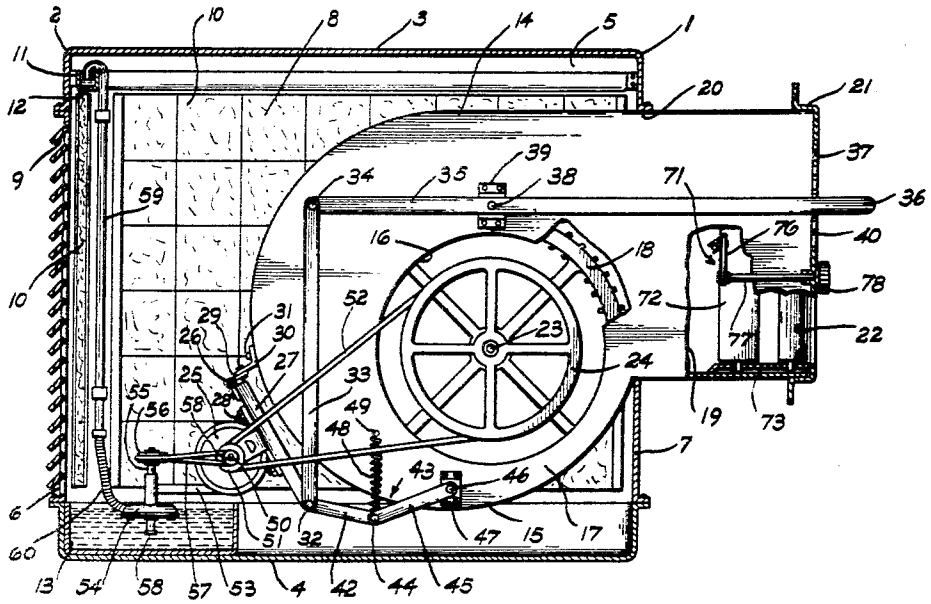
April 26, 1960 R. E. RODICK ET AL 2,934,022

VARIABLE OUTPUT CONTROL FOR BLOWERS

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Fig. 1.



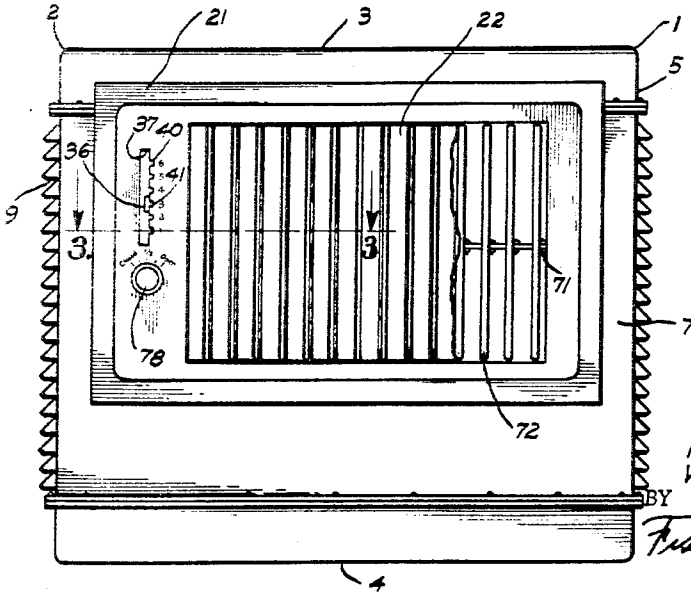


Fig. 2.

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Fig. 3.

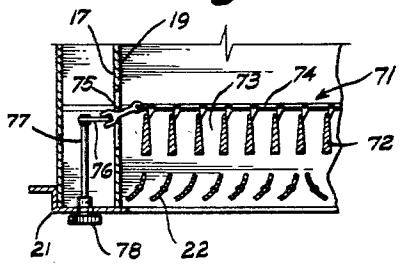


Fig. 4.

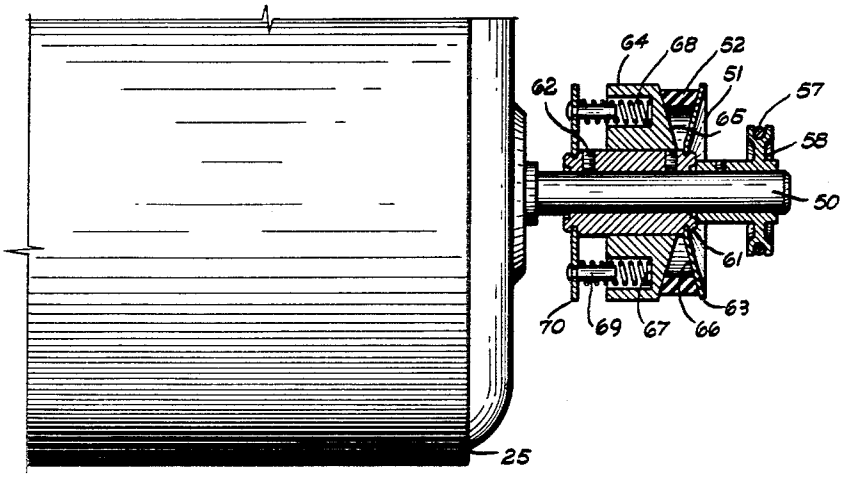
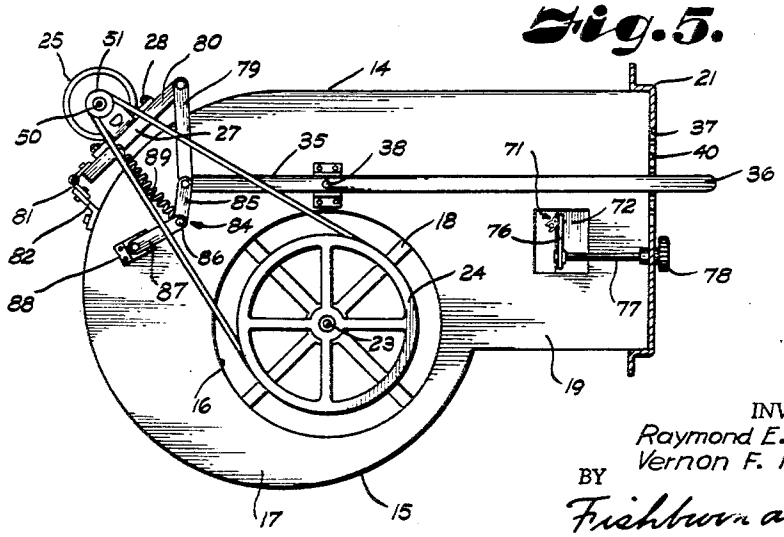


Fig. 5.



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VARIABLE OUTPUT CONTROL FOR BLOWERS

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4 Claims. (Cl. 103—6)

This invention relates to blowers, and more particularly to blowers for evaporative coolers, such as window mounted coolers, and a variable output control therefor.

The principal objects of the present invention are to provide a blower unit for evaporative coolers and the like with variable controls for the blower and the output air thereof to give a wide range of operation for maximum comfort in a space being cooled; to provide an evaporative cooler with a blower and motor and pump mounting with drive connections and controls for varying the speed of the blower to increase or decrease the volume of air delivered thereby while maintaining the speed of the pump for a constant output thereof; to provide such a structure wherein the motor is pivotally mounted relative to the blower and has a variable speed pulley operatively connected by a belt to the blower whereby the pulley is responsive to variation in tension on the belt drive effected by pivoting the motor to change the center thereof relative to the blower; to provide such a structure with a pivoted motor mounting and linkage and control lever arm extending adjacent the discharge of the cooler for remote control of the motor position; to provide such a structure with linkage and having a leverage for moving the motor center relative to the blower pulley center with a small force applied to said control arm; to provide such a structure with cooperative interengaging portions on the control arm and cooler for retaining the control arm and motor in selected positions; to provide such a structure with a motor mounting and counterbalancing mechanism to reduce the force required at the control arm for moving the motor; to provide such a structure with a variable air damper at the discharge end of the blower to aid in controlling the air volume and noise of air passage; and to provide such an evaporative cooler with a motor mounting and variable speed pulley drive to the blower and air controls that are efficient in operation to give a wide comfort range in the space being cooled.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

Fig. 1 is a vertical sectional view through an evaporative cooler with the blower thereof provided with a variable speed control and air delivery control.

Fig. 2 is a front elevation of the evaporative cooler with portions of the grille broken away to show the air control dampers.

Fig. 3 is a horizontal sectional view through the discharge of the evaporative cooler taken on the line 3—3, Fig. 2.

Fig. 4 is a sectional view through the motor pulleys.

Fig. 5 is a side elevational view of the blower with a modified form of the motor mounting and variable speed control.

Referring more in detail to the drawings:

1 designates an evaporative cooler generally consisting of a housing 2 having a top wall 3, bottom wall 4, side walls 5, rear wall 6 and front wall 7 defining a chamber 8. Certain of the side and rear walls 5 and 6 have louvered openings 9 for passage of air into the compartment 8. Filter pads 10 of fibrous material are suitably supported in compartment 8 in covering relation to the louvered openings 9 where by the air moving through the louvered openings into the compartment 8 passes through the filter pads 10. Troughs 11 are supported in the housing 2 above the pads 10 and provided with apertures 12 whereby water in the troughs will drip onto the pads 10 to wet same. A catch basin or pan 13 is arranged on the bottom wall 4 and under the lower ends of the pads 10 whereby water dripping from the pads 10 will be collected in the pan 13.

A blower 14 is supported in the compartment 8 and includes a casing 15 having inlet openings 16 in end walls 17 aligned with an impeller 18 rotatably supported in the casing 15 whereby rotation of the impeller 18 draws air through the openings 16 into the interior of the impeller and discharges same through a discharge duct 19. The blower 14 is mounted in the housing 2 whereby the duct 19 extends through an opening 20 in the front wall 7. The end of the duct 19 is spaced from the housing 2 and is provided with a panel 21 having spaced vertical members 22 providing a grille structure through which the air from the blower is discharged. In the structure illustrated, the housing 2 may be positioned on the exterior of a building with the duct 19 extending through a window opening with the panel 21 inside a space to be conditioned or cooled and preferably adjacent the window sash. The mounting members (not shown) for the evaporative cooler may be of conventional structure.

The blower impeller 18 is mounted on a shaft 23 and also carried by the shaft 23 but externally of the blower casing 15 is a pulley 24 that is fixed relative said impeller and adapted to be driven by a motor 25. Secured to the blower casing 15 is a motor mount 26 which includes a plate 27 to which the motor 25 is secured by suitable fastening devices 28. One end of the plate 27 is hingedly connected by a hinge member 29 to a support or bracket 30 fastened to the blower casing 15 by suitable fastening devices 31. The other end of the plate 27 is pivotally connected by a pin 32 to one end of a link 33, the other end of said link being pivotally connected by a pin 34 to a control lever or arm 35 which extends forwardly with the opposite end forming a handle portion 36 extending through a slot 37 in the panel 21. The arm 35 has a pivotal mounting intermediate its ends, said mounting being by a suitable pin 38 carried by a bracket or support 39 secured to an end wall 17 of the blower casing remotely of the motor preferably above the inlet opening 16 whereby upward movement of the handle portion 36 moves the link 33 downwardly to swing the motor plate 27 away from the blower casing, as illustrated in Fig. 1. A plurality of vertically spaced notches 40 are preferably arranged at one side of the slot 37 adapted to be engaged by a lug 41 on the adjacent side of the arm 35 whereby the arm may be retained in selected position and retain the motor plate to hold the motor 25 in corresponding relatively spaced relation to the blower casing.

The pivot pin 32 also is pivotally connected to one end of a link 42 of a toggle structure or pair of links 43, said link 42 having its other end pivotally connected by a pin 44 to one end of the other link 45 of the pair, said link 45 having the other end thereof pivotally connected as at 46 to a bracket 47 mounted on the end wall 17 of the blower substantially opposite to the bracket 39 relative to

the opening 16. A spring 48 has one end connected to the pivot pin 44 and the other end connected as at 49 to the blower casing to bias the toggle links tending to move same to an in line relation and swing the plate 27 away from the blower casing, as illustrated in Fig. 1.

The motor 25 is preferably a conventional electric motor having a shaft 50 on which is mounted a variable speed drive pulley 51. A drive belt 52 operatively connects the drive pulley 51 with the blower impeller pulley 24. A bracket 53 is fixed to the motor housing and extends therefrom over the pan 13 and supports a water pump 54 having a drive shaft 55 on which is fixed a driven pulley 56 operatively connected by a belt 57 to a drive pulley 58 fixed on the motor shaft 50. The bracket 53 supports the pump whereby the pump moves with the motor maintaining the belt centers thereof whereby the pump is driven at the same speed by the motor at any time the motor is operated. The pump has an intake 58 extending into the pan 13 whereby water is drawn therefrom and delivered through a duct 59 to the trough 11 above the filter pads 10. The duct 59 includes a flexible portion 60 connected to the discharge of the pump to permit movement of the pump with the motor 25.

The variable speed drive pulley 51 is of such construction that when the tension on the drive belt 52 is increased the effective diameter of the drive pulley is reduced whereby the speed of the drive belt is also reduced. In the structure illustrated, the drive pulley has a hub 61 fixed to the shaft 50 by fastening devices 62. At one end of the sleeve is a flange 63 fixed thereto and extending outwardly therefrom, the flange 63 being inclined to form one side of belt engaging pulley portions. A ring member 64 is slidably sleeved on the hub 61 with the end surface adjacent the flange 63 inclined to form the other side of the belt engaging pulley portions. The belt engaging portion or surface 65 of the member 64 and belt engaging portion 66 of the flange 63 diverge outwardly from the hub 61 at a suitable angle to engage the opposite side surfaces of a conventional V-belt. The slide member 64 has a plurality of spaced recesses 67 extending inwardly thereof from the end opposite the surface 65 to receive compression springs 68, the opposite end portions of said springs being sleeved on drive pins 69 fixed on a flange 70 that is secured to the opposite end of the hub member 61. Engagement of the springs 68 and pins 69 relative the recesses 67 of the ring member 64 drives the ring member whereby it rotates with the hub 61. The springs 68 urge the ring member toward the flange 63 tending to cause the belt engagement therewith to move outwardly toward the peripheral edges of the surfaces 65 and 66 and increase the effective diameter of the drive pulley. However, tension on the belt 52 counteracts the springs 68 whereby they cooperate to provide an effective diameter of the drive pulley governed by the centers of the pulleys 51 and 24.

In the structure illustrated in Fig. 1, the weight of the motor tends to swing the plate 27 away from the blower casing 15. Also the spring 48 and toggle levers or links 43 tend to swing the motor plate 27 away from the blower casing 15 and thereby effect an increase in the distance between the pulley centers of the pulleys 51 and 24. This provides a counterbalance to the forces tending to swing the plate 27 inwardly toward the blower casing that are applied by the tension of the belt 52 whereby substantially little force is required on the handle 36 of the lever arm 35 to move the motor plate 27 and change the pulley centers and thereby the rotative speed of the impeller 18 and the air moved by said impeller as said air movement is directly proportional to the speed of the impeller and any change in the speed thereof results in a change in the volume of air moved by the impeller. However, movement of the motor plate 27 to change the speed of the blower impeller does not change the speed of the pump 54.

To further control the air delivery for a maximum comfort range in the space to be cooled, a variable air control damper 71 is arranged in the discharge duct 19 of the blower. In the illustrated structure, a plurality of spaced vertically extending damper vanes 72 have their ends pivotally mounted in plate 73 fixed to the duct 19 or grille panel 21 and each of said damper vanes are connected to a rod 74 having one end connected by a link 75 with an arm 76 on a shaft 77 of a control knob 78 mounted in the panel 21 whereby rotation of the knob 78 swings the damper vanes from open to closed positions. These damper vanes 72 act as a throttle easily adjusted from the face of the unit to control the air volume delivered by the blower and the noise of the air passage from the grille.

The grille members 22 preferably are also pivoted whereby the direction of the air discharged from the cooler may be altered.

In operating an evaporative cooler constructed and assembled as described, the motor 25 is energized to drive the pump 54 and blower impeller 18. The pump delivers water from the pan 13 to the trough 11 where it drips onto the pad 10. Air drawn through the louvered openings passes through the wetted pad 10 evaporating the water, cooling the air, and said air is then drawn through the inlet opening 16 of the blower and is discharged by the impeller through the duct 19, setting of the damper vanes 72 providing some control on the air volume delivered by the blower. When it is desired to change the speed of the blower, for example to increase the air output, the handle 36 is grasped and moved laterally to release the lug 41 from the notch 40 and said handle 36 then moved downwardly and the lug engaged with another lower notch. Downward movement of the handle 36 moves the opposite end of the lever arm upwardly, raising the link 33, swinging the motor plate 27 inwardly toward the blower casing 15. This shortens the pulley center spacing of the motor pulley and blower pulley, and the springs 68 move the ring member 64 toward the flange 63 forcing the engagement of the belt 52 therewith outwardly, increasing the effective diameter of the drive pulley 51, and increasing the speed of the impeller 18 accordingly to increase the air output of the blower.

In the form the invention illustrated in Fig. 5, the lever arm 35 is mounted on the blower housing substantially in the manner illustrated in Fig. 1, and the end of said lever arm in the housing 2 is connected to one end of an upwardly extending link 79 that has its opposite end pivotally connected to one end of a motor plate 80. The other end of the motor plate is hingedly connected by a hinge member 81 to a bracket 82 mounted on the blower casing 15. The motor 25 is secured on the plate 80 and the motor shaft 50 has a variable speed drive pulley 51 operatively connected by a belt 83 with the impeller pulley 24. The toggle mechanism 84 includes a lever 85 having one end pivotally connected to the arm 35 and link 79, and its other end pivotally connected by a pin 86 with a link 87 having its other end pivotally connected to a bracket 88 that is secured to the end wall 17 of the blower housing. A spring 89 connects the pivot 86 and motor plate 80 to provide a counterbalancing action wherein the spring tends to urge the motor plate 80 toward the blower casing 15 and also applies the force to the toggle mechanism 84 tends to raise the inner end of the lever 35 and link 79 to force the motor plate 80 away from the blower housing. Due to the toggle linkage, the force applied thereby is greater than the spring action urging the motor plate toward the blower and the weight of the motor also tending to swing the plate 80 toward the blower to provide an effective counterbalance. Movement of the lever arm 36 swings the motor plate 80 to alter the centers of the pulleys to vary the drive and speed of the impeller, the variable drive pulley operating in the same manner as illustrated and described relative to the form of the invention illustrated in Figs. 1 to 4 inclusive.

It is to be understood that while we have illustrated and described certain forms of our invention, it is not to be limited to the specific form or arrangement of parts herein described and shown except insofar as such limitations are included in the claims.

What we claim and desire to secure by Letters Patent is:

1. A variable output control for an evaporative cooler having a blower comprising, a blower casing, an impeller rotatably mounted in the blower casing, a pulley fixed to said impeller, a motor having a drive shaft, a support fixed relative to the blower casing, means mounting the motor on the support for hinging movement to swing the motor and drive shaft thereof toward and away from said blower casing, a variable speed pulley on the drive shaft, a belt operatively connecting the variable speed pulley and the impeller pulley, said variable speed pulley being characterized by the changing of the effective diameter of the belt engagement therewith in response to change in tension of said belt, a control arm, means pivotally mounting said control arm on a support remotely disposed relative to said motor, means connecting the control arm to the motor in spaced relation to the motor mounting means whereby movement of the arm swings the motor to change the spacing between the motor pulley and the impeller pulley, resilient means having connections between the motor and blower casing to urge the motor away from the blower casing and counterbalance the tension of the belt tending to urge the motor toward the blower casing, a pump, means fixed relative to the motor and carrying said pump whereby the pump swings with said motor, and means operatively connecting the motor shaft and pump to drive the pump.

2. In an evaporative cooler having a housing and a blower casing having an impeller delivering air through a discharge duct extending from the housing, a variable output control for the blower including, a motor having a drive shaft, a support fixed relative to the blower casing, means mounting the motor on the support for hinging movement to swing the drive shaft toward and away from said blower casing, a pulley fixed relative to the blower impeller for rotating same, a variable speed pulley on the drive shaft, a belt operatively connecting the variable speed pulley and the impeller pulley, said variable speed pulley being characterized by changing of the effective diameter of the belt engagement therewith in response to change in tension of said belt, a control arm having a handle at one end thereof, means pivotally mounting said control arm on a support remotely disposed relative said motor, a link connecting the control arm to the motor in spaced relation to the motor mounting means whereby movement of the arms swings the motor to change the spacing between the motor pulley and impeller pulley, a pump, a bracket fixed relative to the motor and carrying said pump whereby the pump swings with the motor, and means operatively connecting the motor shaft and pump to drive the pump.

3. In an evaporative cooler having a housing and a blower casing having an impeller delivering air through a discharge duct extending from the housing, a variable output control for the blower including, a motor having a drive shaft, a support fixed relative to the blower casing, means mounting the motor on the support for hinging movement to swing the drive shaft toward and away from said blower casing, a pulley fixed relative to the blower impeller for rotating same, a variable speed pulley on the drive shaft, a belt operatively connecting the variable speed pulley and the impeller pulley, said variable speed pulley being characterized by changing of the effective diameter of the belt engagement therewith in response to change in tension of said belt, a control arm having a handle at one end thereof, means pivotally mounting said control arm on a support remotely disposed relative said motor, a link connecting the control arm to the motor in spaced relation to the motor mounting means whereby movement of the arms swings the motor to change the spacing between the motor pulley and impeller pulley, spring biased means connected to the link and blower casing to urge the motor away from the blower casing and counterbalance the tension of the belt tending to urge the motor toward the blower casing, a pump, a bracket fixed relative to the motor and carrying said pump whereby the pump swings with the motor, and means operatively connecting the motor shaft and pump to drive the pump.

4. In an evaporative cooler having a housing and a blower casing having an impeller delivering air through a discharge duct extending from the housing, a variable output control for the blower including, a motor having a drive shaft, a support fixed relative to the blower casing, means mounting the motor on the support for hinging movement to swing the drive shaft toward and away from said blower casing, a pulley fixed relative to the blower impeller for rotating same, a variable speed pulley on the drive shaft, a belt operatively connecting the variable speed pulley and the impeller pulley, said variable speed pulley being characterized by changing of the effective diameter of the belt engagement therewith in response to change in tension of said belt, a control arm having a handle at one end thereof, means pivotally mounting said control arm on a support remotely disposed relative said motor, a link connecting the control arm to the motor in spaced relation to the motor mounting means whereby movement of the arms swings the motor to change the spacing between the motor pulley and impeller pulley, a pair of pivotally connected links, means connecting one of said pair of links to the blower casing, means connecting the other of said pair of links to the first-named link, a spring urging said pair of links toward an in line relationship to urge the motor away from the blower casing and counterbalance the tension of the belt tending to urge the motor toward the blower casing, a pump, a bracket fixed relative to the motor and carrying said pump whereby the pump swings with the motor, and means operatively connecting the motor shaft and pump to drive the pump.

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