March 1, 1932. L. S. ADAMS 1,847,549

AIRPLANE STOWING APPARATUS

Filed Oct. 21, 1929 3 Sheets-Sheet 1

Fig. 1.

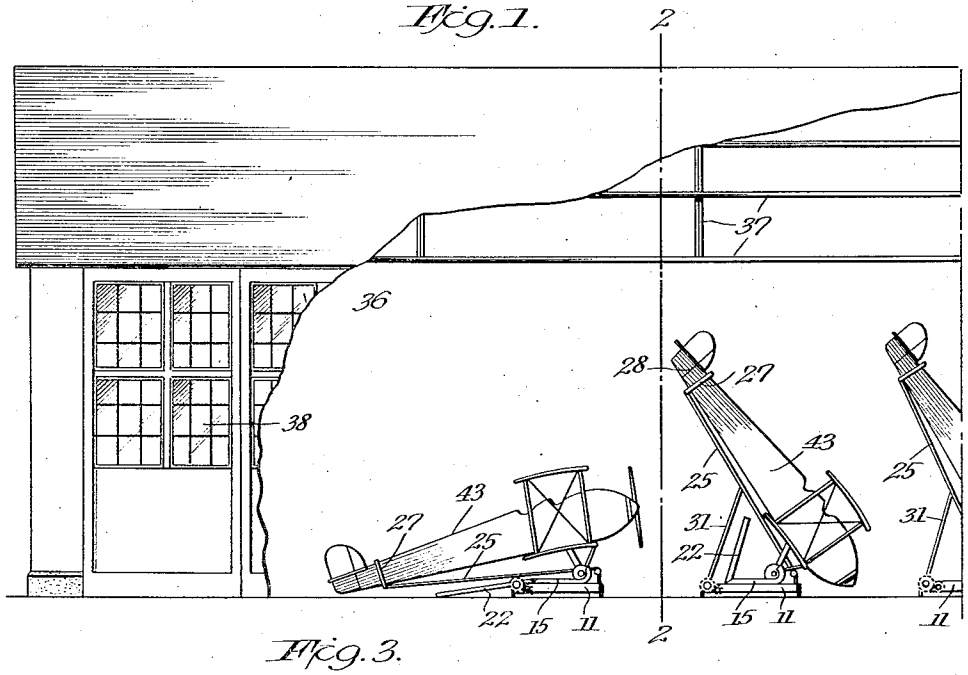
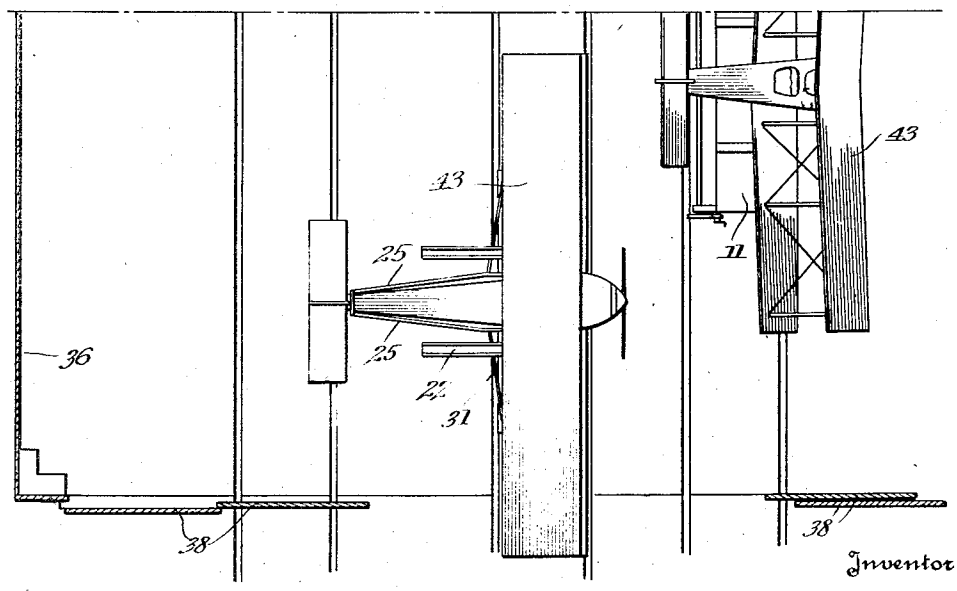


Fig. 3.



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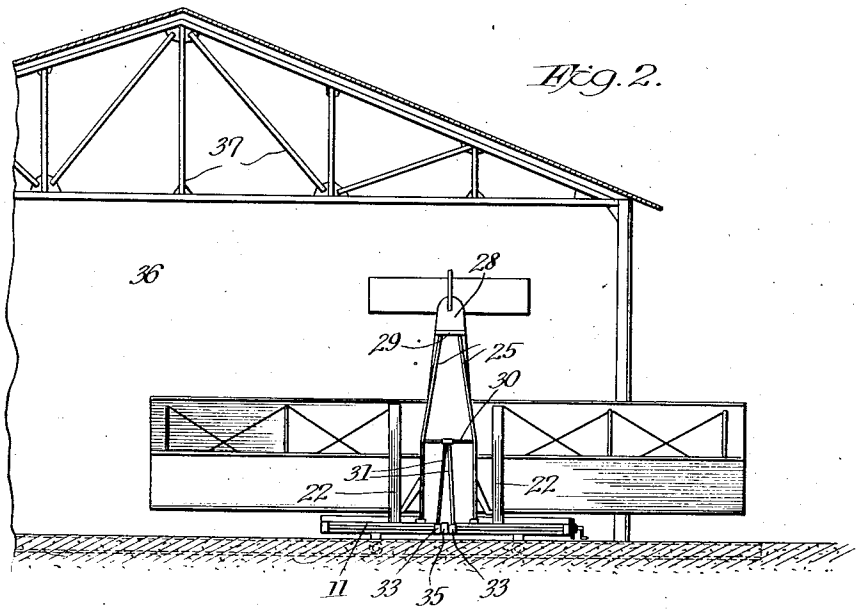
his Attorneys

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AIRPLANE STOWING APPARATUS

Filed Oct. 21, 1929 3 Sheets-Sheet 2.

Fig. 2.



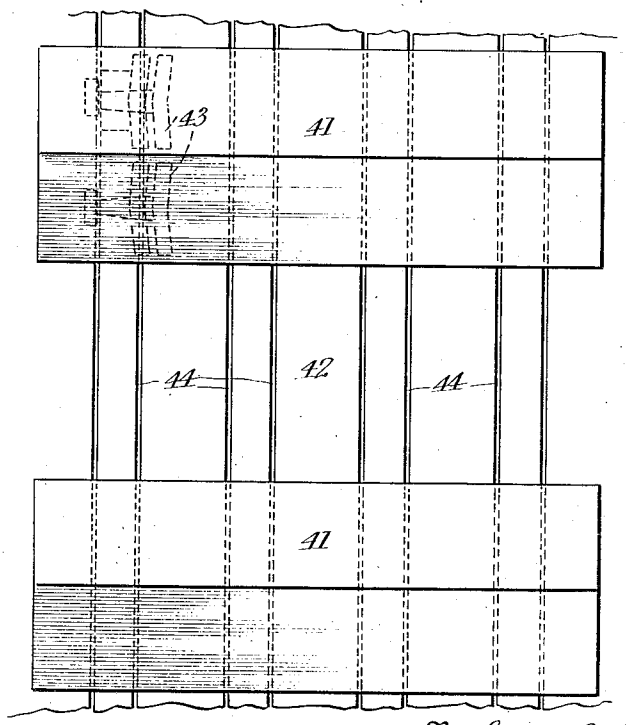


Fig. 4.

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AIRPLANE STOWING APPARATUS

Filed Oct. 21, 1929 3 Sheets-Sheet 3

Fig. 5.

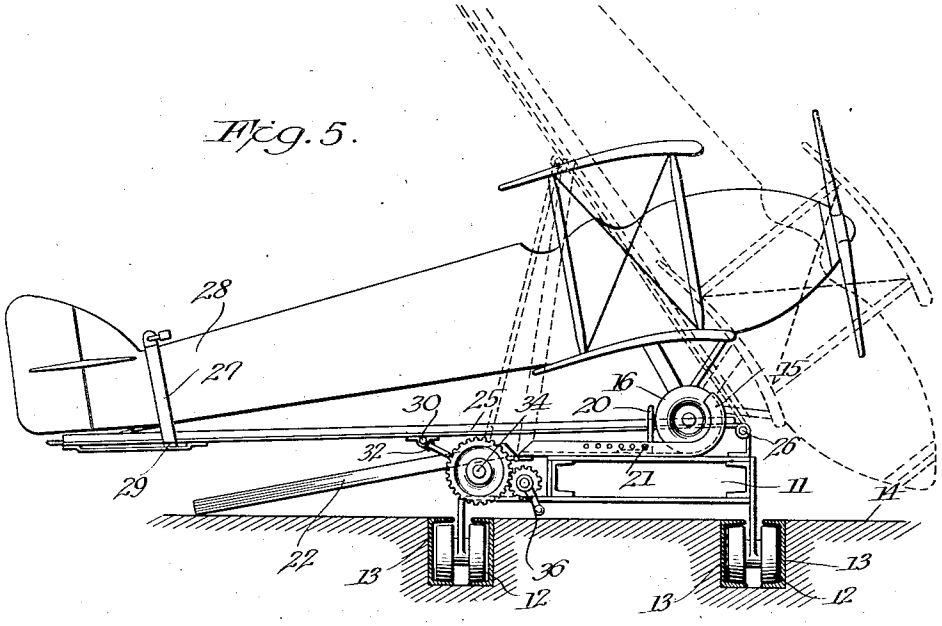
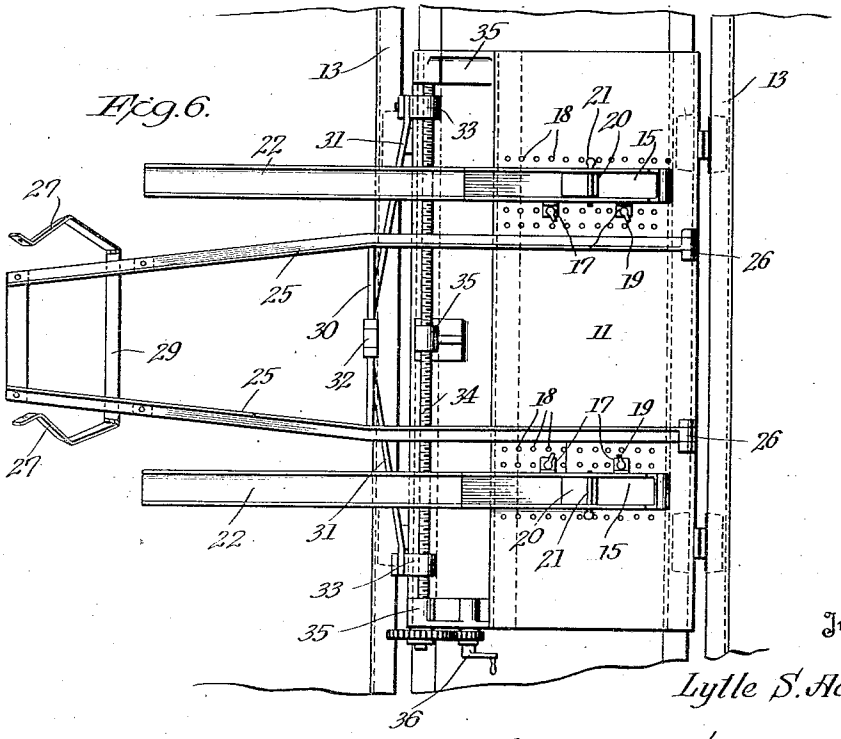


Fig. 6.



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Patented Mar. 1, 1932 1,847,549

UNITED STATES PATENT OFFICE

LYTLE S. ADAMS, OF SEATTLE, WASHINGTON, ASSIGNOR TO AEROPLANE HANGAR AND EQUIPMENT CORPORATION, OF BUFFALO, NEW YORK, A CORPORATION OF DELAWARE

AIRPLANE STOWING APPARATUS

Application filed October 21, 1929. Serial No. 401,242.

This invention relates primarily to airplanes of the land type, although adaptable to seaplanes, and aims to provide for securing them against wind or storm and stowing them in compact space with a minimum amount of effort and number of attendants.

The difficulties heretofore experienced in handling airplanes on the runways and in hangars as usually constructed, wherein the planes are lined up in rows facing the entrance, have required a large field force of men to prevent accidents in moving planes, and have necessitated large areas for the housing or storage of the planes. Attempts have been made to utilize large hangars for housing more than one row of planes, but this plan requires moving the planes in the front row to get access to those in the rear and is not satisfactory.

My invention aims to make available for storage purposes all of the room below the roof of a hangar or other building equipped therewith, and to provide ready access thereto, whereby a larger number of planes may be stored than heretofore without requiring some to be moved to get out others.

The invention contemplates securing each plane to a suitably constructed carrier or carriage, preferably running upon a track, the tracks or carrier runways being arranged in parallel lines transversely of the airplane runway and extending to each side thereof to provide a series of individual berths access to any one of which may be had at any time without disturbing planes berthed alongside. Means are provided for up-ending the planes by their tails to take up less ground space whereby the carriers may be spaced close together.

Further objects and advantages will be apparent from the following description of an illustrative form of the invention shown in the accompanying drawings, wherein

Fig. 1 is a front view of a hangar equipped with apparatus for carrying out the invention;

Fig. 2 is a vertical cross-section through the same on the line 2—2 in Fig. 1;

Fig. 3 is a plan view of the hangar shown in Figs. 1 and 2, drawn to the same scale;

Fig. 4 is a plan view of a portion of an airplane runway and hangars drawn to a smaller scale, showing the arrangement of tracks for serving the storage area;

Fig. 5 is a side view to a larger scale of a plane run up on a carriage and made fast, ready to be up ended and pushed sidewise into a hangar, the dotted lines showing the up ended position in which the plane is conveniently stored; and

Fig. 6 is a plan view to the same scale as Fig. 5 of the carriage and track, showing a short section only of the track for guiding and holding the carriage.

The appartus illustrated in the drawings, which show a typical runway and field arrangement, comprises a carriage 11 of substantial construction, provided with wheels 12, arranged to run within supporting and guiding tracks 13, sunk flush with the surface of the runway 14. The floor of the carriage supports a pair of cradles 15, which may be secured thereto in spaced relation to suit the track of the wheels 16 or supporting members of the type of plane for which the berth is intended. In the device illustrated, the cradles are bolted by means of lugs 17, the securing bolts being arranged in one or another of the holes 18 in the floor plate and provided with clamp nuts 19, for convenient adjustment to suit varying sizes and types of planes. The wheels are preferably secured in the cradles by removable chocks 20, locked in place by pins 21 or other suitable means. Hinged skids 22 which can be folded up out of the way after a plane is on the carriage, as shown in dotted lines in Fig. 5, are advantageously provided to permit the plane to be taxied to its position in the cradles.

The carriage is provided with a tilting frame 25, pivoted to the edge of the carriage adjacent the leading edge of the plane in the position in which it is run on the carriage, as shown in Fig. 1, by hinges 26 of any suitable form. The free end of the tilting frame is provided with a cradle 27 and a strap or other suitable supporting and holding device for securing the tail end 28 of the fuselage or frame of the plane. The details of this

tail connection will be adapted to the type of plane for which the berth is intended, but should be constructed so as to provide for slight movement between the frame and cradle, as by the slide 29.

The tilting frame 25 may be braced midway by a cross-member 30 to which the elevating gear is attached. In the form of device illustrated, the elevating gear comprises a pair of struts 31 pivoted to the cross-member 30 at their outer or supporting ends by means of a double shackle 32 permitting relative movement in all directions, and pivoted at their supported ends to nuts 33 having right and left threads, respectively, and running on the right and left threaded ends of the screw shaft 34, which is journaled in suitable pedestals or bearings 35 on the carriage. A hand crank 36 and reduction gearing is provided for rotating this screw shaft to elevate the tail of the plane after it has been secured to the tilting frame, as shown in dotted lines in Fig. 5.

Hangars 36 of the usual type of truss-roof construction, as illustrated in Figs. 1, 2 and 3, are suitable for housing the planes in their up ended condition, the planes being stowed therein with their wing spread spanning the width of the hanger space, and each trackway forming a berth for a single plane. The roof trusses 37 should be high enough to accommodate the planes in their raised position. Sliding doors 38, or doors opening outwards covering each berth, may be provided, and preferably these doors should be high enough to take the planes in their fully raised position, although this is not essential provided there is width enough to admit the planes in partly raised position.

If desired, the storage space, whether or not covered by hangars, may be divided into parallel sections 41 separated by runways 42, each section being wide enough to house two planes 43, as indicated diagrammatically in Fig. 4, wherein the parallel trackways 44 cross the storage spaces and runways, each trackway serving the berths on each side of each runway. The storage spaces may be roofed and provided with sliding doors along each side giving access to each berth from either side thereby making an entirely new type of hangar well adapted to housing large numbers of planes on a small area so that each may be readily accessible.

By adjusting the cradles 15 to bring the center of gravity of the plane nearly in vertical alinement with the axis of the hinges 26 the power required for lifting the tail end of the plane and for holding the plane securely in its up ended position is a minimum, and one attendant can easily berth the plane unaided by first chocking the wheels and then operating the elevating gear. In the case of a very heavy plane, tackle or a small tractor may be used for moving it in and out of the hangar.

The advantages of the invention from the standpoint of safety, convenience and economy of installation and operation are obvious.

The invention is not restricted to the apparatus illustrated, but what I desire to secure and claim as my invention is as follows:

1. An airplane handling and storing apparatus comprising a trackway having top and bottom rails, a car having wheels engaging between said trackway, rails to prevent overturning, said car providing a cradle for supporting an airplane near its center of gravity, a tiltable frame on said car, and means on said frame for supporting the tail of an airplane held in said cradle.

2. An airplane handling and storing apparatus comprising a trackway having top and bottom rails, a car having wheels engaging between said trackway rails to prevent overturning, said car providing a cradle for supporting an airplane near its center of gravity, a tiltable frame on said car, and means on said frame for raising and supporting the tail of an airplane held in said cradle.

3. An airplane handling and storing apparatus comprising a trackway having top and bottom rails, a car having wheels engaging between said trackway rails to prevent overturning, said car providing a cradle for supporting an airplane, a frame on said car, and means on said frame for supporting the tail of an airplane held in said cradle.

4. An airplane handling and storing apparatus comprising a trackway having top and bottom rails, a car having wheels engaging between said trackway rails to prevent overturning, said car providing a cradle for supporting an airplane near its center of gravity, a tiltable frame on said car, means on said frame for supporting the tail of an airplane held in said cradle, and folding means for guiding an airplane from the ground runway to said cradle.

5. An airplane handling and storing apparatus comprising a trackway, a wheeled carrier running on said trackway, a cradle on said carrier for supporting an airplane at about its center of gravity, means on said carrier for engaging said airplane adjacent to its tail, and means for lifting said tail engaging means to up end said airplane.

6. An airplane handling and storing apparatus comprising a trackway, a wheeled carrier running on said trackway, a cradle on said carrier for supporting an airplane at about its center of gravity, means on said carrier for engaging said airplane adjacent to its tail, and means on said carrier for lifting said tail engaging means.

7. An airplane handling and storing apparatus comprising a trackway, a wheeled carrier running on said trackway, a cradle on said carrier for supporting an airplane at about its

center of gravity, means for securing said airplane in said cradle, means on said carrier for engaging said airplane adjacent to its tail, and means for lifting said tail engaging means to up end said airplane.

8. An airplane handling and storing apparatus comprising a wheeled carrier, a cradle on said carrier for supporting an airplane at about its center of gravity, means on said carrier for engaging said airplane adjacent to its tail, and means for lifting said tail engaging means to up end said airplane, said lifting means constituting a support and brace for said tail engaging means from said carrier.

9. An airplane handling and storing apparatus comprising a wheeled carrier having runways for the ground wheels of an airplane, removable chocks for preventing movement of said wheels along said runways, a frame pivotally connected to said carrier near said chocks, means carried by said frame for engaging the tail portion of an airplane, and a strut extending from said carrier to said frame for supporting the tail engaging end thereof.

10. An airplane handling and storing apparatus comprising a wheeled carrier having runways for the ground wheels of an airplane, removable chocks for preventing movement of said wheels along said runways, a frame pivotally connected to said carrier near said chocks, means carried by said frame for engaging the tail portion of an airplane, and a strut extending from said carrier to said frame for supporting the tail engaging end thereof, said strut having a screw nut at its supported end engaging a screw shaft on said carrier for moving it axially to raise said frame.

11. Apparatus for securing airplanes on the ground comprising a wheeled carrier, a pair of supports thereon for engaging an airplane at each side of its center of gravity, a middle support thereon having means for engaging an airplane near its tail, means permitting relative movement between said airplane tail engaging means and said supports, and means for raising said middle support to lift the tail end of the airplane.

12. Ground apparatus for handling and storing airplanes comprising a wheeled carrier and means for securing an airplane thereto in an inclined position crosswise of the length of said carrier, substantially as described.

13. Apparatus for handling and storing airplanes comprising a storage space, a runway for planes under their own power extending alongside said storage space, a track crossing said runway and entering said storage space, a car on said track, and means on the car for supporting the plane with its tail upended.

14. Apparatus for handling and storing airplanes comprising a storage space, a runway for planes under their own power extending alongside said storage space, a track crossing said runway, a car on said track, and means on the car for anchoring the plane near its center of gravity with its tail upended.

15. Apparatus for handling and storing airplanes comprising parallel storage spaces, airplane runways between said storage spaces, tracks running transversely of said storage spaces and runways, wheeled carriers on said tracks, and means for anchoring airplanes thereon with their tails upended.

16. The method of handling and storing airplanes in close order in a hangar to permit independent removal, which consists in moving them into place sideways in an upended position, whereby said upended portions each overly the adjacent airplane in lengthwise spaced relation thereto.

17. A method of handling and storing airplanes which includes running the airplanes under their own power into position beside their respective storage spaces facing sideways thereof, elevating the tail ends thereof and shifting said airplanes transversely into said storage spaces and securing them with their tail ends in overlapped relation.

In testimony whereof, I have signed my name to this specification.

LYTLE S. ADAMS.