

March 10, 1942.

N. M. HARRISON
RETRACTABLE ANTENNA

2,275,626

Filed Nov. 28, 1940

2 Sheets-Sheet 1

Fig. 1

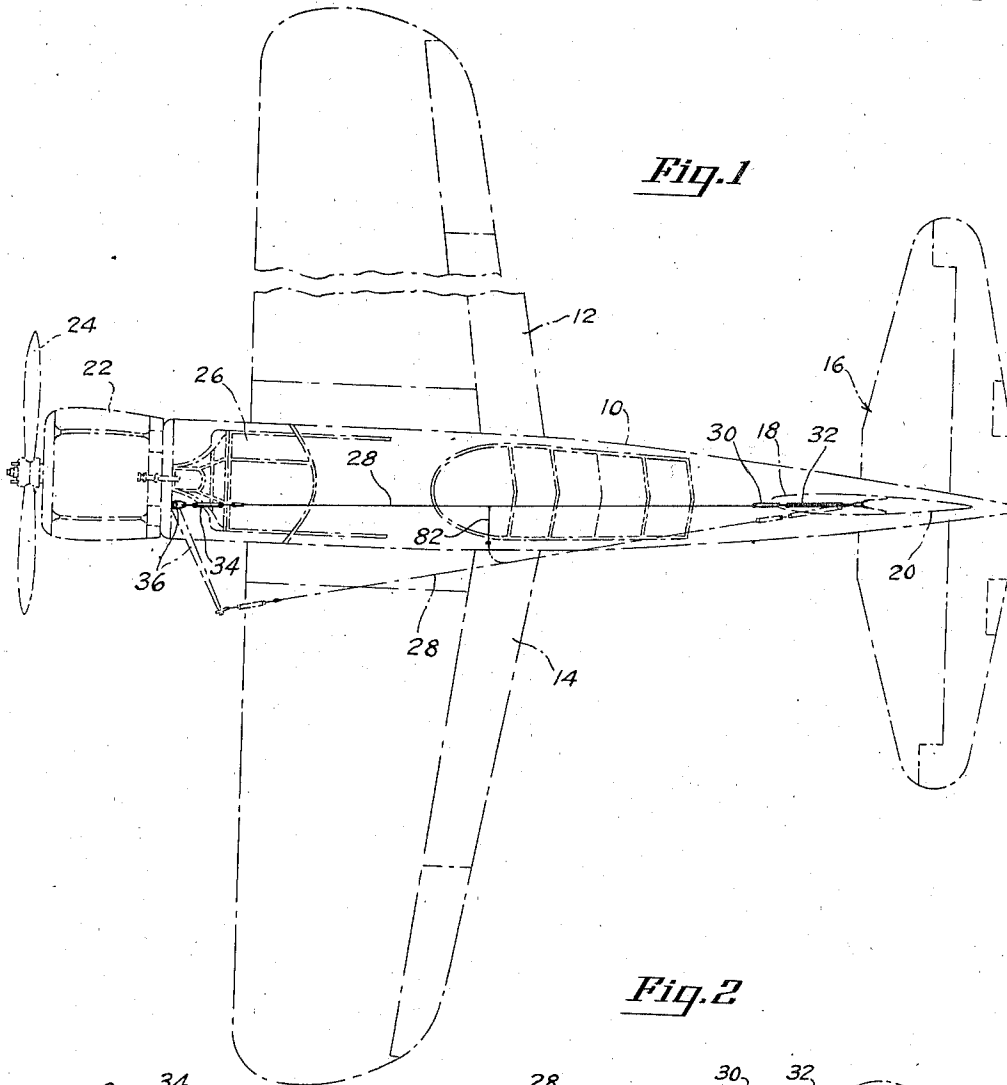
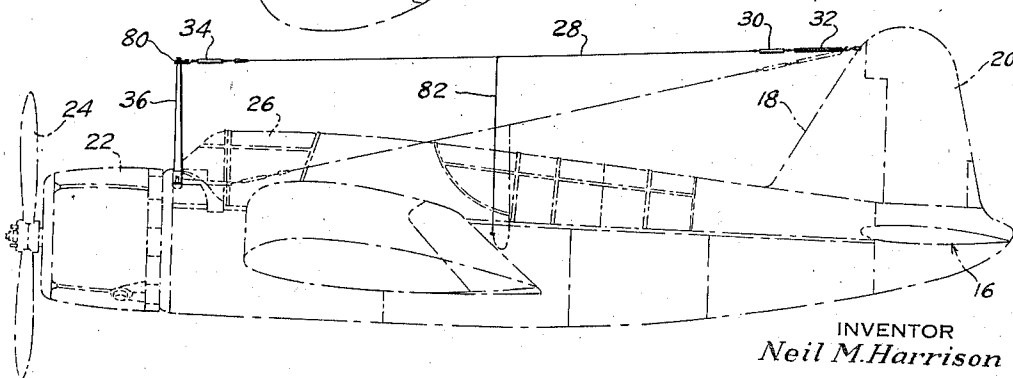


Fig. 2



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2 Sheets-Sheet 2

Fig. 3

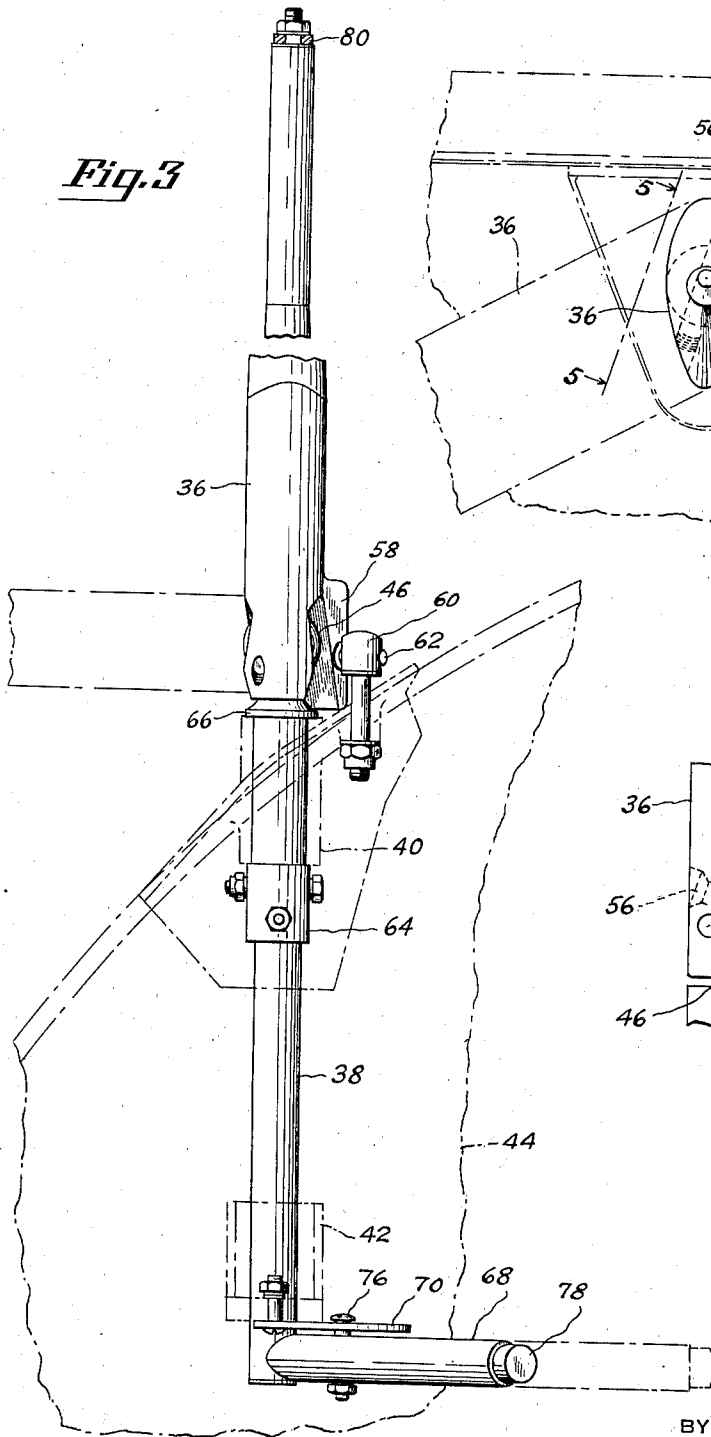


Fig. 4

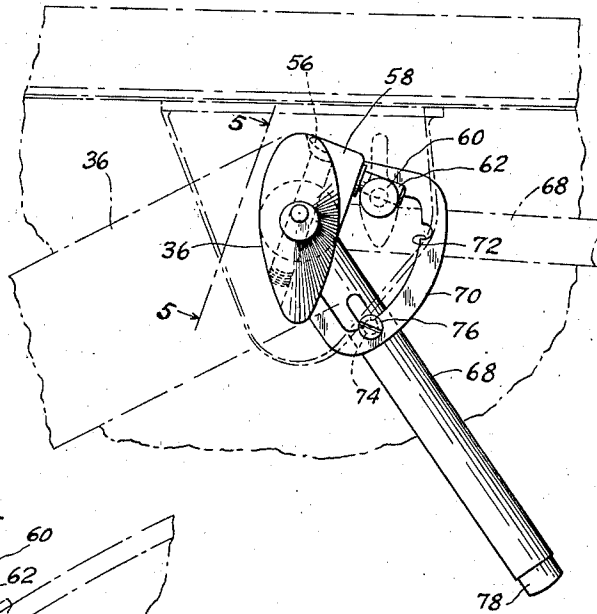
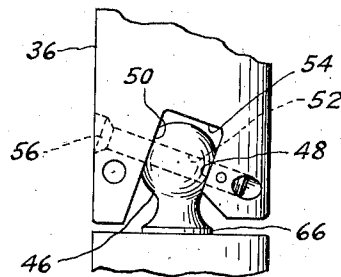


Fig. 5



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2,275,626

RETRACTABLE ANTENNA

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8 Claims. (Cl. 250—33)

This invention relates to improvements in vehicle radio equipment and has particular reference to an improved retractable mast for a vehicle radio aerial.

An object of the invention resides in the provision of a retractable radio mast of the character indicated which can be moved between its operative position and its retracted position by movement of a control handle within the vehicle convenient to the operator thereof.

A further object resides in the provision of an improved retractable radio aerial mast of the character indicated which will maintain the aerial under tension in both its operative and retracted position and in its various intermediate positions.

A still further object resides in the provision of a retractable radio aerial mast of the character indicated which can be positively locked in either its operative or retracted position against accidental displacement therefrom.

Other objects and advantages will be more particularly pointed out hereinafter or will become apparent as the description proceeds.

In the accompanying drawings, in which like reference numerals are used to designate similar parts throughout there is illustrated a suitable mechanical arrangement for the purpose of disclosing the invention. The drawings, however, are for the purpose of illustration only and are not to be taken as limiting or restricting the invention since it will be apparent to those skilled in the art that various changes in the illustrated arrangement may be resorted to without in any way exceeding the scope of the invention.

In the drawings,

Fig. 1 is a top plan view of an aircraft equipped with a radio aerial and improved aerial mast constructed according to the invention.

Fig. 2 is a side-elevational view of the airplane shown in Fig. 1 showing the improved radio aerial mast applied thereto.

Fig. 3 is a detail view on an enlarged scale of the retracting and extending mechanism for the aerial mast.

Fig. 4 is a top plan view of the mast and operating mechanism shown in Fig. 3, and

Fig. 5 is a side-elevational view of the bottom portion of the mast showing the connection of this mast to a rotatable support carried by the aircraft, this view being taken on the line 5—5 of Fig. 4 looking in the direction of the arrows.

In the accompanying drawings, the improved retractable mast is shown as applied to an aircraft and, while the improvement may have

great utility in connection with other vehicles such as automobiles and ships or boats, it is thought that the showing in connection with an airplane is sufficient for the purpose of fully disclosing the invention.

In the arrangement illustrated the airplane is of generally conventional form and has an elongated fuselage 10 provided with wings 12 and 14 positioned one upon each side of the fuselage and with a tail group, generally indicated at 16, at the rear of the fuselage, which tail group includes a vertical fin 18 supporting the movable rudder 20. At its forward end the fuselage 10 carries an engine enclosed in a nacelle or cowl 22 for driving the propeller 24. Immediately behind the cowl 22 is the pilot cockpit 26 conventionally separated from the engine compartment 22 by a fire wall 44 which constitutes the front end of the fuselage proper.

A radio aerial 28 in the form of a wire or cable is connected at its rearward end through suitable means such as the insulator 30 and spring 32 to the upper end of the vertical fin 18 and is connected at its forward end through an insulator 34 with the upper end of a mast 36 supported on the forward end of the fuselage adjacent to the front end or fire wall. As is particularly shown in Figs. 1 and 2 the mast is located on the upper surface of the fuselage slightly to one side of the top center in order not to interfere with the vision of the pilot from the interior of the cockpit 26.

This location of the mast 36 and vertical fin 18 gives the aerial 28 a position in which it extends lengthwise of the fuselage somewhat above the top surface thereof. While this location has been found highly desirable for the reception of radio signals and for placing the aerial in a location in which it will not obstruct the view of the pilot or observer, there are certain occasions when this location of the aerial interferes with operation of the aircraft. For example, many military aircraft are provided with lift or hook-on members located on the top of the fuselage or on the upper surfaces of the wings adjacent to the fuselage so that in the case of a seaplane cooperating with surface vessels the seaplane may land on the water and be lifted to the deck of the vessel by hoisting with the lift or hook-on member, and in the case of an airplane cooperating with aircraft of the lighter than air type the airplane may hook on to a trapeze lowered from the craft with which it cooperates. While other occasions might be enumerated in which it is desired to have free access to the upper surface of the air-

plane, it is thought that the examples cited above are sufficient for the purposes of this disclosure. In order to clear the upper surface of the airplane for the connection of a hoisting hook or trapeze, the aerial may be moved out of the way by swinging it laterally and downwardly to the position shown in broken lines in Figs. 1 and 2 in which position the mast 36 projects laterally outward from its position on the forward upper surface of the fuselage instead of projecting vertically upward in its operative position as indicated by full lines in Figs. 1 and 2.

As is particularly shown in Fig. 3, the mast 36 is mounted upon the top of a rotatable post 38 mounted in bearings 40 and 42 secured in place in the fuselage of the aircraft. In the construction illustrated these bearings may be connected to the fire wall 44 which closes the front end of the fuselage. The greater portion of the post 38 is within the fuselage but the end projects out of the fuselage through the bearing bracket 40 and is provided with an end ball 46, particularly illustrated in Figs. 3 and 5. This ball 46 is provided with opposite parallel flattened faces 48 and 50 disposed at an oblique angle to the axis of the post 38 and with a transverse aperture 52 the center line of which is perpendicular to the faces 48 and 50. The lower end of the mast 36 is provided with a slot 54 dimensioned to receive the ball end 46, the sides of this slot being disposed at an angle to the center line of the mast and the post 38 and parallel to the spaces 48 and 50 of the ball end 46. The end of the mast is also provided with apertures at opposite sides of the slot 54 which apertures register with the aperture 52 in the ball end 46 and a pin 56 extends through these registering apertures to pivotally connect the mast to the upper end of the post 38. The lower end of the mast is provided with an offset abutment 58 which engages with a stop 60 secured to the bearing bracket 40 when the mast is rotated to its vertical or operative position. Preferably the abutment 58 carries a projecting pin 62 which engages in a groove in one side of the stop member 60 to lock the mast securely in its upright position.

Immediately below the bearing bracket 40 the post 38 carries a sleeve 64 which is secured to the post in contact with the bottom of the post bearing to vertically position the post and hold it against upward movement through the bearing, downward movement through the bearing being limited by a shoulder 66 formed on the post immediately below the ball end 46. At its lower end and immediately below the bearing 42 the post is provided with an outwardly projecting handle 68 secured to the bottom end of the post in such a manner that the post can be rotated by angular movement of the handle. A fixed quadrant 70 is provided at the bottom of the post and has spaced notches 72 and 74 therein positioned to receive a locking pin 76 carried by the handle 68 whenever the handle is in the position in which the mast 36 is operative or the position in which the mast is fully retracted. This locking pin may be disengaged by a thumb lever 78 of some desired or conventional construction.

The forward end of the aerial is connected to the top of the mast by a pivotal connection 80 and the aerial is connected with the radio apparatus by a suitable lead-in wire such as is indicated at 82.

In operating the device, if it is desired to move the mast from its upright operative position to its retracted substantially horizontal position, the

locking pin 76 is disengaged and the lever 68 moves from the position shown in full lines in Fig. 4 to the position shown in broken lines in that figure. This movement of lever 68 will rotate the post 38 and the mast 36 and as these two members rotate the mast 36 will start to retract as soon as pin 56 has passed a position parallel to the aerial. As the mast continues to rotate the pin 56 will move through the plane of the aerial to positions of gradually increasing angularity on the opposite side of the aerial from the position shown in Fig. 4 and the pull of the aerial at the tip of the mast will begin to rotate the mast about this pin to relieve this tension. As the mast continues to rotate the tension of the aerial will continue to pull it down about the axis of the pin 56 until it acquires the substantially horizontal position shown in broken lines in Fig. 3 at which time the lever 68 will be in the position shown in broken lines in Fig. 4 and the locking 76 may be engaged in the notch 72 to hold the mast in this position. When it is desired to erect the mast to its operative position the lever 68 will be moved from the broken line position shown in Fig. 4 to the full line position shown in this figure. As the lever is moved in this direction rotating the post 38 and mast 36, the tip of the mast will try to move forwardly swinging about the axis of the post 38 and pulling on the aerial. This pull will continue until the pin 56 has assumed a position in which its axis acquires an angular position with respect to the direction of pull of the aerial that this pull rotates the mast about the axis of this pin 56 and returns the mast to its upright position as the post 38 is rotated. When the post 38 has reached its operative position the lever 68 will be in the position shown in full lines in Fig. 4 and the locking pin 76 will then be engaged in the notch 74 to hold the post 38 and mast 36 against rotation. At the same time pin 62 will engage in the stop 60 to restrain the mast from movement about the axis of the pin 56.

While a suitable mechanical arrangement has been hereinabove described and illustrated in the accompanying drawings for the purpose of disclosing the invention, it is to be understood that the invention is not limited to the particular arrangement so described and illustrated, but that such changes in the size, shape and arrangement of the various parts may be resorted to as come within the scope of the sub-joined claims.

Having now described the invention so that others skilled in the art may clearly understand the same, what it is desired to secure by Letters Patent is as follows:

1. A radio mast installation for aircraft comprising a radio aerial, a mast supporting one end of said aerial, a rotatable post extending through the fuselage of said aircraft and attached at its outer end to one end of said mast by a pivotal connection having its axis inclined relative to the axis of rotation of said post, and means within said fuselage operatively connected with said post to rotate said post and said mast to retract said mast from a vertical to a horizontal position.

2. A radio mast installation comprising a rotatable post, a radio mast attached at one end to one end of an antenna and connected at its opposite end to said post by a hinge having an obliquely disposed hinge joint, whereby rotation of said post will change the angular relationship between said hinge joint and the direction of the force exerted by said antenna and cause said

mast to move angularly into and out of alignment with said post.

3. A radio mast installation comprising a rotatable post supported upon the fuselage of an airplane for rotation about a substantially vertical axis, a radio mast attached at one end to one end of an antenna and connected at its opposite end to said post by a hinge having an obliquely disposed hinge joint, and rotating means for said post, whereby rotation of said post by changing the angular relation between said hinge joint and the direction of the force exerted on said mast by said antenna causes said mast to move angularly about said oblique hinge joint.

4. A radio mast installation comprising a rotatable post supported upon the fuselage of an airplane for rotation about a substantially vertical axis, a radio mast attached at its outer end to a radio aerial and connected at its inner end to said post, said connection between said mast and said post including an obliquely disposed hinge joint, means to angularly move said post and retain said post in angularly disposed positions, whereby by changing the angular relationship between said hinge joint and the force exerted on said mast by said aerial, in one position of said post said mast will be extended vertically and in the other position of said post said mast will be disposed substantially horizontally.

5. A radio mast installation comprising a rotatable post secured vertically to the fuselage of an airplane and extending therein, a mast hingedly connected to said post outside said fuselage and having a radio aerial attached at its outer end, manual means within said fuselage to angularly move said post and mast between limiting positions, means to secure said post in said limiting positions, an abutment on said mast, and a

stop fixed to said post and engaging said abutment when said mast is in extended position.

6. A radio mast installation comprising a rotatable post secured vertically to the fuselage of an airplane and extending therein, a mast hingedly connected to said post outside said fuselage and having a radio aerial attached at its outer end, manual means within said fuselage to angularly move said post and mast between limiting positions, means to secure said post in said limiting positions, an abutment on said mast, a stop fixed to said post and engaging said abutment when said mast is in extended position, and a radio aerial attached at the free end of said mast, whereby angularly moving said post raises and lowers said aerial.

7. A radio mast installation comprising a rotatable post secured to the fuselage of an airplane and extending therethrough, a mast connected to said post outside said fuselage, and operating means within said fuselage to angularly move said post and retain said post in fixed positions, said mast and post being connected by a joint having inter-engaging surfaces oblique to the axes thereof and a pin extending normally to said oblique surfaces and hingedly connecting said mast and post together.

8. A radio mast installation comprising a rotatably supported post, a mast connected to said post and, in one position, located substantially coaxial with said post, a hinge joint in which the hinge axis is oblique to the mast axis connecting said post and said mast, an aerial wire pulling in one direction in said mast, means for rotating said post to change the position of said hinge axis relative to said aerial wire so that the aerial wire will pull the mast from a vertical to a horizontal position or vice versa as the post is turned in one direction or the other.

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