May 30, 1950 E. O. GILLEN 2,509,733

WINDOW VENTILATOR

Filed Jan. 4, 1947 2 Sheets-Sheet 1

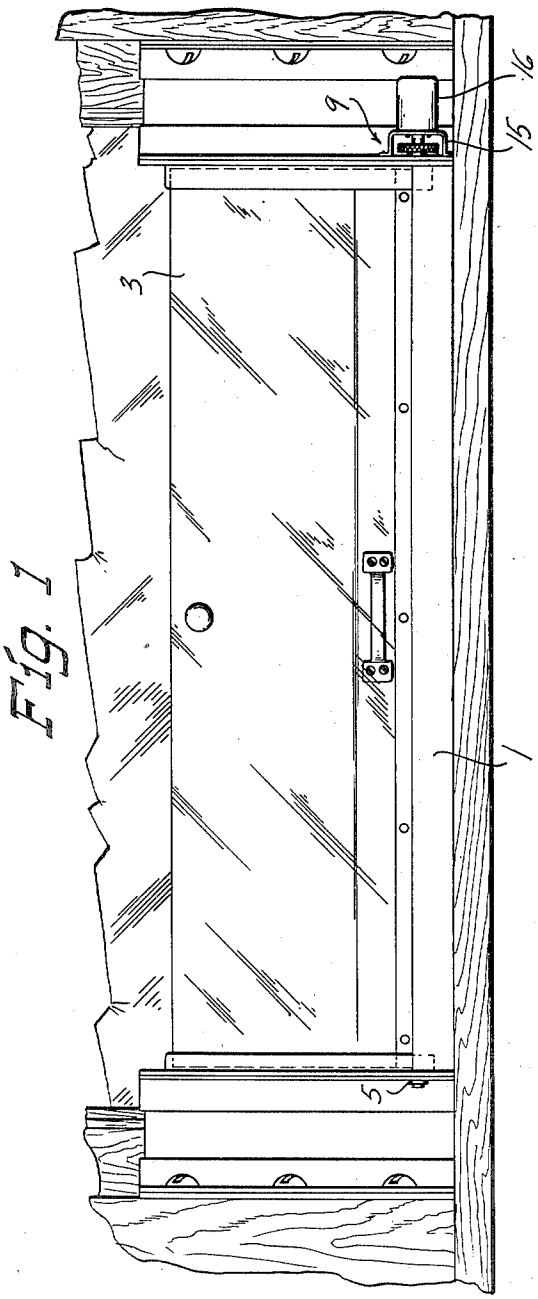


Fig. 1

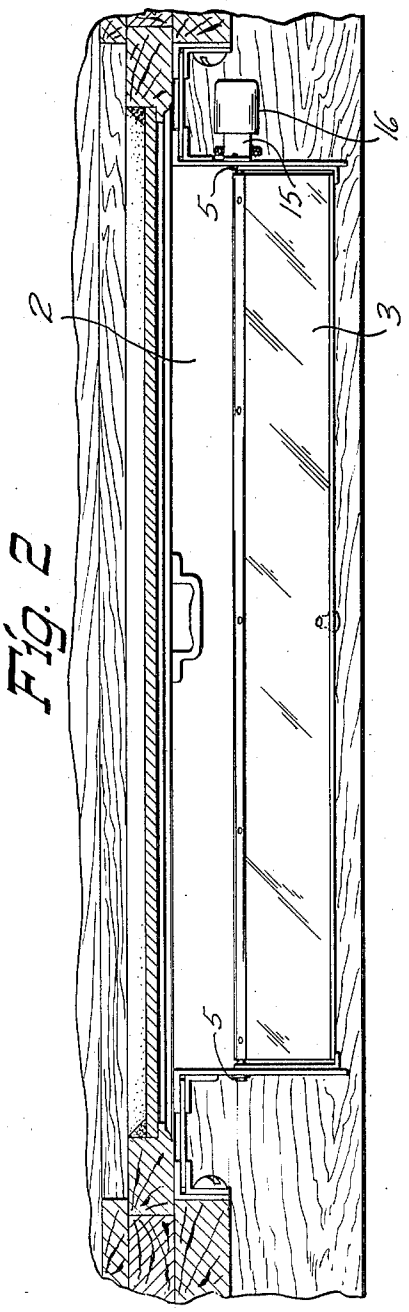


Fig. 2

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Filed Jan. 4, 1947 2 Sheets-Sheet 2

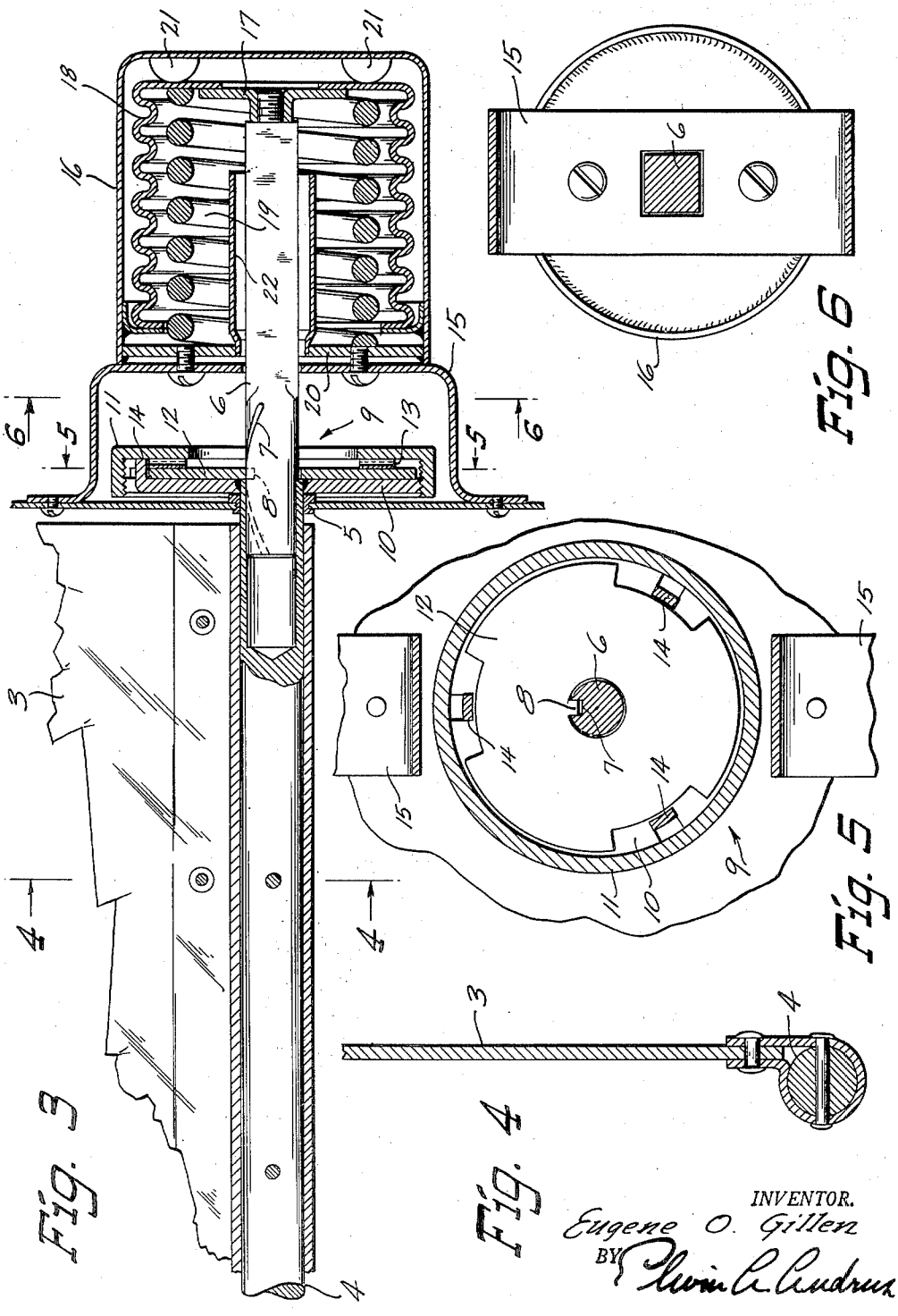


Fig. 3

Fig. 6

Fig. 5

Fig. 4

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WINDOW VENTILATOR

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2 Claims. (Cl. 236—49)

1

This invention relates to a window ventilator in which one or more vanes are controlled mechanically by a thermostat to provide a desired minimum room temperature resulting from the ventilation.

One of the major difficulties with this type of ventilator has been the flutter of the vane from wind pressures and the fact that it was difficult to provide a thermostat of the necessary power and length of movement required to give the desired range of movement for the vane and to hold the vane against flutter and wind pressures.

The present invention has overcome these difficulties and is applicable to provide mechanical thermostat control for large vanes.

The principal object of the invention is to provide a ventilator in which the thermostat is employed solely for the purpose of moving the vane or vanes, and in which wind pressure against the vane or vanes is not transmitted to the thermostat when the latter is static.

Another object of the invention is to provide a ventilator in which a substantial mechanical advantage is employed for the thermostat to effect movement of the vane or vanes within the range of movement of a practical thermostat.

Another object is to free the thermostat of compression otherwise required to hold the vane against wind pressure, and thereby provide for operation of the thermostat in the range of its maximum efficiency without fatigue.

Another object is to reduce the factor of safety necessary for the thermostat.

Another object is to provide for the employment of a larger vane for a given thermostat without overloading the latter.

The invention is illustrated in the accompanying drawings as applied to a single vane ventilator operated by a bellows thermostat.

In the drawings:

Figure 1 is an elevation of the ventilator taken from the room side;

Fig. 2 is a top plan view of the ventilator in place;

Fig. 3 is an enlarged broken longitudinal vertical section taken on the axis of the pivot shaft for the vane;

Fig. 4 is a transverse vertical section taken on line 4—4 of Fig. 3 and showing the vane construction with the hollow pivot bar near the power end;

Fig. 5 is a transverse vertical section taken on line 5—5 of Fig. 3 through the clutch; and

Fig. 6 is a transverse vertical section taken on line 6—6 of Fig. 3 at the mouth of the thermostat.

The ventilator has an extensible casing or partition 1 adapted to set onto a window sill and be secured at its ends to the window casing on the inside of a window.

2

The partition 1 has an upwardly opening recess 2 therein forming a passage for air into the room when the window is open, and which recess contains a vane 3 adapted to pivot against the window sash to close the ventilating passage.

The vane 3 is secured upon and extends upwardly from a pivot shaft 4 extending horizontally longitudinally of the ventilator parallel to the plane of the window and which is mounted in suitable bearings 5 in the casing 1 at the ends of recess 2.

One end of shaft 4 extends through the casing wall into the room space adjacent the window casing and is hollow for receiving a longitudinally movable drive rod 6.

The rod 6 is interconnected with shaft 4 by a suitable non-circular helical interlock which transforms the axial movement of rod 6 into a rotary movement for shaft 4, and which prevents the transforming of the rotary movement of rod 4 back into axial movement of rod 6.

The drive rod 6 illustrated has a helical spline or keyway 7 therein disposed to receive a corresponding lug or tooth 8 secured to the end of shaft 4 for the purpose of converting axial movement of rod 6 into the desired rotary movement of shaft 4.

If desired, a clutch 9 may be interposed between tooth 8 and shaft 4, to provide for adjustment of the vane 3, as set forth in the copending application of the present inventor, Serial No. 679,315, filed June 26, 1946, for Room ventilator.

The clutch 9 may comprise a disc 10 secured on the end of hollow shaft 4 and having threads thereon for receiving a clutch housing 11 which contains a second clutch disc 12 carrying tooth 8 formed integral therewith. The two discs 10 and 12 are biased into a predetermined frictional engagement by a spring washer 13 between the outer end of housing 11 and disc 12.

A stop 14 is provided by striking ears forwardly from the edge of disc 10 and machining the same to accurate length for engaging the end of housing 11 and determining the tightness with which it presses spring 13 and disc 12 against disc 10.

The outer surface of the cylindrical portion of housing 11 is knurled to provide an easy hand grip for loosening and tightening the clutch in setting the vane.

The drive rod 6 moves axially through the clutch without turning, and as it does so the helical spline 7 moves tooth 8 circumferentially,

thereby translating the axial movement of rod 6 into a rotary movement for clutch 9 and shaft 4.

The pitch of spline 7 is such that a considerable leverage is created in favor of angular movement of the tooth 8 by axial movement of rod 6, and is sufficiently long to prevent any appreciable tendency of the tooth 8 to effect axial movement of rod 6.

The rod 6 is held against turning by its passage through the bracket 15 which supports the thermostat 16, the rod 6 either being splined longitudinally in the opening in the bracket or being of a non-circular shape such as rectangular in the portion of the rod which moves through the opening, the opening being shaped to loosely fit the rod and constitute a supporting bearing therefor.

The outer end of rod 6 is secured to the thermostat actuator, which in the illustration is the head 17 of expansion bellows 18.

The thermostat 16 comprises a fluid tight cup-shaped housing secured to bracket 15 at its rim and having the bellows 18 sealed to its rim and extending inwardly of the housing. The inner end of bellows 18 is closed by head 17 to which rod 6 is secured in any suitable manner.

A thermo expanding fluid is contained in the space between the housing and bellows to compel contraction of the bellows and movement of the head 17 axially toward clutch 9 when the temperature rises.

A coil spring 19 is disposed inside the bellows between head 17 and a cross member 20 secured to the rim of the housing and to bracket 15, and serves to control the movement of the bellows in response to the expansion and contraction of the fluid in the thermostat at all times.

Suitable limit stops 21 and 22 may be provided in the thermostat to prevent overstressing of the bellows from movement of the same.

Since the vane 3 only needs to move through an angle of about 35°, and since thermostats are available of the required strength and having a stroke in excess of a half an inch responsive to a temperature range of from about 35° F. to about 65° F., the power ratio obtainable in the spline may be as high as ten to one.

Wind pressures on vane 3 are not transmitted to the bellows 18, except that in movement of the vane in any given instance the bellows must exert a force on rod 6 sufficient to overcome the wind pressure at that instant upon the vane. Since the wind pressure on vane 3 is usually applied in surges, it is unnecessary to have a thermostat of a strength to overcome the maximum wind pressure in order to effect movement of the vane. It is sufficient if the thermostat is strong enough to move the vane at such resistance as may be present between surges of wind pressure.

Flutter of the vane is prevented except for the yielding of the parts, and no flutter is transmitted back to the thermostat.

The invention provides a simple construction for the ventilator and for transmitting the power of the thermostat to the vane.

The thermostat is free from the wide range of pressures heretofore imposed upon thermostats controlling vanes that were subject to high wind pressures and surges in either direction.

The invention may have various embodiments within the scope of the accompanying claims.

I claim:

1. A ventilator of the class described, comprising a pivotal vane mounted upon a shaft and disposed to be subjected to varying wind pressures and the like tending to cause pivotal movement of the same, a spring loaded thermostat bellows disposed with its axis parallel to said shaft, a reciprocal power transmitting member connected to the free end of said bellows to reciprocate therewith in response to temperatures imposed on the bellows and adapted to exert an axial thrust force for operating said vane, a fixed guide for said member independent of said bellows and external thereof, said guide being rotationally interlocked with said member to prevent rotation of the member and to prevent stressing of said bellows, a rotary member helically interlocked upon said power member to be rotated in response to axial thrust movement of the power member therethrough, and means to drive said shaft from said rotary member, said helical connection having a pitch related to the friction thereof substantially preventing the transformation of rotary forces resulting from said wind pressures into axial forces on the bellows.

2. A ventilator of the class described, comprising a pivotal vane mounted upon a shaft and disposed to be subject to varying wind pressures and the like tending to cause pivotal movement of the same and rotation of the shaft, a spring loaded thermostat bellows disposed axially in alignment with the shaft at one end thereof, a push rod connected to the free end of said bellows and extending axially into the hollow end of said shaft, a clutch disc secured on the end of said shaft, a spring pressed clutch disc mounted on said push rod and adapted to frictionally drive said first named disc, a helical driving connection between said last named clutch disc and said push rod for transforming axial thrust movements of the push rod into corresponding rotary movements of the disc, and means disposed to prevent said push rod from rotating under the influence of the back thrust of said helical connection, said helical connection having a pitch substantially preventing the transformation of rotary forces resulting from said wind pressures into axial thrust forces on said push rod.

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