Dec. 6, 1938. W. W. CLARK 2,138,999

VACUUM LIFT DEVICE

Filed June 30, 1937

Fig. 1

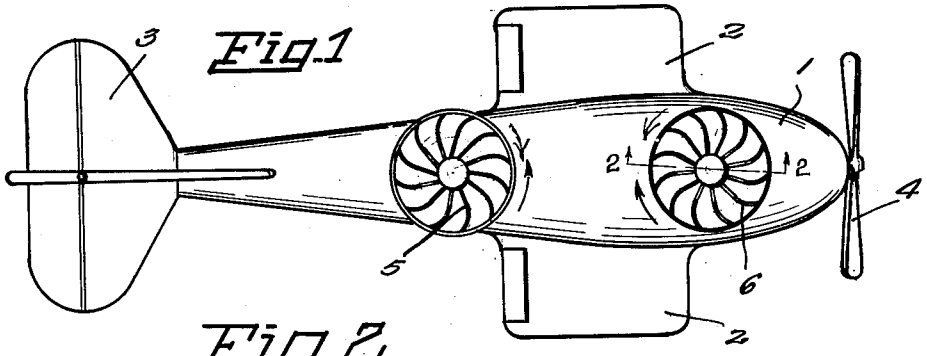


Fig. 2

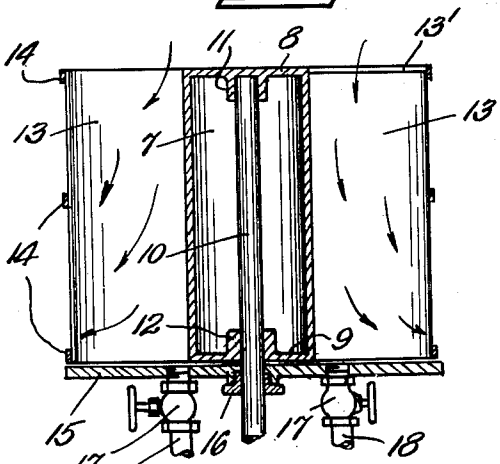


Fig. 3

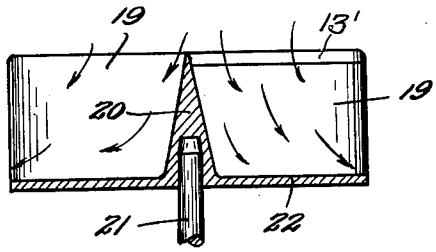


Fig. 4

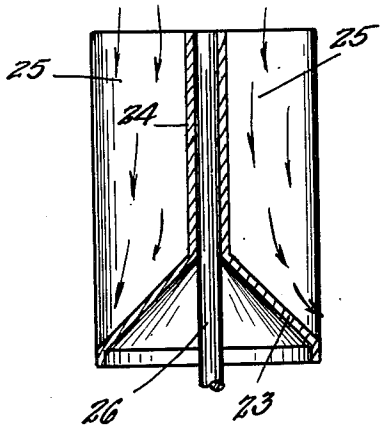
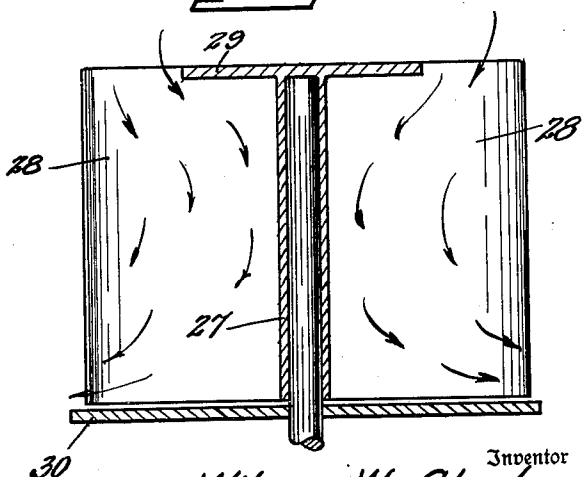


Fig. 5



Inventor

Wilmer W. Clark

By

Glenn L. Fish

Attorney

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VACUUM LIFT DEVICE

Wilmer W. Clark, Spokane, Wash.

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1 Claim. (Cl. 170—156)

This invention relates to a vacuum lift device for air and water craft, and it is one object of the invention to provide a device of this character of such construction that when it is incorporated in the construction of an airplane or the like, a vacuum may be created over the same and exert an upward pull which will cause the air craft to rise easily.

Another object of the invention is the provision of a vacuum lift device which may be mounted over the fuselage or the wings of an air craft or over the hull of a boat where it may very effectively serve its purpose and at the same time be out of the way.

Another object of the invention is to provide means whereby the vacuum created can be controlled and thus the lifting power of the device regulated. It will thus be seen that by properly adjusting the device, an airplane or other air craft can be caused to rise easily and after reaching a desired altitude caused to remain at this altitude.

Another object of the invention is the provision of a device of this character which is of simple construction and very efficient in its operation.

The invention is illustrated in the accompanying drawing, wherein

Figure 1 is a top plan view of an air craft equipped with two of the improved vacuum lift devices.

Figure 2 is a sectional view taken vertically through one of the vacuum lift devices.

Figure 3 is a vertical sectional view through a vacuum lift device of a modified construction.

Figure 4 is a sectional view of another modified form of the invention.

Figure 5 is a sectional view of still another modified construction.

In the accompanying drawing, the improved vacuum lift device has been shown incorporated in the construction of an airplane but, as previously set forth, it may be employed in the construction of a water craft such as a submarine, fast motor boat of the hydroplane type or other air or water craft which it is desired to permit to rise easily and maintain a substantially constant height after rising to the desired altitude.

The airplane illustrated in Figure 1 has the usual body or fuselage 1 having side wings 2 which are very short, and a tail assembly 3 of a conventional form and construction. There has also been provided the usual propeller 4 at the front of the body. The body 1 carries a pair of vacuum lift devices 5 and 6 which rise from the body and are spaced from each other longitudinally thereof, the rear device 5 being so located that it projects rearwardly of the wings and the front device 6 being located in such a position that it projects forwardly of the wings. While two vacuum lift devices have been shown in use, it is to be understood that any number found desirable may be provided.

Each of the vacuum devices is constructed as shown in Figure 2 and consists of a cylindrical drum 7 closed at its upper and lower ends by heads 8 and 9. A shaft 10 extends vertically through the drum axially thereof and has its upper end seated in a socket 11 carried by the head 8 and an intermediate portion engaged through the sleeve 12 of the head 9. Blades 13 having beveled upper edges 13' extend from the drum radially thereof for its full depth. The beveled edges which are formed upon front faces of the blades are an important feature as they serve to reduce air friction and pressure at upper ends of the blades. In order to brace the vanes or blades there have been provided hoops 14 disposed in vertical spaced relation to each other and firmly secured to the outer free side edges of the blades. These hoops maintain the blades in proper spaced relation to each other and also prevent them from loosing the curvature shown in Figure 1. The curved blades are set close together and while the best proportions for practical use can only be determined by actual use, the number of blades in a device having a circular diameter of three feet and a hub diameter of twelve inches will be about thirty blades. The height of the blades should be about three feet. The reason for making the blades so high in proportion to the width is to permit of running the device at a slower speed or, in other words, a fewer number of revolutions per minute and yet make sure that no air entering at the top can reach the bottom before being thrown out by centrifugal force. Referring to this figure it will be seen that the blades of the device 5 curve in an opposite direction to that of the device 6, this being due to the fact that the vacuum lift devices 5 and 6 turn in opposite direction as shown by the arrows in Figure 1. The shaft 10 of each device extends downwardly through a stationary plate 15 which is fixed upon the body 1 of the airplane in any desired manner and carries a stuffing box 16 which fits about the shaft and prevents leakage of air about the shaft. The shaft may be of any desired length and extend downwardly into the body for connection with suitable driving means. The plate also carries valves 17 which are screwed into openings formed in the plate and connected with pipes 18 which may be led from a suitable source of air under pressure or merely admit atmospheric air to pass upwardly through the plate 15. Flow of air upwardly through the valves 17 controls operation of the vacuum lift in a manner to be hereinafter set forth. It is important that dependable airtight

valves capable of quick, accurate and delicate adjustment be used.

During use of the airplane to which the vacuum lift devices have been applied, rotary motion is imparted to the shafts 10 and the drums and blades carried thereby will have rotary motion imparted to them. The two devices rotate in opposite directions so that they will not exert a spinning effect upon the airplane. Therefore, the airplane will not be twisted and subjected to undesired strains and the normal ease with which it can be steered will not suffer any ill effects. As the devices rotate at a high rate of speed, air will be thrown outwardly by centrifugal force at the sides from between the curved blades as indicated by the arrows in Figure 2. Naturally, air from the surrounding atmosphere will tend to be forced into the device by atmospheric pressure to replace that thrown out by centrifugal force. No air can enter through the bottoms of the rotating members because the bottoms are closed in each form illustrated. Air cannot enter through the sides because a stream of air is being constantly thrown out by centrifugal force from each space between the blades and the curvature of the blades is such that even a strong wind blowing against a side of a rotating member cannot enter the spaces between the blades but will be deflected by the curvature at the outer ends of the rapidly moving blades. Therefore, the only place air can enter the rotating members is through the tops thereof. By having the centers closed at the tops as shown in Figures 1, 2 and 5 air must enter the rotating members at a distance from the centers of rotation. Ordinary atmospheric pressure is sufficient to force the air into the devices to replace that thrown out of centrifugal force. The rotating members are intended to revolve at such speed that air forced in at the tops by atmospheric pressure will be thrown out the sides before it can reach the bottoms of the spaces between the blades. The air at the bottoms of the spaces will be thrown out by centrifugal force and since no more air can get into the bottoms of the spaces so long as the rotating members continue to rotate at the requisite speed, it follows that a vacuum will be formed at the bottom of each space between the blades of all the rotating members which will be equal to a vacuum over all or nearly all of the area covered by the rotating members. Lift will be gained from the atmospheric pressure exerted against the under side of the plate or cone closing the bottom of each device. Such atmospheric pressure at sea level is 14.7 pounds per square inch so that a device which produces a high vacuum with the rotating member and which has an effective circular diameter of three feet, will have a theoretical lift at sea level of about seven tons or more. This will exert a lifting force and permit the air plane to take off very quickly as it will have a tendency to move vertically off the ground. The devices also exert a gyroscopic effect which tends to stabilize the airplane during flight and when properly adjusted permit the airplane to maintain itself at a constant altitude instead of gradually increasing its altitude. Maintaining the airplane at a constant altitude is accomplished by opening the valves until a sufficient quantity of air is allowed to pass upwardly through the plate 15 to counteract the lifting effect and when it is desired to descend, the valves can be opened until a sufficient quantity of air passes upwardly into the vacuum lift devices to permit downward movement of the airplane. It will thus be seen that the airplane can be allowed to sink and descend in a vertical path until it rests upon the ground. A safe landing can, therefore, be made during a fog as forward motion during landing is not necessary. At the beginning of a flight, rotation of the vacuum lift devices is started with the valves wide open and the valves then slowly closed until the fuselage lifts slightly upon its springs. One side may lift first in case the airplane is unevenly loaded, in which case the valves will be adjusted until the lift is even. This will trim the load and the valves can then be closed equally and the airplane will rise from the ground when the engine is speeded up and sufficient pull exerted by the vacuum lift devices. The propeller will impart forward movement to the airplane. The extent to which the valves are closed and the speed at which the vacuum lift devices rotate controls the speed at which the airplane rises. When a desired altitude is reached it is merely necessary to open the valves until no further lifting action is exerted beyond that necessary to maintain the air plane at the attained altitude.

In Figure 3 there has been illustrated a modified form of vacuum lift device. In this embodiment of the invention, the blades 19 radiate from a cone-shaped hub 20 formed with a socket to receive the upper end of the drive shaft 21. A bottom plate 22 is provided and serves to insure outward movement of air by centrifugal force as indicated by the arrows. This vacuum lift device is of considerably less height than the vacuum lift illustrated in Figure 2.

The vacuum lift device may also be formed as shown in Figure 4 wherein there has been provided a conical bottom 23 from which rises a tubular hub 24. The blades 25 project radially from the hub and at their lower ends are welded or otherwise firmly secured to the bottom. The shaft 26 extends through the hub and is secured therein in any desired manner.

In Figure 5 there has been illustrated another modified construction. This form of vacuum lift device has a tubular hub 27 from which the blades 28 radiate and at the top of the hub there has been mounted a cap-plate or disc 29 which is of approximately one-half the diameter of the entire device so that air drawn downwardly will follow the path indicated by the arrows and be thrown outwardly by centrifugal force. The plate 30 corresponds to the plate 15 and may carry valves corresponding to the valves 17 if so desired.

Having thus described the invention, what is claimed as new is:

A vacuum lift device comprising a tubular hub, a disc surrounding the upper end of said hub and closing the upper end thereof, and radially curved blades extending radially from said hub and projecting radially beyond the periphery of the disc, a stationary plate under the blades and hub and constituting a barrier for lower ends of spaces between the blades.

WILMER W. CLARK.