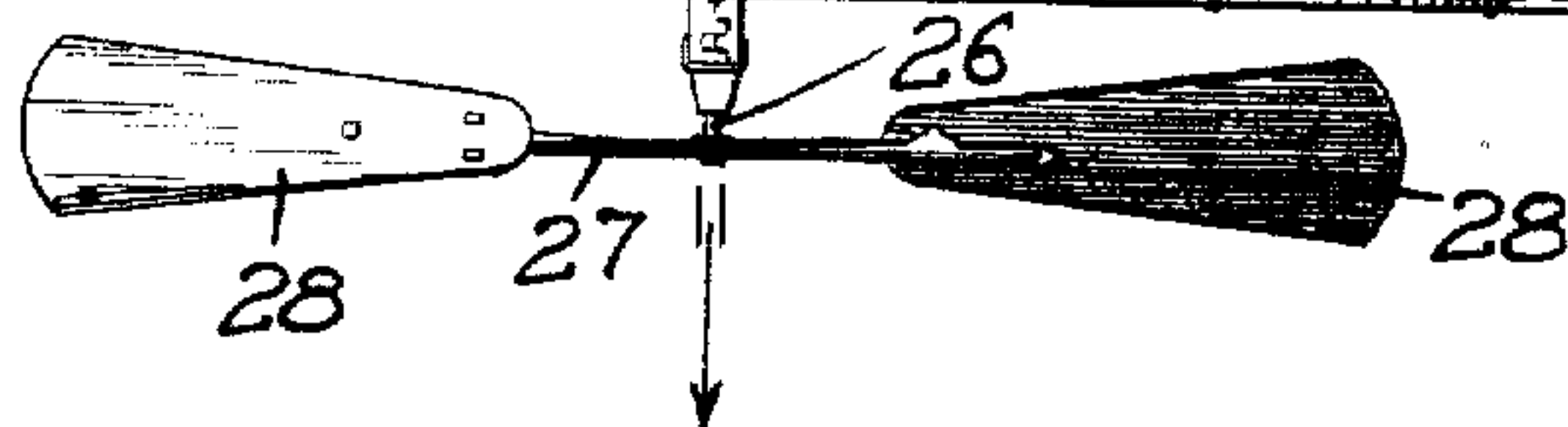


Fig 6.



Fig 7.

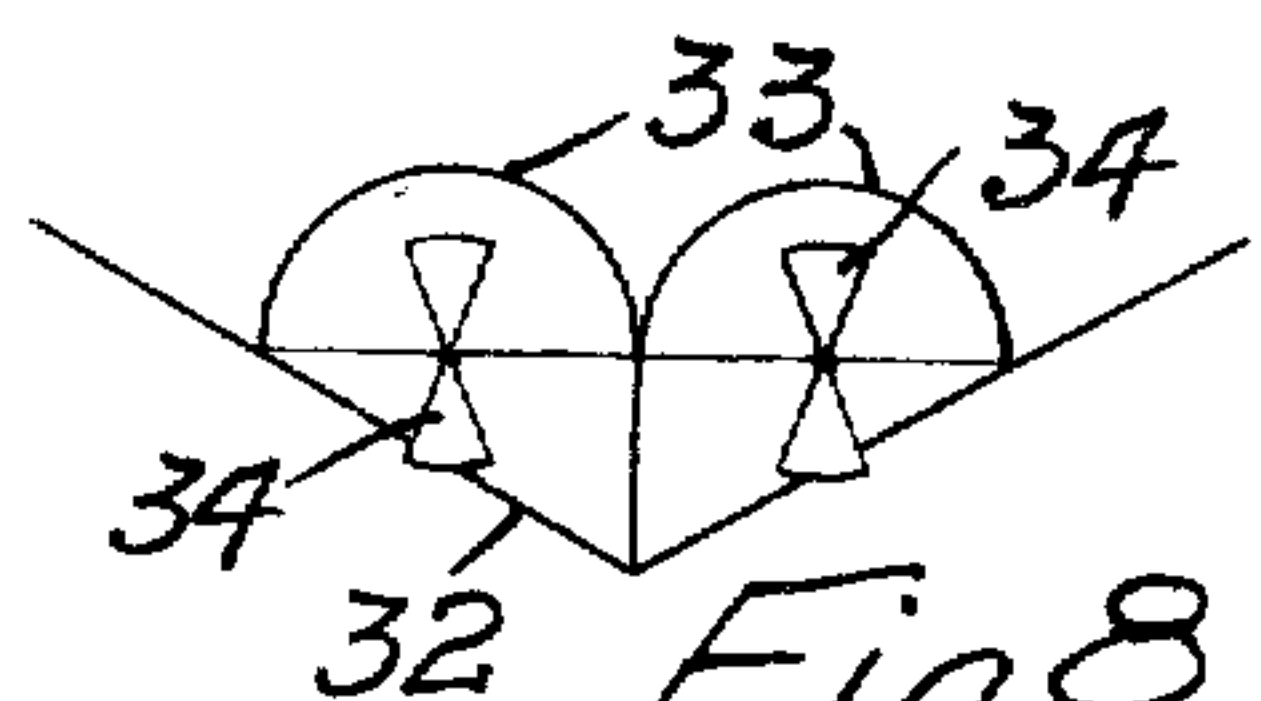


Fig 8.

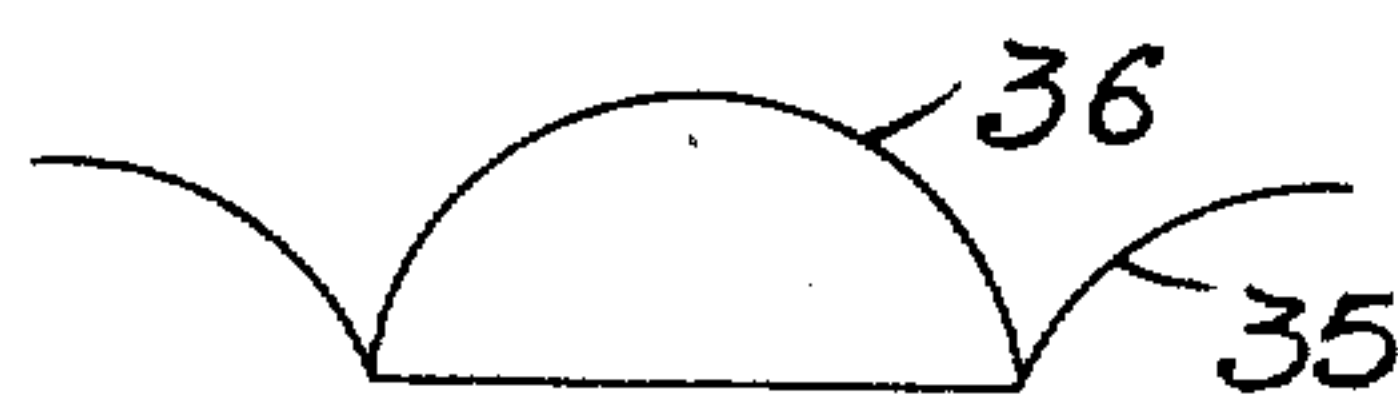


Fig 9.

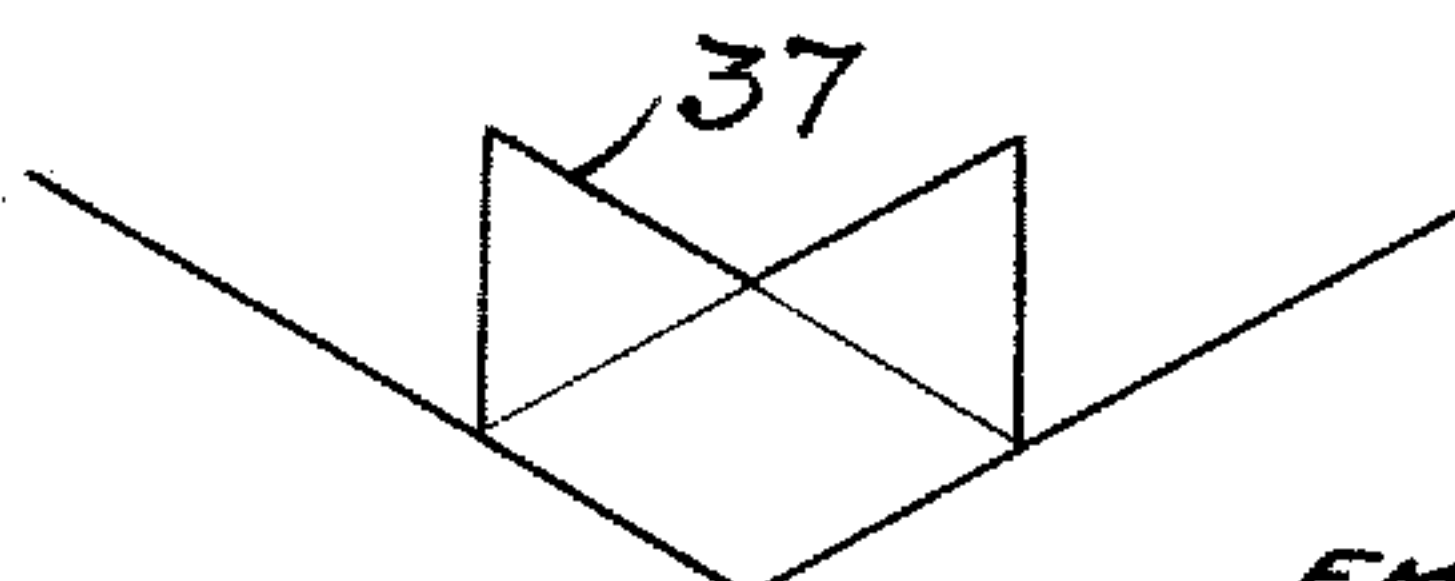


Fig 10.

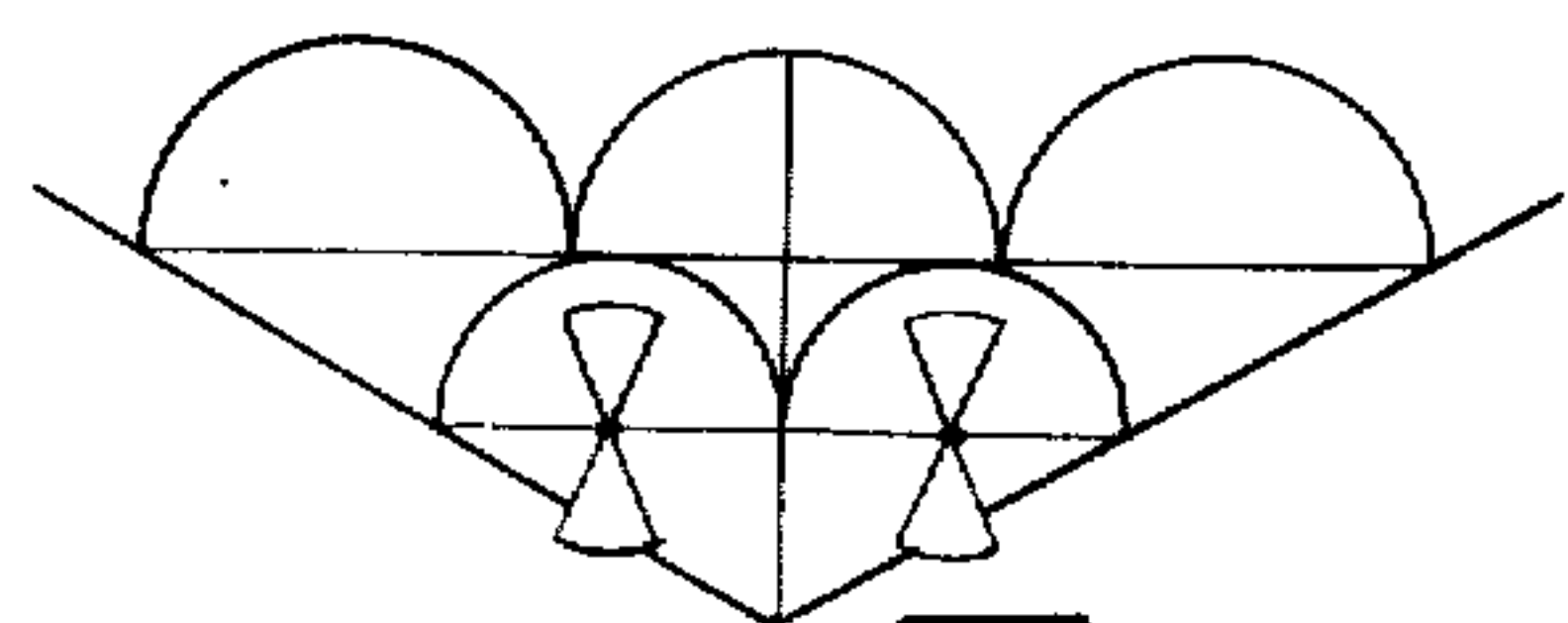


Fig 11.

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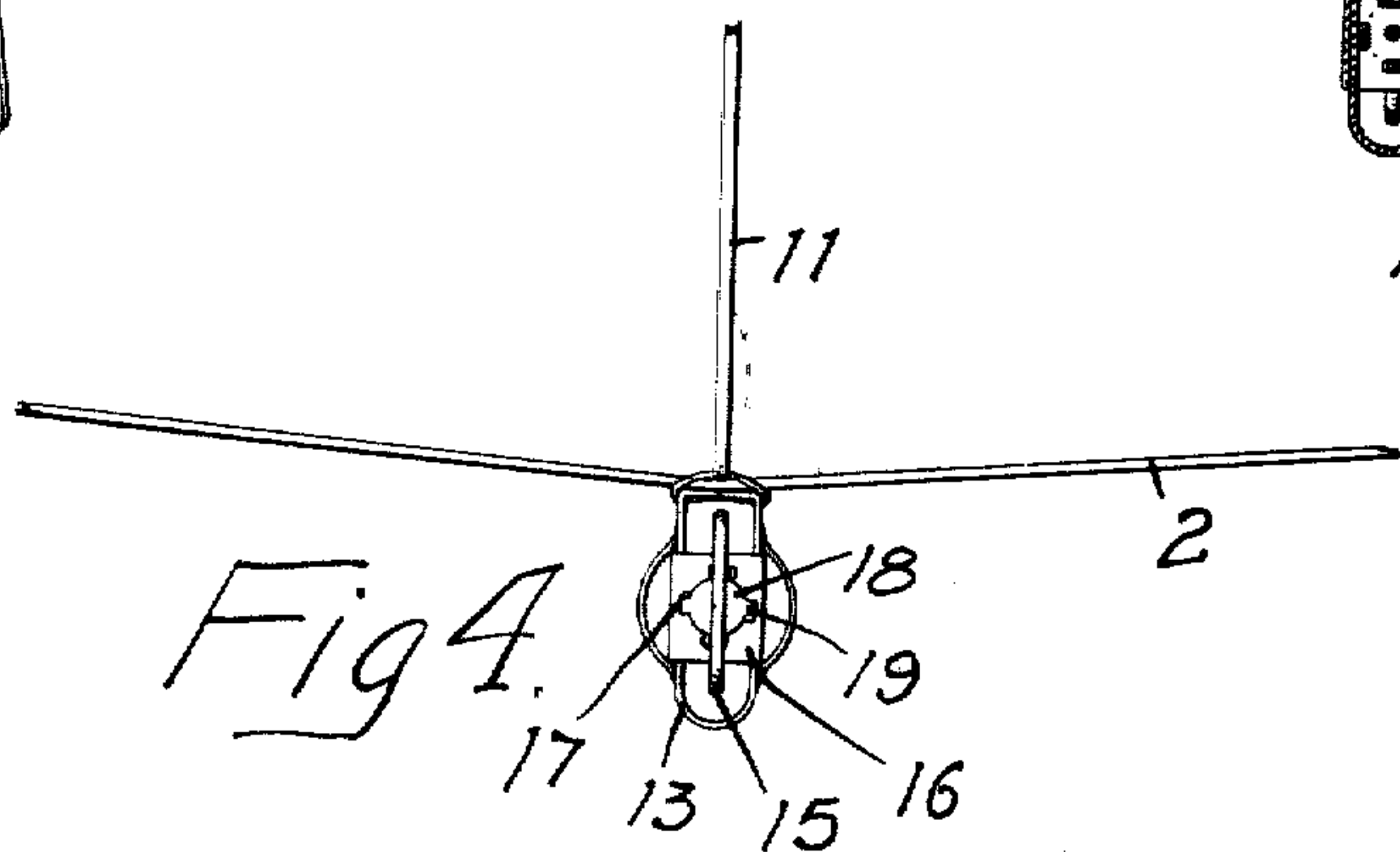
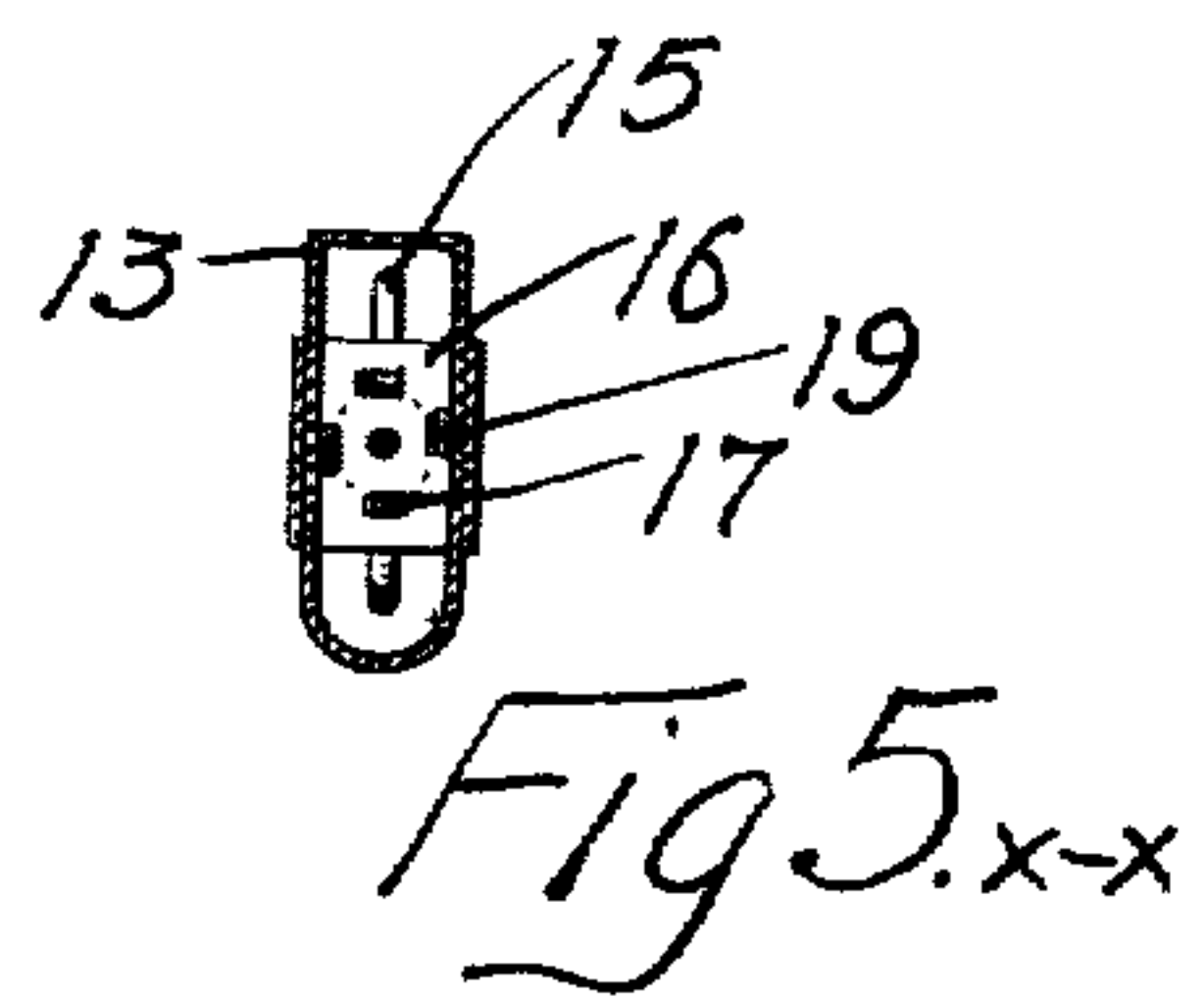
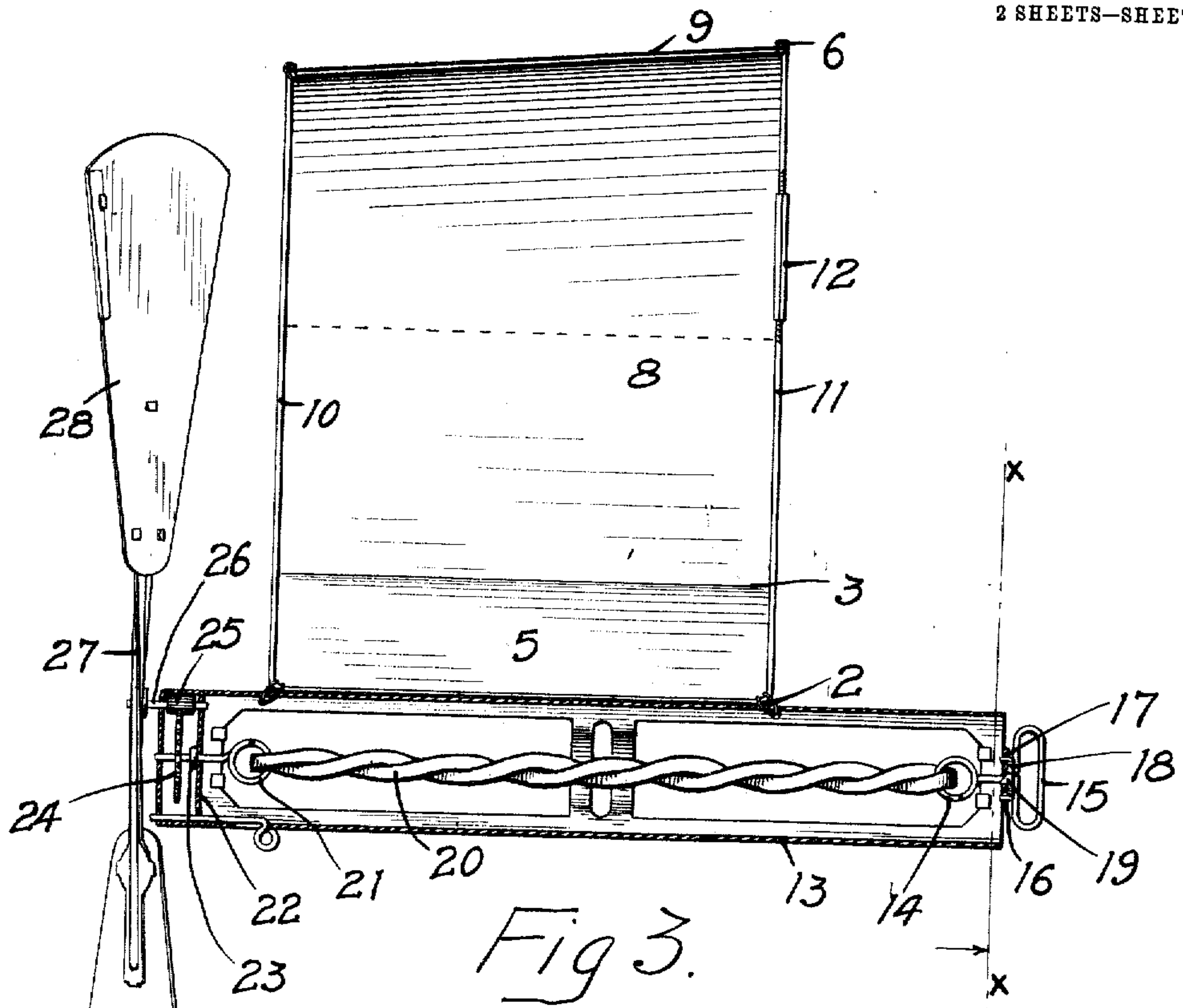
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

EMIL H. EICHENFELS, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO H. J. NICE COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MIN-
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TOY FLYING-MACHINE.

No. 911,538.

Specification of Letters Patent.

Patented Feb. 2, 1909.

Application filed January 20, 1908, Serial No. 411,591. Renewed December 5, 1908. Serial No. 466,163.

To all whom it may concern:

Be it known that I, EMIL H. EICHENFELS, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Im-
5 improvements in Toy Flying-Machines, of which the following is a specification.

My invention relates to flying machines and particularly to those of the toy type.

10 The object of my invention is to provide a flying machine that will float upon the air and move a considerable distance, through the buoyancy and support derived from its shape and the relative arrangement of its parts and its propelling means.

15 A further object is to provide a flying machine of very simple and economical construction and one that is particularly adapted for toy purposes.

20 The invention consists generally in an aero-plane member and a curved or arched hood mounted thereon.

Further, the invention consists in a propeller opposite the transverse axis of the aero-plane member and in front of the hood
25 whereby the air currents will be drawn through or under the hood.

Further, the invention consists in means for raising or lowering the rear edge of the hood for the purpose of changing the center
30 of gravity of the device and regulating the angle of its flight.

Further, the invention consists in means whereby the machine is caused to describe a curve in its flight either to the right or the
35 left and return substantially to the starting point.

Further, the invention consists in various constructions and combinations, all as hereinafter described and particularly pointed
40 out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a front view of a flying machine embodying my invention. Fig. 2 is a plan view of the same.
45 Fig. 3 is a transverse vertical sectional view illustrating the propelling means. Fig. 4 is a rear view of a portion of the machine illustrating the means for putting the propelling device under tension. Fig. 5 is a sectional
50 view on the line $x-x$ of Fig. 3. Figs. 6, 7, 8, 9, 10 and 11 are diagrammatic views illustrating modified forms of the aero-plane and hood members.

55 In the drawing, 2 represents the frame of the aero-plane portion of the machine con-

sisting of small strips of bamboo or other light fibrous material which possesses considerable strength in proportion to its weight. Cross bars 3 of the same material connect the sides of the aero-plane frame and brace
60 and strengthen the same. The frame is filled with suitable panels 4 and 5 of thin light material such as paper, silk, etc. The ends of the aero-plane are turned upwardly as indicated in Fig. 1, and its under surface
65 corresponds substantially to the curve of the bottom of a boat, the aero-plane floating on the currents of air in much the same way as a boat floats upon the water. The upwardly curved ends tend to make the ma-
70 chine more stable allowing it to rise and fall as the lateral currents of air strike the curved ends and causing the machine to tip in much the same way as a bird follows the shifting air currents. The flexible ends of
75 the aero-plane provides for lateral balance.

Upon the aero-plane I mount a hood or arched frame 6 having suitable cross braces 7 and end panels 8 and an intermediate panel 9. The ends of the frame 6 are se-
80 cured to the aero-plane by any suitable means and vertical braces 10 and 11 connect the middle portion of the aero-plane with the corresponding portion of the hood, a turn buckle device 12 being provided in the
85 brace 11 for the purpose of lengthening or shortening the braces and raising or lowering the rear edge of the hood. Normally the hood flares slightly from its forward towards its rear edge and by adjusting the turn
90 buckle the center of gravity of the machine may be changed to vary its equilibrium and cause it to alter the angle of its flight.

Beneath the middle portion of the aero-plane and directly under the hood I arrange
95 a transverse frame 13 of light material, in the rear end of which a hook 14 is mounted having a handle 15. A plate 16 is provided in the end of the frame having a series of notches 17 therein and a disk 18 is secured
100 to the said handle and has lugs 19 adapted to drop into said notches and lock the hook 14 against backward rotation. This locking device is in effect a simple inexpensive ratchet, very effective for the purpose de-
105 signed and very light and easily made.

A propelling device 20 is provided within the frame 13 consisting preferably of a band of elastic material such as rubber that is
110 capable, when twisted, of exerting consid-

erale power for driving a mechanism attached thereto. At the opposite end of the frame is a hook 21 to which the tension band is attached, said hook having bearings in the end of the frame and in a wall 22 and held against longitudinal movement in one direction by a button 23. A gear 24 is mounted on the shank of the hook and arranged to mesh with a pinion 25 on a stud 26 that has bearings in the end of the frame and the wall 22 and carries a propeller 27 that is provided with blades 28. These blades are near the forward edge of the hood and their revolution tends to suck the air through the hood.

In preparing the device for flight the handle 15 is turned until the tension band is fully wound up and the handle being prevented from turning backward by the ratchet the power of the tension device will be applied to the hook 21 and transmitted to the propeller to revolve the same. The revolution of the propeller will draw the air through the hood and the machine will float out upon the air currents describing a wide curve and returning substantially to the starting point. It will roll slightly to accommodate itself to any cross currents of air and will rise and fall as it floats along in much the same manner as a bird will float upon the air or a boat upon the water.

I have found that the curved form of hood over the aero-plane produces the best result as it impinges on a greater volume of air than would be possible with a straight hood. I have also found that the currents of air produced by the action of the propeller will be directed through the hood and the velocity of the air traveling between the hood and the aero-plane is increased and the carrying capacity of the machine is correspondingly augmented. The curved form of the hood and its location over the center of the aero-plane allows the greatest pressure of the atmosphere to be applied to the middle portion of the hood, thereby increasing the equilibrium of the machine. Cross currents of air striking the machine will have the least effect on a hood of this form. Furthermore, the greatest degree of stability may be obtained without providing a multiplicity of braces and increasing the weight of the machine. As heretofore stated the longitudinal equilibrium may be easily controlled by the adjustment of the turn buckle.

Ordinarily a single propeller will operate a device of this kind in a straight line only. By means of this form of hood and the location of the propeller blades, I am able to describe a curve with the machine and return it substantially to the starting point. I am further able to dispense with all rudders or equivalent devices and control the direction of movement of the machine by the simple operation of the propeller coöperat-

ing with the ends of the curved hood. I may prefer the form of hood shown in Fig. 1 and also the type of aero-plane illustrated therein, but in Figs. 6 to 11 inclusive, I have shown diagrammatic views of various forms of aero-planes and hoods which might be employed.

In Fig. 6 the aero-plane 29 has straight upwardly turned ends and the hood 30 between them has straight sides also, the apex of the hood being directly above the middle of the aero-plane.

In Fig. 7 a series of curved hoods 31 are shown.

In Fig. 8 the outline of an aero-plane 32 is illustrated, having its ends inclined upwardly from the center. Hoods 33 are mounted over the aero-plane and have propellers 34.

In Fig. 9 an aero-plane with a straight middle portion and curved ends 35, is shown with a curved hood 36 over the middle portion.

In Fig. 10 an aero-plane similar to the one shown in Fig. 8 has a hood mounted thereon that has vertical ends and a top portion 37 that is inclined downwardly from the ends toward the center.

In Fig. 11 a series of hoods similar to those illustrated in Fig. 8 are shown arranged in two rows one above another, the aero-plane feature being similar to that illustrated in Fig. 8.

To operate the machine the handle 15 is turned until the elastic band is twisted and put under torsion. The device is then released at the desired elevation and the propeller will be rapidly revolved. The operation of the propeller will cause currents of air to be drawn through the curved hood and the blades of the propeller passing near the forward edge of the hood and its upper curved wall will direct currents of air against the top of the hood, and the air displaced by the aero-plane aided by the currents drawn through the hood by the revolving propeller blades will overcome the forces of gravity and the machine will float lightly on the air and be drawn forward by the action of the propeller.

I prefer to use the elastic band device as a source of power as it is extremely light, occupies but little space in the machine, is comparatively durable and when worn out or broken can be easily replaced with but little expense.

I do not wish to be confined in this application to the form of frame shown for the power supplying means, or the means employed for transmitting the power to the propeller, nor do I wish to be confined to any particular size of the machine as it is capable of various modifications without departing from the spirit of my invention.

I claim as my invention:—

1. A toy flying machine comprising an

aero-plane member, a hood member open at its ends mounted thereon, and a propeller carried by the aero-plane member and having its blades arranged to sweep past the open forward end of said hood, and means for operating said propeller.

2. A toy flying machine comprising an aero-plane having upwardly curved ends, a hood open at its ends mounted on said aero-plane over the middle portion thereof, said hood being curved or arched, and a propeller carried by the aero-plane member and centrally arranged with respect to said aero-plane and having blades arranged to sweep past the opening between said aero-plane and hood, substantially as described.

3. A toy flying machine comprising an aero-plane member, a curved hood having its ends secured to said aero-plane, the ends of said aero-plane projecting beyond said hood on each side, said hood being open in the front and rear, and a propeller carried by the aero-plane member and operating in a vertical plane and arranged to sweep past the open forward end of said hood, said propeller drawing currents of air through said hood and directing them against the upper walls thereof, whereby the buoyancy of the device is increased.

4. A toy flying machine comprising an aero-plane element, a hood element open at both ends mounted thereon and substantially semi-circular in form and covering the middle portion of said aero-plane, a propeller carried by the aero-plane element having blades arranged to sweep past the open forward end of said hood and draw the air there-through.

5. A toy flying machine comprising an aero-plane element having a substantially flat middle portion and upwardly curved ends, a hood substantially semi-circular in form mounted over the middle portion of said aero-plane and open in the front and rear, a propeller carried by the aero-plane member and arranged to revolve in front of said hood the blades of said propeller sweeping past the forward edge of said hood and near the same, the currents of air drawn through the hood by the revolution of said propeller being directed against the walls of the hood whereby its sustaining power is increased.

6. A toy flying machine comprising an aero-plane, a curved hood mounted thereon

and open in the front and rear, a propeller carried by the aero-plane and arranged to revolve near the open end of said hood, and means for raising or lowering the rear end of said hood for the purpose specified.

7. A toy flying machine comprising an aero-plane, a curved hood centrally mounted thereon and open in the front and rear, the walls of said hood flaring slightly from the front toward the rear end, and a propeller carried by the aero-plane and having blades arranged to revolve past the open front end of said hood and near the same.

8. In a toy flying machine, the combination, with an aero-plane, of a frame centrally and transversely mounted thereon, a propeller carried by said frame, means arranged to be put under tension for operating said propeller a period of time, a hood open at its ends and mounted on said aero-plane and having its open end near the path of said propeller blades, substantially as described.

9. In a toy flying machine, the combination, with an aero-plane, of a frame carried thereby, a propeller carried by the frame, an elastic band connected to the propeller and means for twisting said band to put it under tension to drive said propeller when released, and a hood mounted on said aero-plane and open in the front and rear and located near the path of said propeller, substantially as described.

10. A toy flying machine comprising an aero-plane element having upwardly curved ends and consisting of a light frame work having panels of thin material therein, a curved hood arranged over the middle portion of said aero-plane and also consisting of a frame with panels therefor, said hood being open in the front and rear, a propeller having blades arranged to sweep past the open end of said hood, the currents of air from the blades of said propeller being directed against the curved inner surface of said hood and the passage of air through said hood being augmented by the movement of said propeller, substantially as described.

In witness whereof, I have hereunto set my hand this 8th day of January 1908.

EMIL H. EICHENFELS.

Witnesses:

J. H. BALDWIN,
J. A. BYINGTON.