Feb. 14, 1967 J. M. WHEATLEY 3,303,772

LOUVERED SHUTTER HAVING IMPROVED CONTROL MEANS

Filed Oct. 23, 1965 2 Sheets-Sheet 1

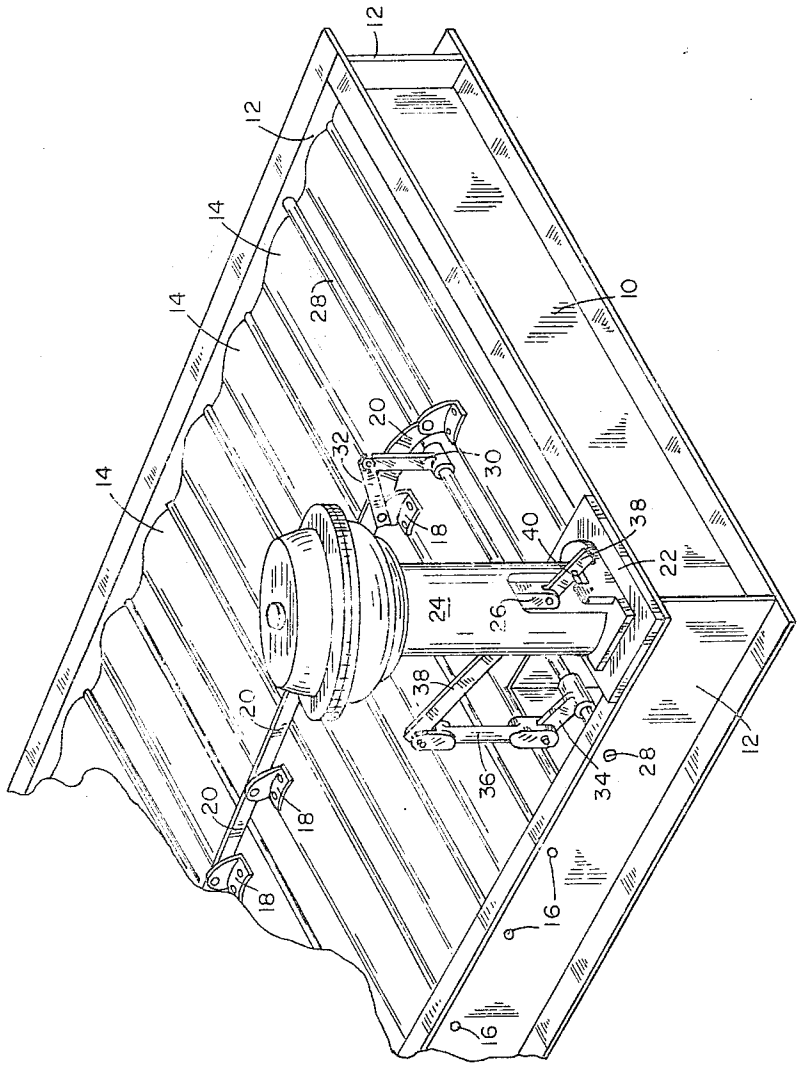


FIG. 1

INVENTOR.
JOHN M. WHEATLEY

BY Harold F. Johnson

ATTORNEYS

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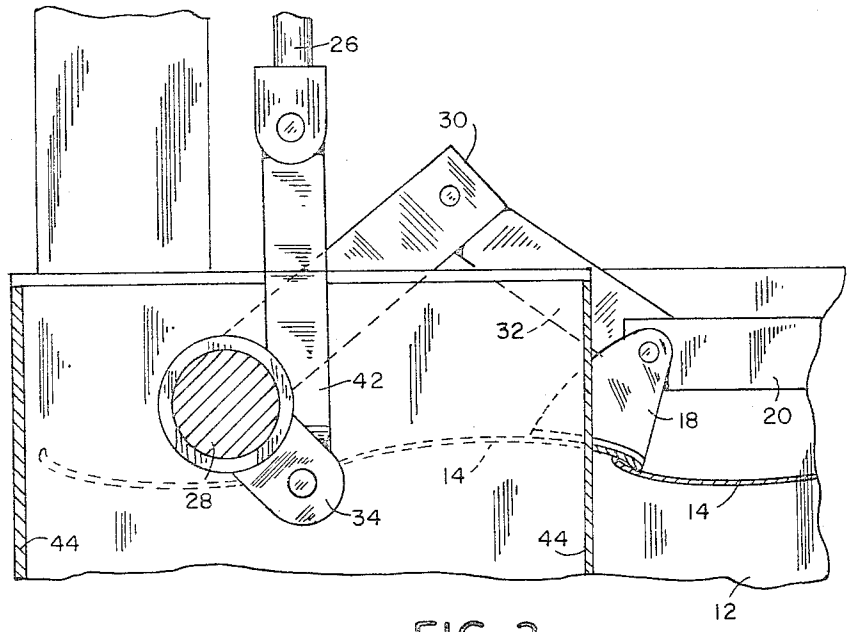


FIG. 3

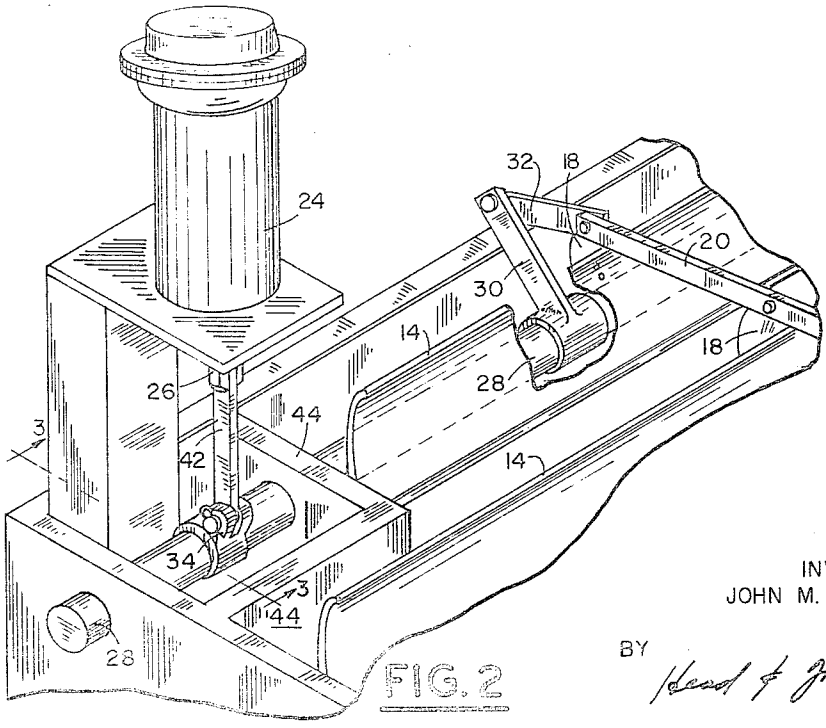


FIG. 2

INVENTOR.
JOHN M. WHEATLEY

BY Hood & Johnson

ATTORNEYS

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LOUVERED SHUTTER HAVING IMPROVED CONTROL MEANS

John M. Wheatley, 1905 W. Independence, Tulsa, Okla. 74127

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4 Claims. (Cl. 98—41)

This invention relates to a louvered shutter having improved control means. More particularly, the invention relates to a louvered shutter for controlling the flow of air therethrough including improved means of controlling the opening and closing of the shutters in response to a linearly applied motion, such as from a pneumatic actuator or the like.

The use of shutters for controlling the air flow through heat exchanger devices is well known in the industry. Shutters may be controlled manually but automatic processing normally requires that they be controlled automatically. The most common means of automatic control of shutters is with the use of pneumatic actuators. These types of actuators utilize a diaphragm which moves in response to air pressure or a vacuum to provide a linear movement. This invention provides unique and improved means of connecting the linear movement provided by pneumatic actuators, or other devices providing a linear force, to the opening and closing of louvered shutters.

It is therefore an object of this invention to provide a louvered shutter having improved control means.

More particularly, it is an object of this invention to provide a louvered shutter having improved means of coupling a linear force, such as that supplied by pneumatic actuators or the like, to the opening and closing of the louver blades.

These basic objects and more particular objects of the invention will be understood by referring to the following description and claims, taken in conjunction with the attached drawings in which:

FIGURE 1 is an isometric partial view of a louvered shutter showing means of utilizing the improved louver control means of this invention.

FIGURE 2 is an isometric partial view of a louver utilizing an alternate embodiment of the improved control means of this invention.

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 1.

Referring now to the drawing and first to FIGURE 1, an isometric view of a louver utilizing improved control means of this invention is shown. The louver includes a frame structure 10 having vertical side walls 12. Supported between the side walls 12 are a plurality of louver blades 14 each of which are pivoted about a longitudinal axis rod 16 extending through the side walls 12.

A pivot bracket 18 is affixed to each of the louver blades 14 and, by means of a blade actuator bar 20 pivotally connected to each of the pivot brackets 18, the axial pivotation of each of the blades 14 is coupled together. When the blades 14 are in the closed position, as shown, the forward edge of each blade overlaps with the rearward edge of the adjacent blade so that air flow through the louver is substantially prevented. When the blades are rotated 90° with respect to their illustrated position, the blades are substantially parallel to each other and permit free flow of air therethrough.

The louver described to this point is substantially of standard construction. The improvement of this invention is the provision of means of coupling an actuator, such as a pneumatic actuator, to control the pivotation of the louver blades.

Positioned in one corner of the louver on the frame structure 10 is a mounting plate 22 upon which is positioned a pneumatic actuator 24 of the type which is commerically available and which generally consists of a flexible diaphragm upon which air or a vacuum operates to move in linear motion an actuating plunger 26. A torque tube 28 is rotatably supported between side walls 12 and above the louver blades 14 so as not to interfere with the pivotation of the blades. A torque arm 30 is affixed to the torque tube 28 and extends perpendicularly therefrom. A blade connector link 32 extends from the outer end of torque arm 30 to pivotal connection with blade actuator bar 20. Thus, as the torque tube 28 is rotated, the motion is transmitted by torque arm 30 and blade connector link 32 to actuator bar 20 so that all of the louver blades 14 are simultaneously pivoted.

Affixed to the torque tube 28 adjacent the pneumatic actuator 24 is a torque lever 34. Supported beneath the pneumatic actuator 24 is a rocker arm 38 pivotally supported to the mounting plate 22 by a pivot pin 40. The other end of the rocker arm 38 is pivotally connected to one end of a yoke 36. The other end of yoke 36 is pivotally connected to the outer end of torque lever 34.

The louver in FIGURE 1 is shown with the louver blades 14 in closed or overlapping position. When pneumatic actuator 24 is activated, the plunger 26 is withdrawn, forcing upward pivotation of the outer end of rocker arm 38. This motion is transmitted by linkage yoke 36 to torque lever 34 which rotates torque tube 28. Rotary motion of torque tube 28 is transmitted by way of torque arm 30 to blade actuator bar 20 for the simultaneous pivotation of louver blades 14.

Referring to FIGURES 2 and 3, an alternate embodiment of the improved louvered shutter control means of this invention is shown. In this embodiment, the louver blades 14 are connected together for mutually dependent pivotation by means of pivot brackets 18 and blade actuator bar 20 in response to rotation of torque tube 28 as previously described with reference to FIGURE 1. In the embodiment of FIGURES 2 and 3, linear movement of pneumatic actuator plunger 26 is applied directly to rotate the torque tube 28. The torque lever 34 extending from torque tube 28 is pivotally connected directly at the outer end thereof with the lower end of an actuator linkage 42 which, in turn, is pivotally connected at the upper end to the lower end of pneumatic actuator plunger 26.

FIGURE 2 shows the louver blades 14 rotated to be substantially parallel to each other, allowing the free flow of air therethrough. As pneumatic actuator 24 is activated, plunger 26 is moved linearly downwardly and this linear motion is transmitted by linkage 42 to torque lever 34 which rotates torque tube 28. The rotation of torque tube 28 functions as previously described with reference to FIGURE 1, that is, it rotates torque arm 30 and by means of blade connector linkage 32 departs pivotal motion to the louver blades 14. FIGURE 3 shows the louver blades 14 rotated to closed or overlapping position.

The pneumatic actuator **24** is preferably located at one corner of the structure **10**. To provide a base for the actuator linkages, a subframe structure **44** is formed in the corner of the louver structure and the first louver blade adjacent the structure **44** is shortened by the dimension of the subframe structure. The bottom of the subframe structure **44** may be closed if required to prevent flow of air therethrough.

This invention provides a unique, simple, and highly effective means for coupling the linear motion of an actuator to control the pivotation of louver blades. The invention is characterized by efficiency, economy and service-free dependability.

While the invention has been described with a certain degree of particularity, it is manifest that many changes may be made in the details of construction and the arrangement of components without departing from the spirit and scope of this disclosure.

What is claimed:

1. A louvered shutter having improved control means comprising:

a frame structure having vertical side walls;

a plurality of spaced louver blades each pivotally supported at each end between and to said frame side walls, said louver blades pivotal in one direction so that each blade overlaps the adjacent blades to substantially prevent air flow through the louver and pivotal in another direction so that each louver blade is substantially parallel each other permitting the free flow of air therethrough;

a pivot bracket affixed to each louver blade;

a blade actuator bar pivotally affixed to each of said pivot bracket whereby the louver blades are coupled for simultaneous pivotation;

an actuator uprightly supported to said frame structure, the actuator having a plunger which, upon activation of the actuator, moves linearly perpendicular to the plane of said frame structure;

a torque tube rotatably supported to said vertical side walls parallel to and above said louver blades;

a torque arm affixed at the inner end to said torque tube and extending perpendicularly therefrom;

a blade connector link pivotally connected at one end to the outer end of said torque arm and at the other end to said blade actuator bar whereby the rotation of said torque tube pivots said louver blades;

a torque lever affixed at one end to said torque tube and extending perpendicularly therefrom;

a rocker arm positioned beneath said actuator and pivotally affixed at a point intermediate the ends thereof to the lower end of said actuator plunger, one end of said rocker arm pivotally attached to said frame structure; and

a linkage yoke pivotally affixed at one end to the other end of said rocker arm, the other end of said yoke pivotally affixed to the outer end of said torque lever whereby linear movement of said actuator plunger pivots said rocker arm which in turn rotates said torque tube for the pivotation of said louver blades.

2. A louvered shutter having improved control means comprising:

a frame structure having vertical side walls;

a plurality of spaced louver blades each pivotally supported at each end between and to said frame side walls, said louver blades pivotal in one direction so that each blade overlaps the adjacent blades to substantially prevent air flow through the louver and pivotal in another direction so that each louver blade is substantially parallel to each other permitting the free flow of air therethrough;

a pivot bracket affixed to each louver blade;

a blade actautor bar pivotally affixed to each of said pivot brackets whereby the louver blades are coupled for simultaneous pivotation;

an actuator uprightly supported to said frame structure, the actuator having a plunger which, upon activation of the actuator, moves linearly perpendicular to the plane of said frame structure;

a torque tube rotatably supported to said vertical side walls parallel to and above said louver blades;

a torque arm affixed at the inner end to said torque tube and extending perpendicularly therefrom;

a blade connector link pivotally connected at one end to the outer end of said torque arm and at the other end to said blade actuator bar whereby the rotation of said torque tube pivots said louver blades;

a torque lever affixed at one end to said torque tube and extending perpendicularly therefrom; and

an actuator linkage pivotally affixed at one end to the lower end of said actuator plunger and at the other end thereof to the outer end of said torque lever whereby linear movement of said actuator plunger rotates said torque tube for pivotation of said louver blades.

3. In a louver shutter having a frame structure having vertical side walls, a plurality of spaced louver blades each pivotally supported at each end between and to said frame side walls, said louver blades pivotal in one direction so that each blade overlaps the adjacent blades to substantially prevent air flow through the louver and pivotal in another direction so that each louver blade is substantially parallel to each other permitting the free flow of air therethrough, a pivot bracket affixed to each louver blade, a blade actuator bar pivotally affixed to each of said pivot brackets whereby the louver blades are coupled for simultaneous pivotation, and an actuator uprightly supported to said frame structure, the actuator having a plunger which, upon activation of the actuator, moves linearly perpendicular to the plane of said frame structure, an improved control means comprising:

a torque tube rotatably supported to said vertical side walls parallel to and above said louver blades;

a torque arm affixed at the inner end to said torque tube and extending perpendicularly therefrom;

a blade connector link pivotally connected at one end to the outer end of said torque arm and at the other end to said blade actuator bar whereby the rotation of said torque tube pivots said louver blades;

a torque lever affixed at one end to said torque tube and extending perpendicularly therefrom;

a rocker arm positioned beneath said actuator and pivotally affixed at a point intermediate the ends thereof to the lower end of said actuator plunger, one end of said rocker arm pivotally attached to said frame structure; and

a linkage yoke pivotally affixed at one end to the other end of said rocker arm, the other end of said yoke pivotally affixed to the outer end of said torque lever whereby linear movement of said actuator plunger pivots said rocker arm which in turn rotates said torque tube for the pivotation of said louver blades.

4. In a louver shutter having a frame structure having vertical side walls, a plurality of spaced louver blades each pivotally supported at each end between and to said frame side walls, said louver blades pivotal in one direction so that each blade overlaps the adjacent blades to substantially prevent air flow through the louvers and pivotal in another direction so that each louver blade is substantially parallel to each other permitting the free flow of air therethrough, a pivot bracket affixed to each louver blade, a blade actuator bar pivotally affixed to each of said pivot brackets whereby the louver blades are coupled for simultaneous pivotation, and an actuator uprightly supported to said frame structure, the actuator having a plunger which, upon activation of the actuator, moves linearly perpendicular to the plane of said frame structure, an improved control means comprising:

a torque tube rotatably supported to said vertical side walls parallel to and above said louver blades;

a torque arm affixed at the inner end to said torque tube and extending perpendicularly therefrom;

a blade connector link pivotally connected at one end to the outer end of said torque arm and at the other end to said blade actuator bar whereby the rotation of said torque tube pivots said louver blades;

a torque lever affixed at one end to said torque tube and extending perpendicularly therefrom; and

an actuator linkage pivotally affixed at one end to the lower end of said actuator plunger and at the other end thereof to the outer end of said torque lever whereby linear movement of said actuator plunger rotates said torque tube for pivotation of said louver blades.

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ROBERT A. O'LEARY, *Primary Examiner.*

W. E. WAYNER, *Assistant Examiner.*