Apr. 10, 1923. 1,451,493

J. H. CRUICKSHANK

STOPPING AND LANDING MECHANISM FOR AEROPLANES, DIRIGIBLES, BALLOONS, AND THE LIKE

Filed Nov. 26, 1921 3 sheets-sheet 1

Fig. 1.

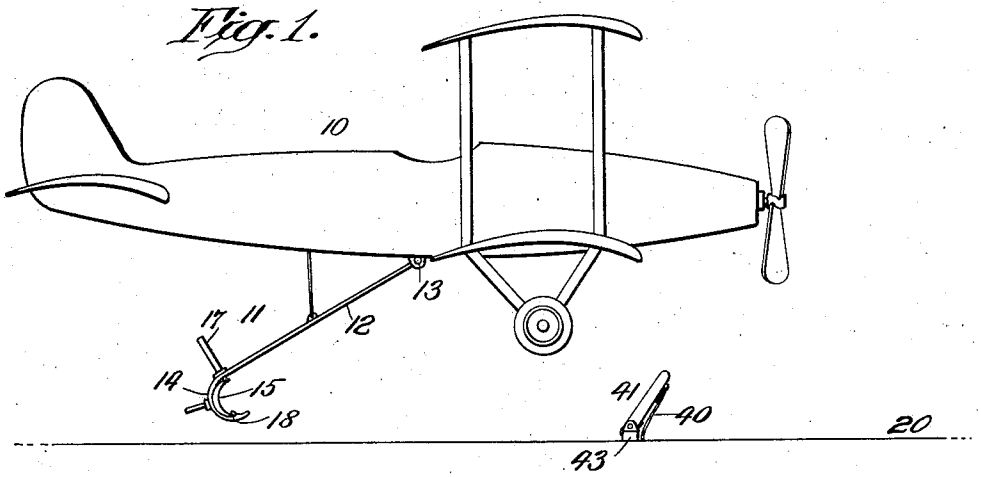
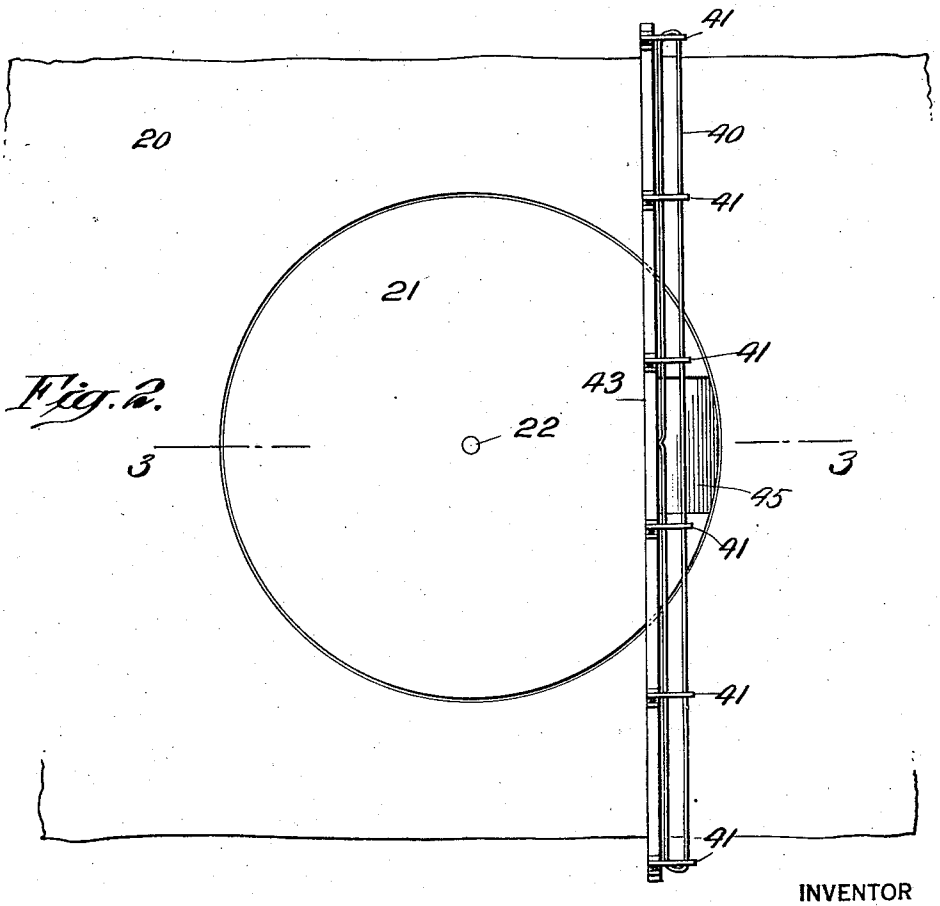


Fig. 2.



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BY

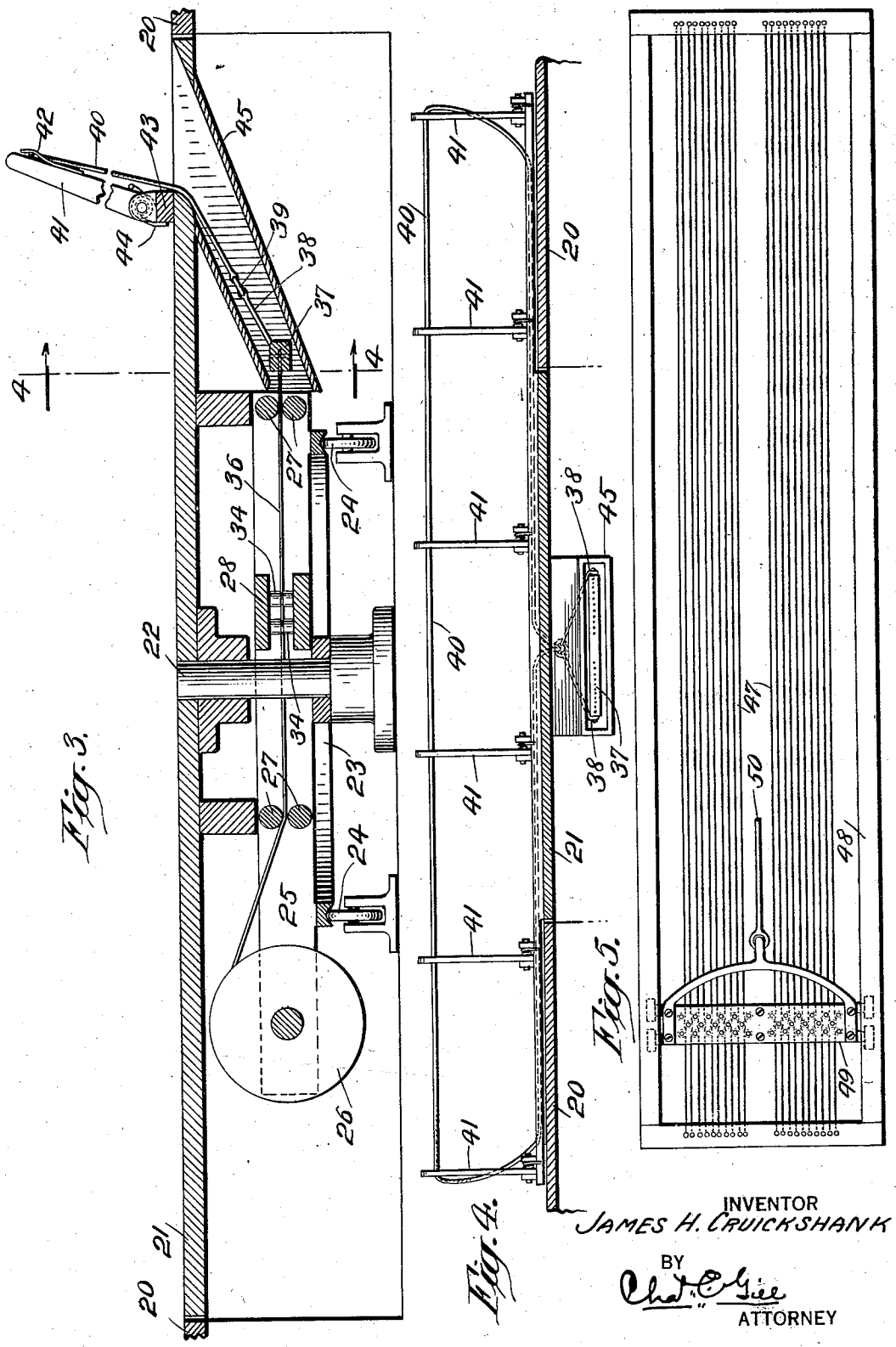
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STOPPING AND LANDING MECHANISM FOR AEROPLANES, DIRIGIBLES, BALLOONS, AND THE LIKE

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Fig. 6.

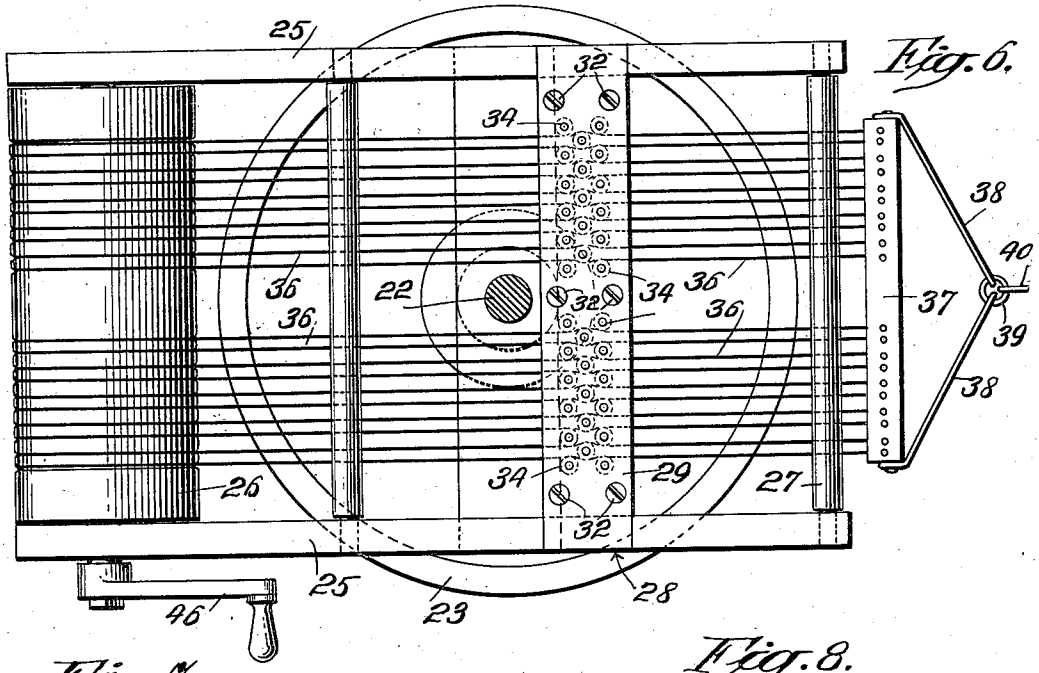


Fig. 7.

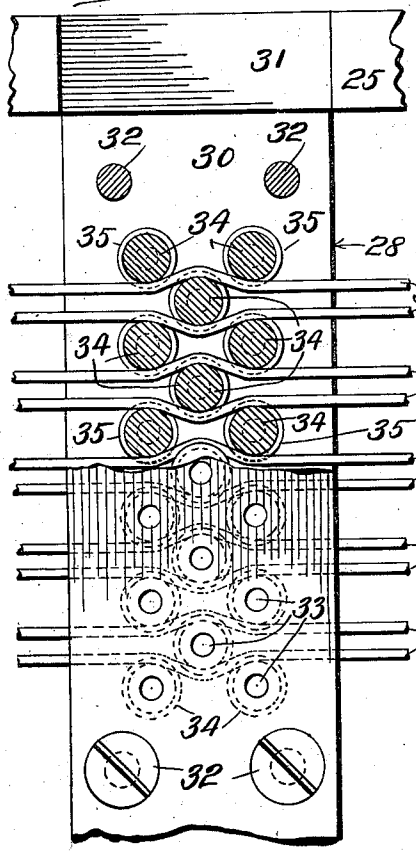


Fig. 8.

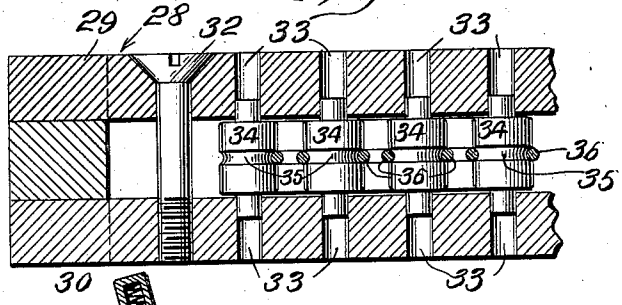
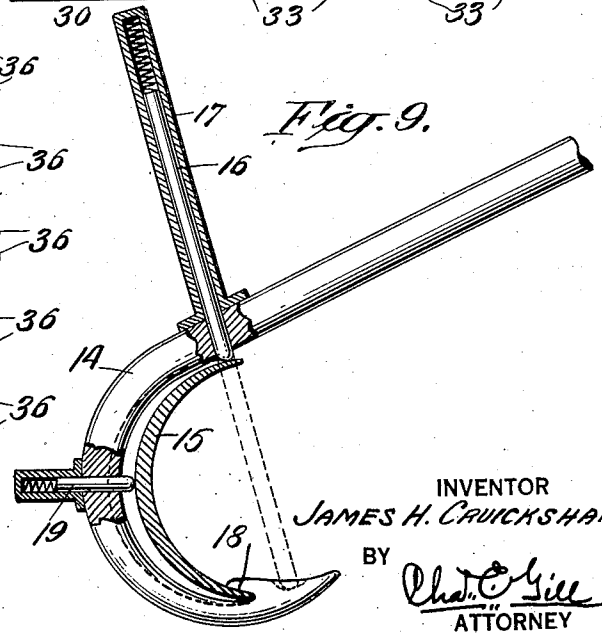


Fig. 9.



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UNITED STATES PATENT OFFICE.

JAMES H. CRUICKSHANK, OF BIG INDIAN, NEW YORK.

STOPPING AND LANDING MECHANISM FOR AEROPLANES, DIRIGIBLES, BALLOONS, AND THE LIKE.

Application filed November 26, 1921. Serial No. 517,929.

To all whom it may concern:

Be it known that I, JAMES H. CRUICKSHANK, a citizen of the United States, and a resident of Big Indian, in the county of Ulster and State of New York, have invented certain new and useful Improvements in Stopping and Landing Mechanisms for Aeroplanes, Dirigibles, Balloons, and the like, of which the following is a specification.

The object of the present invention is to provide stopping and landing place mechanisms for aeroplanes and the like, which may be located almost wherever desired, such as on a field, or on the top of a building, or the deck of a ship, and which will permit of the landing and stopping of the aeroplane or flying machine within a very limited and predetermined area positively, safely, practically and economically.

The apparatus of my invention may be variously constructed, but generally considered comprises a landing surface, a turn-table mounted therein, and means associated therewith to be engaged by the aeroplane or a part suspended therefrom on the landing movement, of the aeroplane, to retard and halt the aeroplane in a manner resulting in the landing of the aeroplane without shock and within the minimum distance of movement, and at the same time securely hold the aeroplane after it has been brought to a stop. The means I employ for retarding and stopping the aeroplane and which is rendered operable thereby preferably comprises a series of wires parallel with one another, and a retarder device applied on and cooperating with said wires and consisting of upper and lower plates holding between them rollers which are interposed between the wires so that on the pull of the retarder device along the wires or the wires through said device, the wires are bent along successive sections thereof by the said rollers engaging them. The bending of the wires by the retarder device serves to create a yielding resistance which will retard and stop the aeroplane without shock and within the minimum distance. The retarder device may be connected with a strong looped cable to be engaged by a hook suspended from the aeroplane, and the movement of the aeroplane with its hook engaging said loop, will pull the retarder device along the wires with which it cooperates.

I present two forms of my invention herein, in one of which the retarder device is stationary and the retarding wires cooperating therewith are adapted to have longitudinal movement through the retarder device under the pull of the aeroplane, and in the other construction of my invention herein presented, the retarder device is movable upon the wires and is pulled along the same. I associate the retarder mechanism with a turn-table so that the turn-table and the retarder mechanism may yield to the direction of motion of the aeroplane.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Fig. 1 is a side elevation of an aeroplane equipped with a hook mechanism for cooperation with the retarder mechanism of my invention, a portion of the retarder mechanism being illustrated in position to be engaged by the hook on the aeroplane;

Fig. 2 is a top view, on a reduced scale, of the stopping and landing mechanism of my invention;

Fig. 3 is a longitudinal section, on a larger scale, of the same taken on the dotted line 3—3 of Fig. 2;

Fig. 4 is a vertical section of the same, taken on the dotted line 4—4 of Fig. 3;

Fig. 5 is a top view of a modified construction of stopping and landing mechanism, in which the retarding rollers or pins are caused to travel along the series of wires, as distinguished from, as shown in Fig. 3, pulling the wires through the rollers or pins;

Fig. 6 is a top view of the retarder mechanism of Fig. 3, with the upper portion of the turn-table omitted and the turn-table post shown in section;

Fig. 7 is a top view, partly broken away and partly in section, of a portion of the retarder frame and its rollers or pins shown in Fig. 6;

Fig. 8 is a vertical section through a portion of the same, and

Fig. 9 is a side elevation, partly broken away and partly in section, of one form of hook mechanism with which I may equip the aeroplane.

In the drawings, 10 designates an aeroplane, which is diagrammatically shown and intended as illustrative of any aeroplane or

flying machine or the like, equipped with hook mechanism 11 for cooperation with the stopping and landing mechanism of my invention. The hook mechanism 11 shown is illustrative of a feature of the invention and will be modified in any suitable manner in accordance with the style of flying machine 10 with which it may be used. The hook mechanism 11 comprises a rod 12 pivotally secured at 13 to the body of the aeroplane and having at its lower end a hook 14 containing a movable crescent-like inner section 15 for cooperation with a locking pin 16 carried in a tube 17 mounted on the rod 12. The hook 14 is formed with a seat 18 for the lower end of the crescent-section 15, and said section 15 is normally pressed forwardly by a spring-pressed pin 19, as shown in Fig. 9, and when in this operative position the upper end of the section 15 holds the spring-pressed pin 16 in its upper inoperative position. The section 15 will be in the position shown in Fig. 9 when the hook 14 is in condition to engage the stopping mechanism hereinafter described, and when such mechanism is engaged by the hook and pressure is thereby exerted against the section 15, the said section will be pressed into the hook 14 in opposition to the pin 19 and will, at its upper end, release the pin 16 to be shot across the open side of the hook, as indicated by the dotted lines in Fig. 9, so that the cable or the like engaged by the hook will become locked within the same. After the aeroplane has stopped and it is desired to release the same from the stopping and landing mechanism, the pin 16 will be moved upwardly into its housing 17, and the spring-pin 19 will return the section 15 to its former position shown by full lines in Fig. 9.

Referring to Figs. 2, 3, 4, 6, 7 and 8, 20 denotes any landing surface, stage, platform, roof, deck, or field, intended as a landing place for an aeroplane, and 21 a turn-table mounted therein and whose upper surface is preferably level with that of the surface 20. The turn-table 21 consists of an upper flat plate suitably mounted on a post 22 and having a lower annular part or ring structure 23 adapted to travel on rollers 24 in any usual manner. The mounting of the turn-table to rotate is a detail to which my invention is not limited.

Below the top of the turn-table 21 I locate the retarder mechanism of my invention, and on reference to Fig. 6 it may seen that this mechanism consists of two side bars 25 equipped with a reel 26, pairs of feed and guide rollers 27 and a retarder frame 28 which, as shown in Figs. 7 and 8, comprises upper and lower plates 29, 30 spaced apart by blocks 31 and otherwise connected together by securing screws 32. The plates 29, 30 are formed with corresponding parallel vertical holes 33 which receive the axles of cylindrical rollers 34 which are grooved at 35. Upon the reel 26 are two series of parallel wires 36 which extend forwardly between the feeding and guide rollers 27 and also between the rollers 34 of the retarder device 28, the forward ends of said wires 36 being secured to a head 37 which has means by which a pull may be exerted against it, these means as at present shown comprising converging bars 38 carrying at their forward ends a ring 39 and a wide loop of cable or the like connected with said ring, as more particularly shown in Figs. 2, 3 and 4. The loop 40 is to be engaged by the hook 14 on the aeroplane and thereupon the aeroplane on its continued forward movement will act against said loop and the head 37 to which the loop is connected, to draw the wires 36 forwardly between the retarding rollers 34 for bringing the aeroplane to a stop. The loop 40 will preferably be laterally spread, as shown in Fig. 4, and have its upper portion supported at the top of pivoted standards 41 by means of spring-clips 42. The lower ends of the standards 41 are secured to a base-bar 43 carried by the turn-table 21, and said standards are equipped with springs 44 which normally hold them in a substantially upright position as shown in Fig. 3, but permit them to be turned downwardly when the loop 40 is engaged by the aeroplane and is to be released from the spring-clips 42, which yield to the pressure of the loop 40 when the latter is engaged by the hook 14 of the aeroplane.

The turn-table 21 is provided with a chute 45 through which the head 37 and wires connected therewith may be drawn outwardly when the hook on the aeroplane engages the loop 40 and is moving to its landing position.

In the operation of the mechanism hereinbefore specifically described, the parts will initially be in the relative positions shown in Fig. 3, with the loop 40 spread and supported upon the pivoted standards 41. The aeroplane on moving to land will drop the hook 14 and this hook will engage the loop 40 and, the aeroplane continuing in motion, the loop 40 will be drawn off from the standards 41 and exert a pull on the head 37 and wires 36, with the result that the wires 36 will be drawn between the retarding rollers 34 and be bent or kinked, as shown in Fig. 7, throughout continuous sections thereof, the effect of the bending or kinking of the wires 36 serving to yieldingly but efficiently retard the movement of said wires between the rollers, whereby the aeroplane will without material jar be brought to a stop within a limited portion of its travel. After the aeroplane has come to rest, the loop 40 will be detached from the hook 14 and the upper plate 29 of the retarder device 28 may be removed to release the rollers 34, and there-

upon by means of a crank or the like 46 the wires, after the final kink has been removed therefrom, may be rewound upon the reel 26, this serving to restore the head 37 and its parts to their normal position. The top plate 29 of the retarding device will then be restored to positon and the loop 40 will be returned to the standards 41. I regard the turn-table 21 as important, since it permits of the loop 40 being presented in any direction suited to the direction of movement of the aeroplane, and, in addition, the turn-table 21 may yield to the direction of movement of the aeroplane 10 so that the hook 14 may exert a direct pull on the loop 40 and therethrough against the head 37 and wires 36. The loop 40 is spread laterally so as to facilitate the engagement therewith of the hook 14, and said hook after engaging the loop 40 will pull the same forwardly in the direction of the line of travel of the areoplane, said loop then collapsing and making a direct pull against the head 37 and wires 36. The standards 41 are pivotally mounted so that they may turn downwardly and forwardly and not form an undue obstruction to the movement of the aeroplane or mechanism 11 carried thereby. The retarding and stopping of the aeroplane is accomplished by the continuous bending, under confinement, of the wires 36 at the rollers 34. The kinks formed in the wires 36 by the rollers 34 are continuously created, said kinks in effect traveling along the length of the wires as said wires are acted upon by the retarding rollers 34.

In the construction shown in Fig. 5 the wires, numbered therein 47, are held in a frame 48 in stationary position and the retarding device 49 is slidable in said frame 48 and carries the retarding rollers corresponding with the rollers 34 of Fig. 8. The retarding device 49 has a connection 50 with the loop 40. I present Fig. 5 to illustrate that I may draw the wires 36 through the retarder device 28, as in Fig. 6, or I may reverse the action and draw the retarder device over the wires, the wires being held against traveling movement. The invention comprehends therefore the traveling of the retarder device over the wires or the travel of the wires through the retarder device as may be found more convenient in conditions of installation. In both forms of my invention the stopping of the aeroplane is accomplished by like means in attaining the same result.

I do not limit my invention to all of the details of form and construction shown in the drawings, since these will vary with the conditions surrounding various installations. The mechanism of my invention is designed to stop an aeroplane with shock-absorbing effect within the minimum distance of movement, and to render aeroplane water motherships practicable and the landing of planes on post office and other buildings practicable.

What I claim as my invention and desire to secure by Letters Patent, is:

1. Mechanism of the character described, comprising a landing surface for an aeroplane or like machine, a turn-table mounted therein and means associated therewith to be engaged by a part connected with the aeroplane or the like while in motion for retarding and arresting the machine, said turn-table being rotatable to align the retarding means with the direction of motion of the machine, and said retarding and arresting means comprising a loop to be caught by said part on the machine, a member consisting of a cross-head having a series of pins or the like and a member consisting of a series of wires extending between said pins and held kinked thereby, one of said members being movable with said loop to effect the kinking of successive sections of said wires by said pins during the movement of said movable member for strongly retarding the motion of the same.

2. Mechanism of the character described, comprising a landing surface for an aeroplane or like machine, a turn-table mounted therein and means associated therewith to be engaged by a part connected with the aeroplane or the like while in motion for retarding and arresting the machine, said turn-table being rotatable to align the retarding means with the direction of motion of the machine, and said retarding and arresting means comprising a loop to be caught by said part on the machine, a stationary cross-head having a series of pins or the like, and a member consisting of a series of wires extending between said pins and held kinked thereby and connected to and movable with said loop to travel between said pins, said pins on the travel of the wires between them being adapted to kink successive sections thereof and thereby strongly retard the motion of the same and the machine connected therewith.

3. Mechanism associated with a landing surface for retarding and arresting an aeroplane or like machine, for landing the same, comprising a member consisting of a cross-head having a series of pins or the like and a member consisting of a series of wires extending between said pins and held kinked thereby, one of said members being movable and having an exposed part to be engaged by a part carried by the machine while in motion and travel therewith, whereby continuously successive sections of said wires become kinked by the pull of the machine and effect the gradual retardation of the machine.

4. Mechanism associated with a landing surface for retarding and arresting an aero-

plane or like machine, for landing the same, comprising a stationary cross-head having a series of pins or the like, and a member consisting of a series of wires extending between said pins and held kinked thereby and having a part to be engaged by a part carried by the machine while in motion and travel therewith for drawing said wires between said pins, said pins on the travel of the wires between them being adapted to kink continuously successive portions thereof and thereby create a strong resistance to the travel of the wires and consequently effect the retardation of the machine.

Signed at New York city, in the county of New York and State of New York, this 3rd day of November, A. D. 1921.

JAMES H. CRUICKSHANK.