

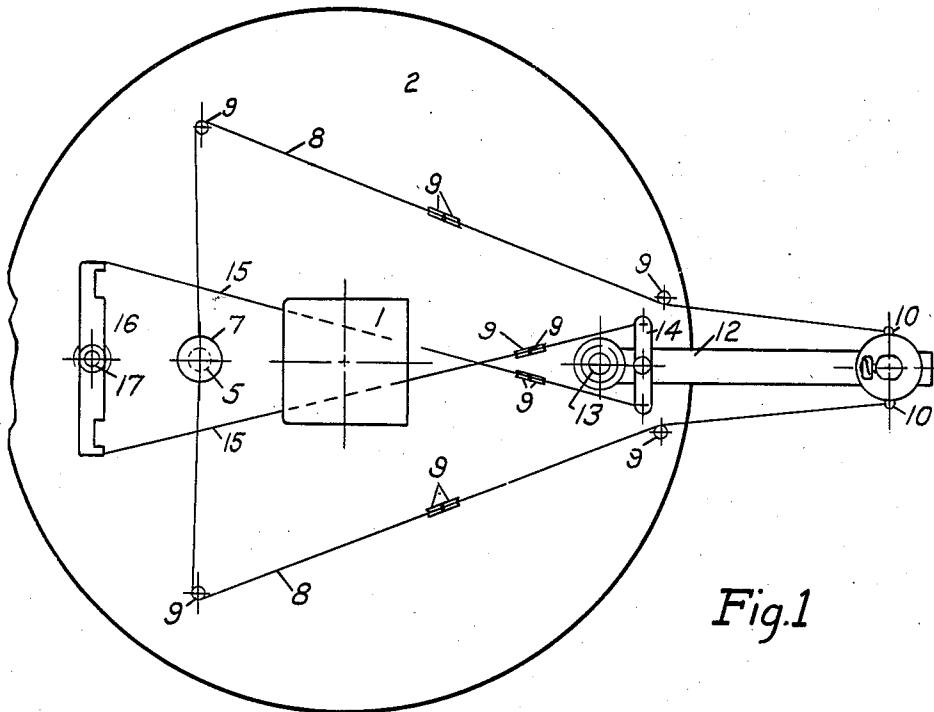
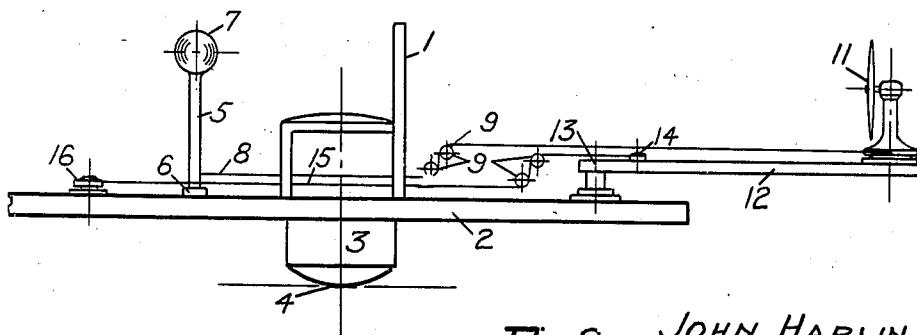
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AVIATION GROUND TRAINING MACHINE

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AVIATION GROUND TRAINING MACHINE

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3 Claims. (Cl. 35-12)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured by or for and used by the Government of the United States for governmental purposes without the payment to me of any royalty thereon, in accordance with the provisions of the act of April 30, 1928 (Ch. 460, 45 Stat. L. 467).

The invention relates to aviation ground trainers of the non-translatable type and has for its object the incorporation in such trainers of a proper weight balance.

All of the ground trainers of the non-translatable type with which your petitioner is familiar do not duplicate the weight balance of an airplane in that they are banked in a normal turn, and, in the absence of centrifugal force, this gives to the operator the feeling of a sideslip. Hereofore, so far as your petitioner is aware, all efforts to overcome this deficiency in ground trainers have involved incorporation of means for translation of the trainer in order to set up a centrifugal force in the turn comparable to that obtained in an airplane. While this does provide a type of trainer superior to the customary non-translatable type and to the type herein described, it has the disadvantage of requiring a large space for operation.

The objective of this invention is attained by providing a mechanism in which use of the rudder control only, results in a turn of the proper direction and also banks the trainer in a direction opposite to that which would occur in an airplane, and in which use of the aileron control only, results in a turn of the proper direction and banks the trainer in the direction in which an airplane would be banked. By proper combination of the aileron and rudder controls it is thus possible to turn the trainer while maintaining it in a level position.

One form of my invention is illustrated in the accompanying drawing, in which Fig. 1 is a side view and Fig. 2 a plan view.

In the drawing, 1 is the pilot's seat rigidly mounted on the trainer platform 2 which in turn is supported on the pedestal 3 which has a spherical bottom surface 4.

Number 5 is the control stick which is mounted on the platform 2 through a universal joint 6. Mounted on the control stick 5 is a counterweight 7 having sufficient mass and movement to cause the trainer to tilt fore and aft and sidewise when it is moved by the pilot. This provides the aileron and elevator control.

Connected to the control stick 5 are ropes or control wires 8 which pass over the pulleys 9 to their attachment to the arms 10 fastened to the

fan 11 which is so mounted as to blow the air forward toward the pilot's seat. The fan is rotatably mounted on arm 12, which in turn is rotatable about the bearing 13. Rigidly attached to arm 12 are arms 14, to which are attached ropes or control wires 15, which are crossed before their attachment to the rudder pedals 16, which are free to rotate about the bearings 17.

In operation, pressure applied by the right foot of the operator on the rudder bar or pedal 16 to move it forward, acts upon the arm 12 through the medium of the crossed connecting wires 15 to rotate said arm 12 clockwise around its pivot 13. The fan 11 being pivoted on the arm 12, and connected to the control stick 5 by the wires 8, the movement of the arm 12, clockwise straightens out the right hand connecting wire 8 and increases the sharpness of the bend in the left hand wire 8. The effect of this is to cause the fan to rotate clockwise on the bar 12, since the points 9, 9 and 10 of both the wires 8 are not in a straight line. Such clockwise movement of the fan causes it to exert a clockwise turning moment on the trainer around the point of contact of the spherical base 4 with the floor upon which the trainer rests. At the same time, the rotation of the arm 12 and fan 11 around the pivotal bearing 13 moves the centers of gravity of these elements to the left of longitudinal center line of the trainer and causes the trainer to tilt or bank to the left. The result on the trainer is a turn to the right and a bank to the left, giving a weight balance corresponding to that obtained in a skidding turn of an airplane.

If now the control stick is also moved to the right so as to bring the weight 7 on the end thereof to the right of the center line of the trainer a sufficient distance to balance the weight of the arm 12 and fan 11 which is now on the left side of the center line, so that the center of gravity of the whole lies in the center line of the trainer, the trainer will return to a level position. At the same time such a movement of the control stick to the right imparts an additional clockwise rotation to the fan and thus accelerate the turn of the trainer. In this level turn the weight balance is that of a properly banked turn in an airplane.

However, it will be apparent that if the control stick is moved to the right with the rudder control in neutral position the trainer will turn and bank to the right, giving a weight balance such as that obtained in a slipping turn in an airplane.

It will also be apparent that in any combination

of rudder and aileron control positions not resulting in a level turn, the weight balance will be the same as that in an airplane with a like combination of control movements; i. e., too much rudder the balance of a skidding turn, too much aileron the balance of a slipping turn.

Since the fan is mounted on the pivoted arm 12, sidewise movement of the said arm on its pivot in response to a movement of the rudder bar 16, results in moving the fan on an arc forwardly toward the trainer, thus requiring a backward movement of the control stick 5 to establish the same fore and aft balance existing before the rudder bar was moved.

It will be apparent to anyone skilled in the art that a trainer could be constructed in many different forms within the scope of the appended claims and without sacrificing any of the advantages of the invention.

What I claim is:

1. In an aviation ground trainer of the non-translatable type, the combination of a platform, universal supporting means for the platform to permit the same to be tiltable in any direction, a seat on the platform, a control stick and a universal joint for connecting the same to the platform to permit movement of said control stick in any direction, means movable by the control stick to cause the trainer platform and seat to be tilted longitudinally upon fore or aft movement of the control stick and to cause the trainer platform and seat to tilt or bank laterally in the direction of transverse movement of the control stick, a right and left rudder pedal and means

controlled by the rudder pedals to cause the said platform and seat to tilt or bank laterally to the left upon forward movement of the right rudder pedal, and to cause the said platform and seat to tilt or bank laterally to the right upon forward movement of the left rudder pedal.

2. In an aviation ground trainer of the non-translatable type, the combination of a platform, a seat on the platform, universal supporting means for the platform to permit the same to be tilted in any direction, a control stick and a universal connection to permit the control stick to be moved in any direction, means controlled by the control stick to cause the platform and seat to tilt in the direction of movement of the control stick, a right and left rudder pedal and means controlled by the rudder pedals to cause the said platform and seat to tilt or bank laterally to the left upon forward movement of the right rudder pedal and to cause the said platform and seat to tilt or bank laterally to the right upon forward movement of the left rudder pedal.

3. In an aviation ground trainer of the non-translatable type, the combination of a laterally tiltable platform, a seat on the platform, a right and left rudder pedal and means controlled by the rudder pedals to cause the said platform and seat to tilt or bank laterally to the left upon forward movement of the right pedal and to cause the said platform to tilt or bank laterally to the right upon forward movement of the left rudder pedal.

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