

N<sup>o</sup> 21,952



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PROVISIONAL SPECIFICATION.

“Improvements in Flying Machines.”

I, WILLIAM BRITAIN, of “Wildwood”, Rowantree Road, Enfield, Middlesex, Toy Manufacturer, do hereby declare the nature of this invention to be as follows:—

5 The purpose of this invention is to provide a flying machine and the invention consists in various details or in the selection or combination of such details by which a practical flying machine may be constructed.

10 Employing one or more carrying planes of a suitable curvature in longitudinal section and so placed that the whole is inclined to a horizontal longitudinal line of intended flight, I combine with these a tail spaced rearwardly from these planes, the tail serving also partially as a carrying plane and being normally horizontal transversely and inclined in a fore and aft direction to a less angle than the inclination of the aforesaid planes. The tail is preferably broader than its length and is capable of lateral and of fore and aft variation of inclination under the control of the steersman. The centre of gravity of the machine is so placed that the tail carries less weight than the other planes per unit of surface preferably about one half and is so situated vertically that it lies in, or slightly below a line joining the centres of support of the combined carrying planes and of the tail. The control of the tail may be provided for by means of one or two parallel steering wheels for giving fore and aft tilt mounted on a swinging axle or tiller for giving lateral tilt.

15 The machine comprises two similar screw propellers revolvable in contrary directions one being a right hand, the other a left hand screw. These propellers are made as large as conveniently possible and are placed at equal distances one on each side of the centre vertical plane of the machine having their axes inclined at about the same angle as a line drawn from back to front edge of the carrying planes. They may be provided with as many blades as may be found to add to their efficiency.

20 Each blade is constructed with a transverse curve; the concave side being towards the rear, the curve being slight at the extremity and increasing towards the axis. Each blade is constructed with its front edge parallel to, but slightly in advance of a radial line from the axis; and the back edge forms a curve, so that the general pitch slightly decreases as it approaches the axis and the blades are arranged to fill sufficient of the central zones of the propeller to prevent forward escape of the air driven by the propeller.

25 The aforesaid propellers are preferably of “free wheel”, or of feathered type. They are preferably placed behind the main supporting planes. Their direction of revolution is such that the nearest blades of the two propellers move upwardly.

30 The propellers are placed in such a position that the centre of forward resistance of the whole machine when in flight, lies as near as possible in the plane in which the axes of the propellers lie.

35 The framework of the machine is provided with wheels so placed as to support the machine at a convenient angle to permit it when set in motion to run along the ground and to rise from the ground when the speed has become sufficient for flying. It is essential that the wheels should have a castor action so as to permit the machine to move freely obliquely or laterally according to the varying currents of air that it may meet before it leaves the ground. To cushion the machine

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on alighting the wheels or their supporting frames are spring mounted, and in order that the swinging of these wheels may not affect the balance of the machine when flying, the wheel frames are provided with springs sufficient to neutralize the weight of the wheels so that they normally hold or return to true fore and aft positions. 5

Dated this 16th day of October, 1908.

HERBERT HADDAN & Co.,  
Agents for Applicant,  
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## COMPLETE SPECIFICATION. 10

## "Improvements in Flying Machines."

I, WILLIAM BRITAIN, of "Wildwood", Rowantree Road, Enfield, Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:— 15

The purpose of this invention is to provide a flying machine and the invention consists in various details or in the selection or combination of such details by which a practical flying machine may be constructed.

Employing one or more carrying planes of a suitable curvature in longitudinal section and so placed that the whole is inclined to a horizontal longitudinal line of intended flight, I combine with these a tail spaced rearwardly from these planes, the tail serving also partially as a carrying plane and being normally horizontal transversely and inclined in a fore and aft direction to a less angle than the inclination of the aforesaid planes. The tail is preferably broader than its length and is capable of lateral and of fore and aft variation of inclination under the control of the steersman. The centre of gravity of the machine is so placed that the tail carries less weight than the other planes per unit of surface preferably about one half. The position of the centre of gravity depends on the relative areas of the planes and tail and it is so situated vertically that it lies in, or slightly below a line joining the centres of support of the combined carrying planes and of the tail. The control of the tail may be provided for by means of one or two parallel steering wheels for giving fore and aft tilt mounted on a swinging axle or tiller for giving lateral tilt. 20 25 30

The machine comprises two similar screw propellers revolvable in contrary directions one being a right hand, the other a left hand screw. These propellers are made as large as conveniently possible and are placed between the planes and the tail and at equal distances one on each side of the centre vertical plane of the machine having their axes inclined at about the same angle as a line drawn from back to front edge of the carrying planes. They may be provided with as many blades as may be found to add to their efficiency. 35 40

Each blade is constructed with a transverse curve; the concave side being towards the rear, the curve being slight at the extremity and increasing towards the axis. Each blade is constructed with its front edge parallel to, but slightly in advance of a radial line from the axis; and the back edge forms a curve, so that the general pitch slightly decreases as it approaches the axis and the blades are arranged to fill sufficient of the central zones of the propeller to prevent forward escape of the air driven by the propeller. 45

The propellers are preferably of "free wheel" or of flexible-blade type. They may be placed behind the main supporting planes. Their direction of revolution is such that the nearest blades of the two propellers move upwardly. 50

The propellers are placed in such a position that the centre of forward resistance of the whole machine when in flight, lies as near as possible in the plane in which the axes of the propellers lie.

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For transmitting the drive of the motor equally to the two propellers rotating in opposite directions mechanism is employed as described in the Specification of my Application for Patent No. 8866 of 1909 which is as follows:—

To the motor shaft is connected a comparatively small double grooved pulley 5 and a rocking beam or double armed lever is mounted on the same axis as that of the motor shaft or one approximately near thereto, this beam or double armed lever carrying on each of its arms another comparatively small single grooved pulley, hereinafter referred to as a jockey pulley. The two propellers to be 10 driven, or their shafts, are provided with pulleys of relatively large diameter, all the pulleys being approximately in the same plane. A single endless rope is carried about these pulleys as follows: Commencing at any point, for example, below the left hand propeller pulley the rope may be said to extend over the motor shaft pulley, clockwise around about three-quarters of the circumference 15 in one of the grooves of the same, over the left hand jockey pulley, around about three-quarters of its circumference in anti-clockwise direction, thence over the right hand propeller pulley, clockwise round about three-quarters of the circumference thereof, thence to the under side of the motor shaft pulley, clockwise round about three-quarters of its circumference in the other groove thereof, 20 thence anti-clockwise round about three-quarters of the circumference of the right hand jockey pulley, thence over the left hand propeller pulley anti-clockwise round about three-quarters the circumference thereof and thus to the point whence the tracing of this circuit commenced.

The two arms of the beam or lever carrying the jockey pulleys lie at such angle to one another that the rope may normally contact with as large a part of the 25 circumference of the motor shaft pulley as is conveniently possible without causing contact between two oppositely moving parts of the rope.

A spring connects the beam to some convenient fixed part of the framework, tending to draw and hold the beam in such position as to tension the rope and maintain driving friction on the pulleys.

30 A suitable mechanical connection to the beam enables the latter to be rocked when desired in a direction contrary to the tension of the spring and so enables the rope to be slackened and the driving friction reduced so that the rope may slip.

The framework of the machine is provided with wheels mounted in frames 35 hinged or pivoted on horizontal axes and so placed as to support the machine at a convenient angle to permit it when set in motion to run along the ground and to rise from the ground when the speed has become sufficient for flying. It is essential that the wheels should have a castor action so as to permit the machine to move freely obliquely or laterally according to the varying currents of 40 air that it may meet before it leaves the ground. To cushion the machine on alighting the wheels or their supporting frames are spring mounted, and in order that the swinging of these wheels may not affect the balance of the machine when flying, the wheel frames are provided with springs sufficient to neutralize the weight of the wheels so that they normally hold or return 45 to true fore and aft positions.

A flying machine embodying the above devices is diagrammatically illustrated in the annexed drawing in which

Figure 1 is a side elevation,  
 Figure 2 a plan view with the propellers omitted, and  
 50 Figure 3 a cross-section on line 3—3 looking forwardly.  
 Figure 4 is a cross-section of the tail, and  
 Figure 5 illustrates the propeller driving gear, both on enlarged scale.

A suitably constructed framework carries the supporting planes *a*, the motor *b* the driver's seat *c* and the shafts *d d* on which the two propellers *e e* are mounted 55 to rotate. Rearward extensions of the framework carry the universal joint *f* of the tail *m*. These parts are relatively placed as illustrated.

A vertical steering pillar *g* rotatable on its axis gives lateral tilt to the tail

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by connection with the ropes  $h h^1$  and quadrant  $i$ . The steering pillar also carries the winding drum  $j$  journalled transversely on the pillar and carrying the hand wheels  $k k$ . The winding drum  $j$  is connected to the tail by ropes  $l l^1$  to give fore and aft tilt respectively.

The propellers  $e e$  illustrated are four bladed and constructed upon hollow tubes  $n$  mounted on ball bearings  $o o^1$  on the shafts  $d d$ , the ball bearing  $o^1$  is a thrust bearing—the blades are braced by wires  $p$ . Large grooved circles  $q$  are mounted on the front edges of the propeller blades concentric with their axes and are suitably braced to form rope pulleys for driving the propellers.  $r$  represents a small grooved pulley on the crank shaft of motor  $b$ ,  $s$  and  $s^1$  are jockey pulleys on the rocking beam or lever  $t$ .  $u$  is a spring tending to tauten the driving rope  $v$ , and  $w$  is a rod connected to the rocking beam and to mechanism suitably led into proximity with the driver's seat, so that by a pull on this rod the driving rope may be slackened until it ceases to transmit the drive of the motor  $b$ .

The three wheels  $x$  are carried respectively by oblique frames  $y$  horizontally pivoted at  $y^1$  to shafts  $z$  journalled in housings  $z^1$  to act as castors. The springs  $x^1$  cushion the wheels and the springs  $x^2$  tend to return them to true fore and aft positions.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A flying machine having one or more carrying planes of a suitable curvature in longitudinal section and so placed that the whole is inclined to a horizontal longitudinal line of intended flight combined with a tail spaced rearwardly from these planes and having universal movement, the said tail serving also partially as a carrying plane and being normally horizontal transversely and inclined in a fore and aft direction to a less angle than the inclination of the said planes, and two rotary propellers revolving in opposite directions and placed between the aforesaid planes and the tail.

2. A flying machine as in Claim 1, in which the centre of gravity of the machine is so placed that the tail carries less weight than the other planes per unit of surface preferably about one half, the centre of gravity being so situated vertically that it lies in, or slightly below a line joining the centres of support of the combined carrying planes and of the tail.

3. The combination with the tail herein described of one or two parallel steering wheels in a vertical plane or planes for giving fore and aft tilt mounted on a substantially horizontally swinging axle or tiller for giving lateral tilt.

4. A flying machine comprising two similar screw propellers revolvable in contrary directions, one on each side of the central vertical plane of the machine, said propellers having their axes inclined at about the same angle as a line drawn from back to front edge of the carrying planes and revolving so that their nearer sides move upwardly.

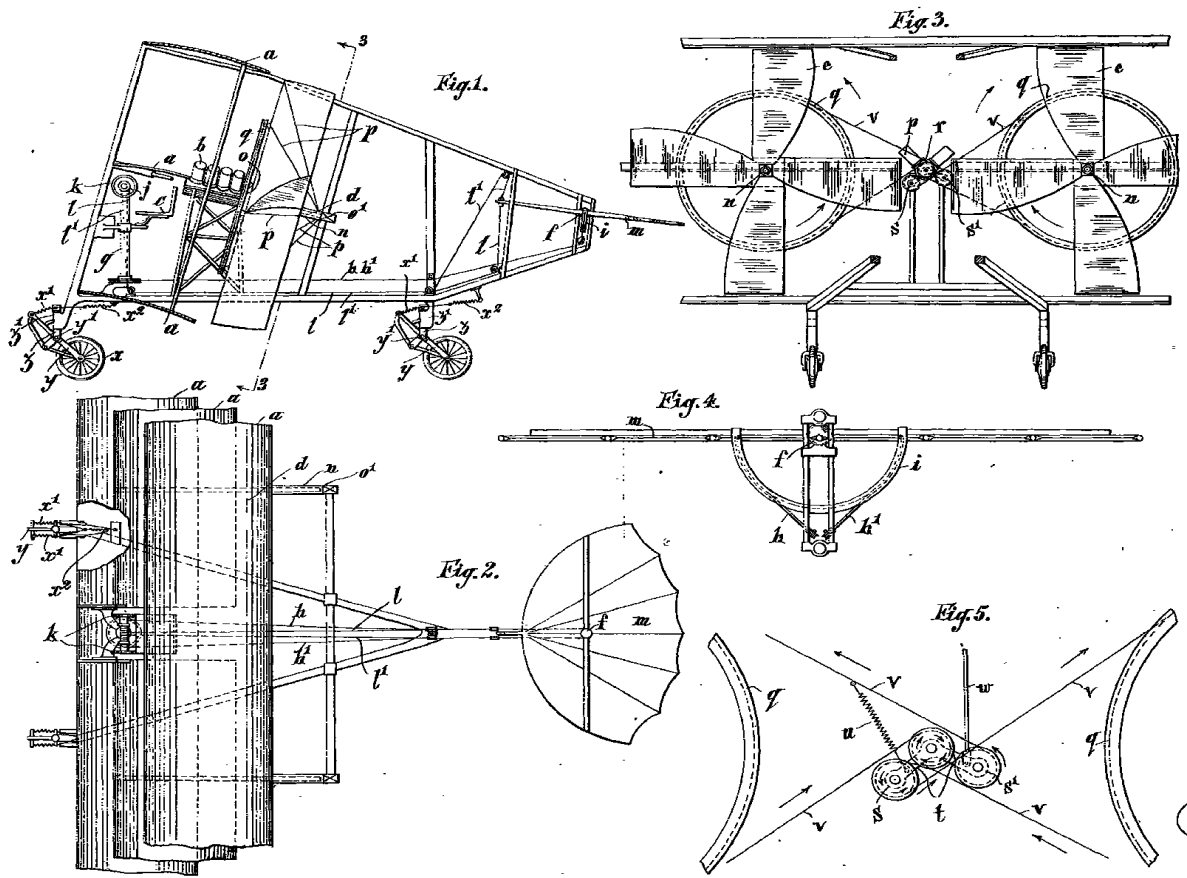
5. The combination with the framework of the machine of wheels mounted on horizontally pivoted frames so placed as to support the machine at a convenient angle to permit it when set in motion to run along the ground and to rise from the ground when the speed has become sufficient for flying, said wheel frames having a castor action and being spring mounted.

6. A flying machine embodying a combination of two or more of the foregoing claims.

Dated this 16th day of April, 1909.

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Agents for Applicant,  
31 & 32, Bedford Street, Strand, London, W.C.

[This Drawing is a reproduction of the Original on a reduced scale.]



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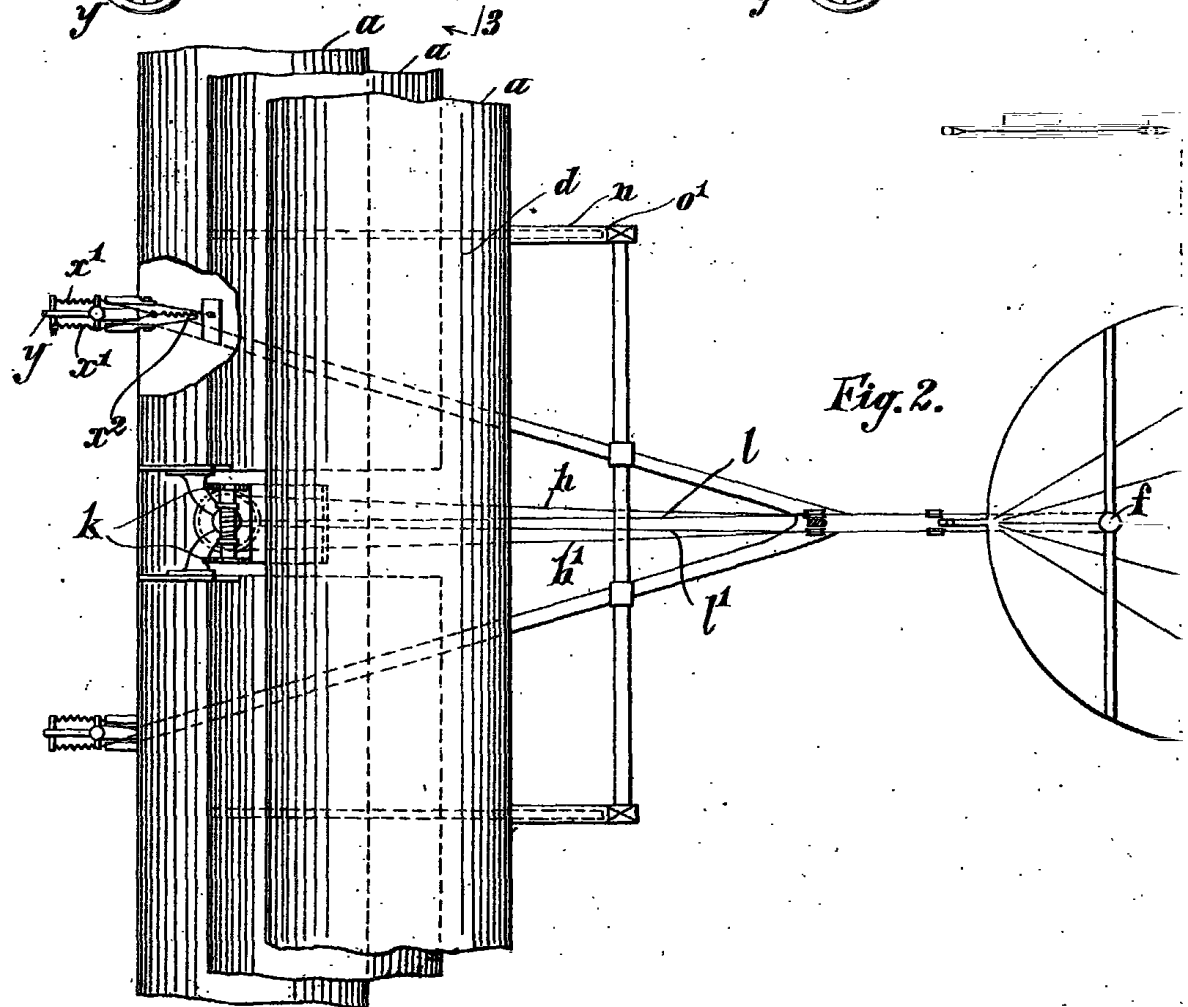
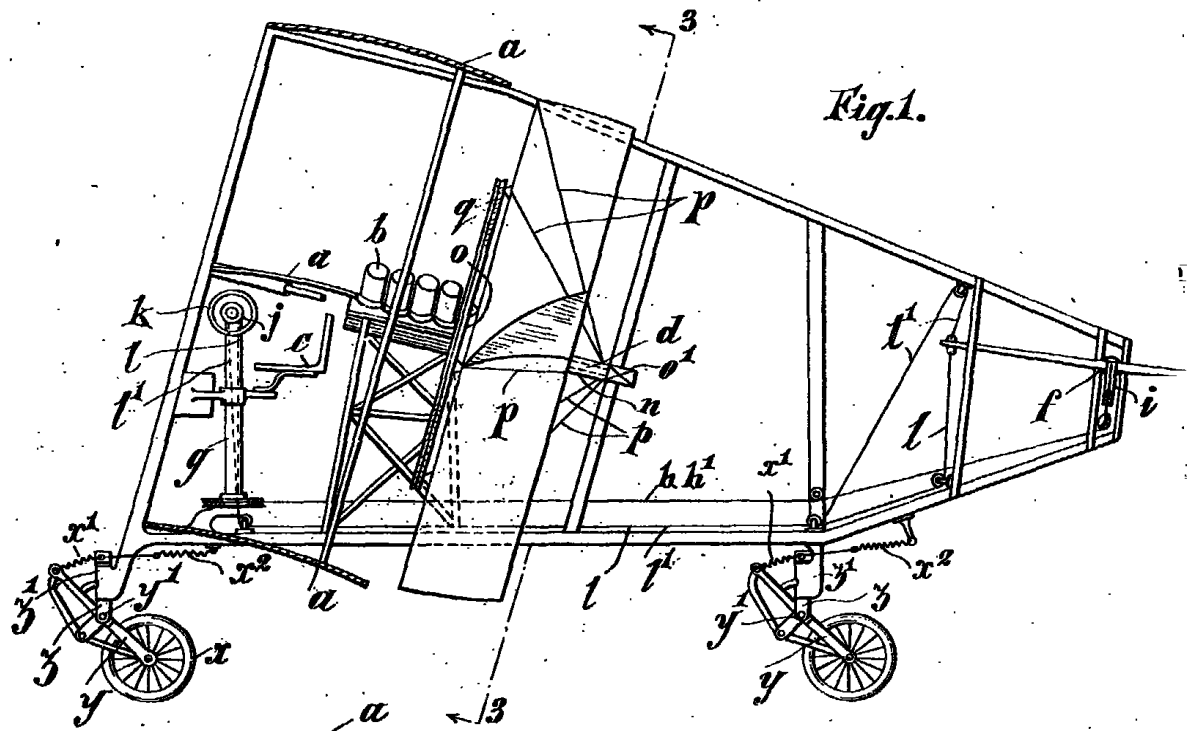


Fig. 3.

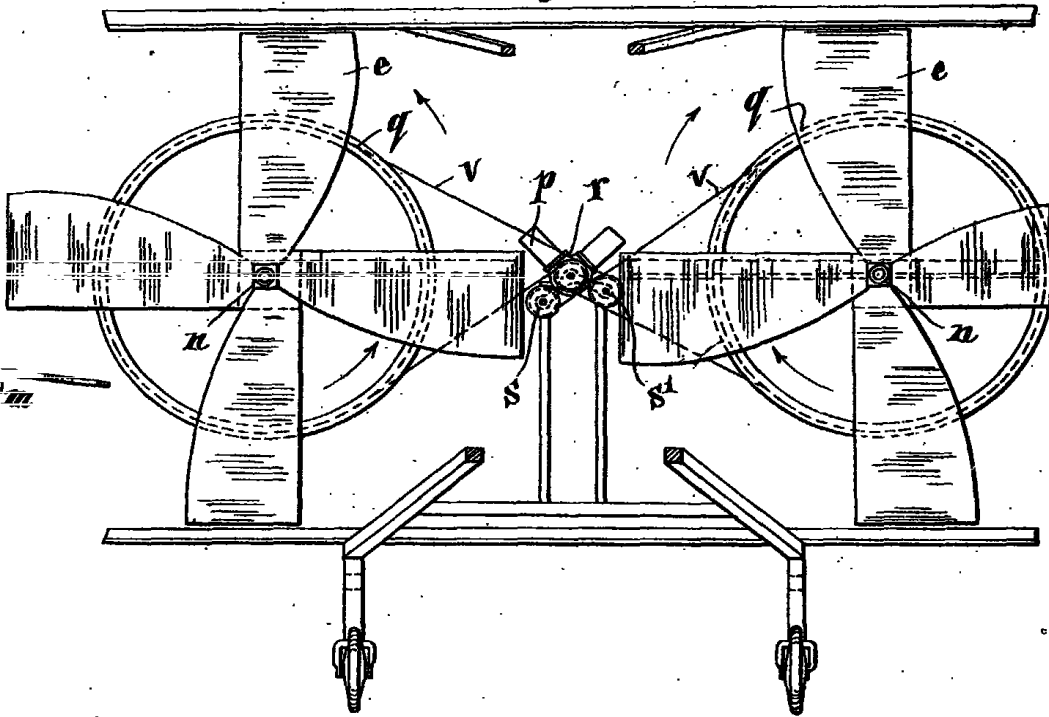


Fig. 4.

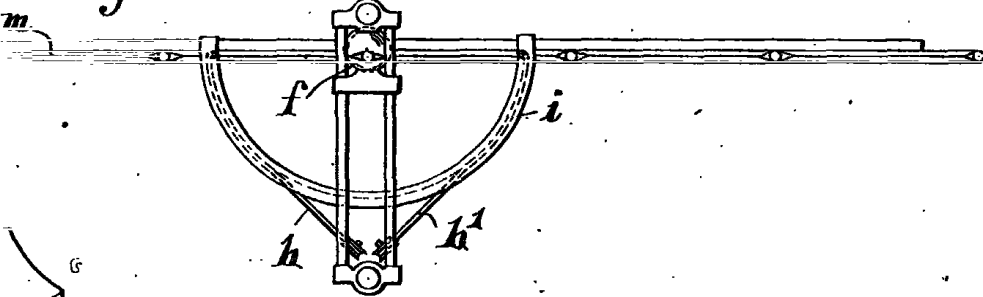
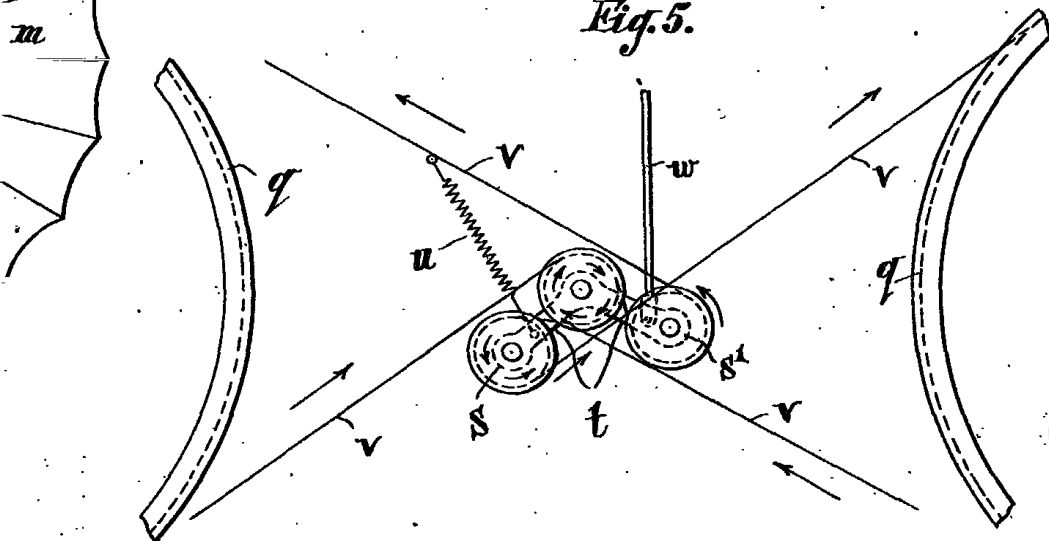


Fig. 5.



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