

Dec. 29, 1931.

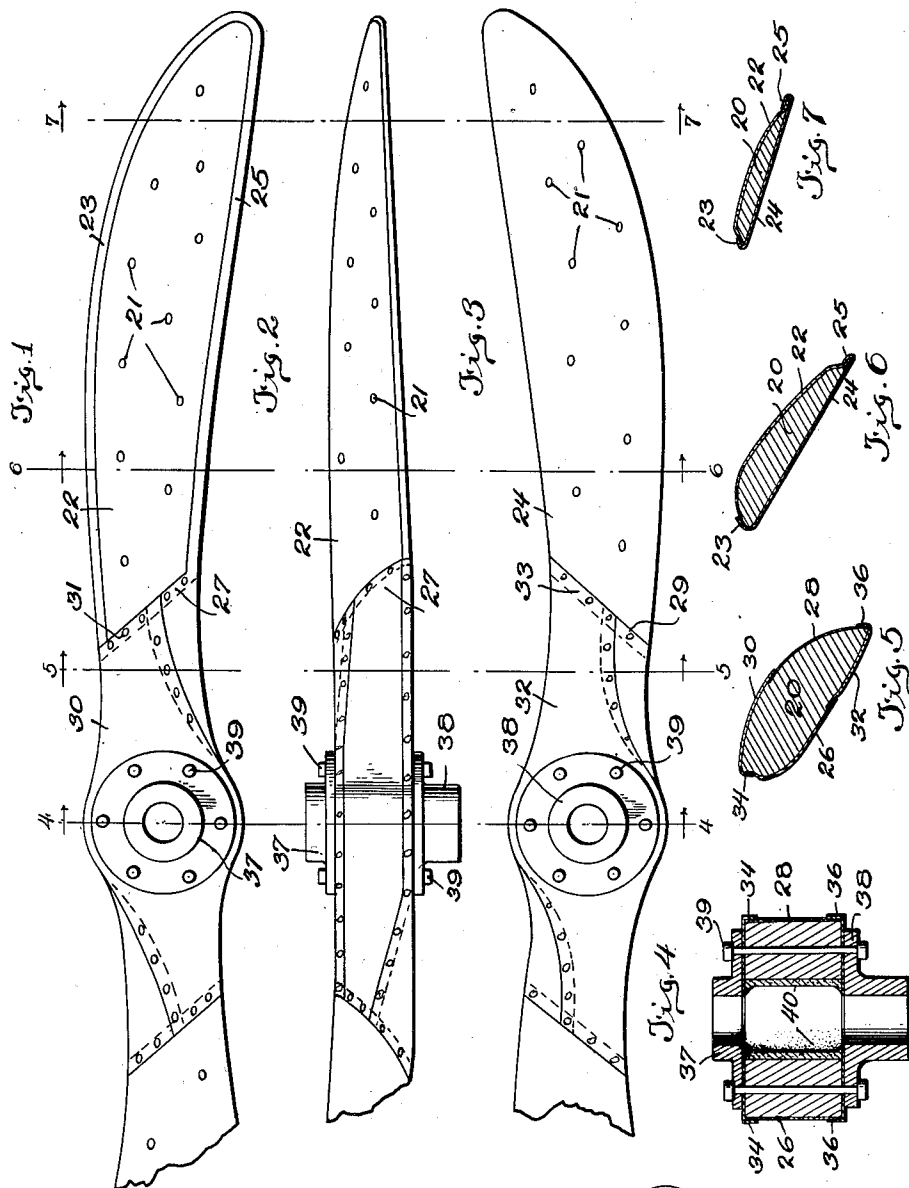
S. HEATH

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AIRSCREW

Filed Jan. 25, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 9

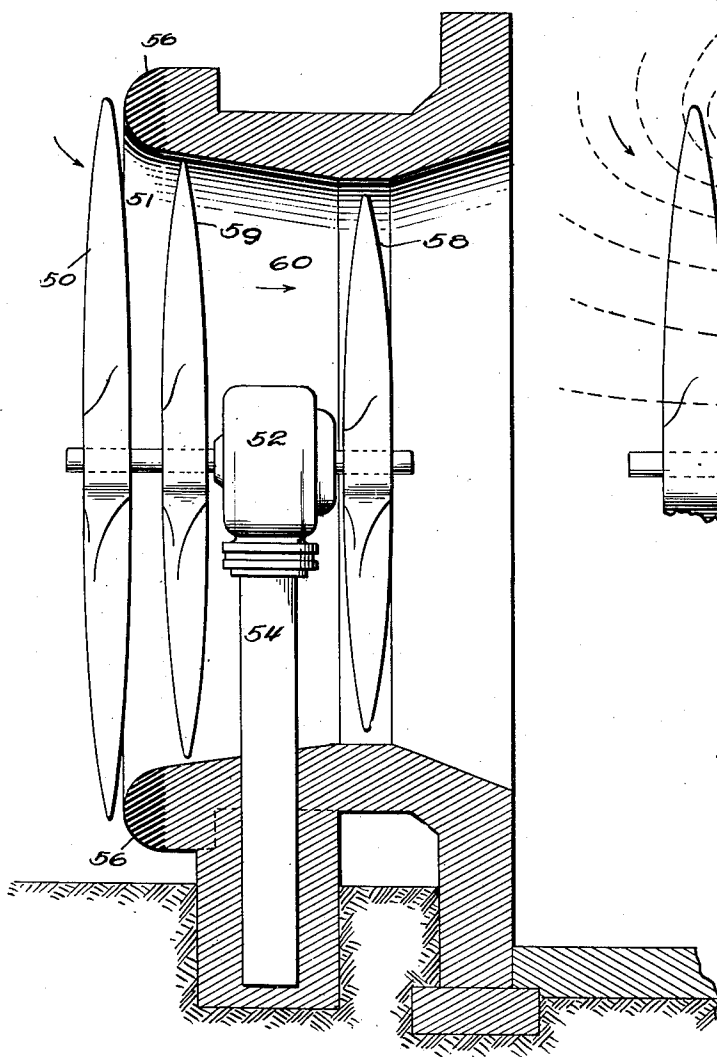
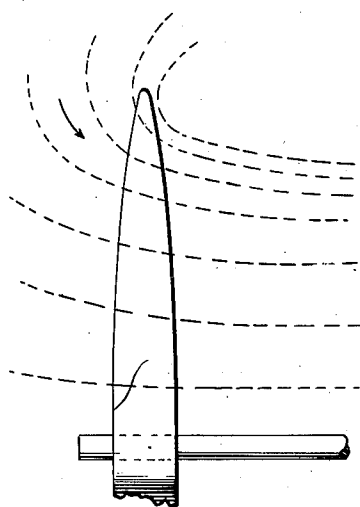


Fig. 8



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AIRSCREW

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This invention relates to airscrews and particularly to propeller-type fans or blowers which are used for moving large quantities of air through an aperture or conduit connected with an enclosed structure or chamber.

One of the objects is the production of an airscrew of moderate weight and great resistance to corrosion but at the same time of suitable form and of sufficient thickness of blade section for effective action, especially at comparatively low speed of the blades.

A further object is to increase the effective action of the propeller by associating with it aperture walls and conduit walls having contours that nearly coincide with the characteristic lines of air flow in the region of the blade tips of a propeller when operating as a blower in the open air and free from any enclosure or obstruction.

A further object is to increase the force of air flow by associating two or more propellers in the same air stream, the propellers being progressively smaller in diameter as they occupy "down stream" positions in the air flow.

With the foregoing objects and other objects which the nature and useful adaptation of my improvement will disclose I have invented the airscrew and blower propeller and arrangement of the same that I have exemplified on the annexed drawings, in which—

Figure 1 is a plan view of my propeller;

Figure 2 is a side view of the same;

Figure 3 is an opposite plan view from Fig. 1;

Figure 4, 5, 6 and 7 are sections on lines 4—4, 5—5, 6—6 and 7—7 of Figures 1, 2 and 3;

Figure 8 is a diagram illustrating the form and direction of air flow that is characteristic of blower propellers operating in the open air, and

Figure 9 is an elevation partly in section showing my propellers arranged in special combination with each other and with aperture and conduit walls.

Like reference numerals refer to the same or corresponding parts throughout.

Figures 1 to 7 show a two bladed propeller similar to an airplane propeller except that

the blades are of greater thickness and breadth that they may be more effective at the comparatively slow speeds at which blower propellers and other airscrews commonly turn. These airscrews are for use in connection with water-cooling towers for industrial plants, forced draft for boilers, mine ventilation, industrial chemical works and in other situations of exposure to chemically destructive agencies or moisture or extreme weather conditions as in connection with wind-driven electric generators and pumping outfits or other modern applications of airscrews with blades of airfoil section as indicated in Figures 6 and 7.

The propeller is made up with a core 20 of any convenient relatively light material such as wood or a fiber composition which is carved or moulded to the requisite design. This core is encased and hermetically sealed in an impermeable casing or jacket of zinc or copper or, preferably, nickel-copper alloy such as Monel metal where very great durability and resistance to corrosion is desired. The sheet metal is laid on each blade in two main sheets 22 and 24 which cover both sides of the blade well up toward the hub. The sheets are secured by screws or nails 21 and to each other at their edges by lapped seams 23 and 25. The sides of the hub are similarly covered by two sheets 26 and 28 the ends of which lap over sheets 22 and 24 as shown at 27 and 29. The casing is then completed by covering the faces of the hub with sheets 30 and 32, the ends of which extend out and lap over sheets 22 and 24 as shown at 31 and 33 and the sides of which lap over sheets 26 and 28 as shown at 34 and 36. The seams 23—25 are thoroughly soldered; all lap seams are first tinned and then securely screwed or nailed and soldered. All screw or nail heads are countersunk below the surface and soldered level. On the hub faces metal flanges 37 and 38 are secured by through bolts 39. These flanges are laid in melted asphalt and this material is also melted into the bore of the propeller at 40 where the center hole has been made larger than the bore of the metal flanges for the purpose of receiving this sealing material with-

out obstructing the entrance of the drive shaft when the propeller is mounted.

With all sheet metal joints securely soldered and hub flanges and center hole laid with melted asphalt the entire propeller is hermetically sealed against the entrance of any moisture or vapors that would tend to injure or destroy its interior structure. This result of a completely sealed propeller is a radical advance upon the current practice with metal clad propellers of providing their tips with escape holes for the outlet of any liquid that may penetrate the unsealed sheathing.

The preferred adaptation of my propeller as a blower is illustrated by Figure 9 in which the propeller 50 is mounted just outside the aperture 51 through which the air is blown into the conduit 60. The preferred drive is electric 52 mounted on a column 54 inside the conduit. The diameter of the conduit diminishes in the direction of air flow. The entrance wall of the aperture is in the form of an annulus of semi-circular cross-section as indicated by shading at 56. The center of the arc on which the annulus is struck being at about the same distance from the center of the conduit as the ends of propeller 50 from the center of the conduit the entrance diameter of the aperture is nearly the same as the propeller diameter. However, it is preferred to let the blades extend slightly beyond the center of the annulus as shown, the amount of this extension being most when there is greatest clearance between the propeller tips and the aperture walls.

This form of aperture or conduit entrance accommodates the natural flowing tendency of the air as shown at Fig. 8, and by keeping the entrance walls in alignment with the boundary of the natural air stream affords no passage for backflow of air along the aperture walls.

When it is desired to blow against greater resistance (or pressure) than the propeller 50 at the aperture entrance can readily overcome at a given speed and diameter I place one or more auxiliary propellers on the same driving shaft with their blade tips inside of the conduit entrance as shown at 58 and 59. These auxiliary propellers are given higher pitch to compensate their reduced disk area and the higher speed of the air upon which they must act. It is a special feature of these propellers that in relation to each other and to the flow of the air set in motion by them they are progressively smaller in diameter as their positions are further "down stream" in the direction of air flow.

Having now fully described my invention, what I claim is:

1. An airscrew comprising a wood core and a casing of sheet metal completely enclosing said core, said metal casing being hermetical-

ly sealed and including separate parts secured together.

2. An airscrew comprising a wood core and a casing of sheet metal completely enclosing said core, said metal casing comprising separate sheets mechanically attached to said core and to each other with all joints and points of attachment soldered and hermetically sealed.

3. An airscrew comprising a core and a casing of sheet metal completely enclosing said core, said sheet metal being applied separately to the blade portions and the hub portion of said core with all joints securely soldered and sealed.

4. An airscrew comprising a core with hub and blade portions, a casing of sheet metal completely enclosing said core and a metal flange secured to the hub of said core, all joints being hermetically sealed.

5. An airscrew comprising a core with hub and blade portions, a sheet metal casing separately applied to the hub portion and blade portions of said core, that portion of the metal casing covering said hub portion comprising four pieces separately applied and secured to each other by overlapping seams.

SPENCER HEATH.