

April 1, 1969

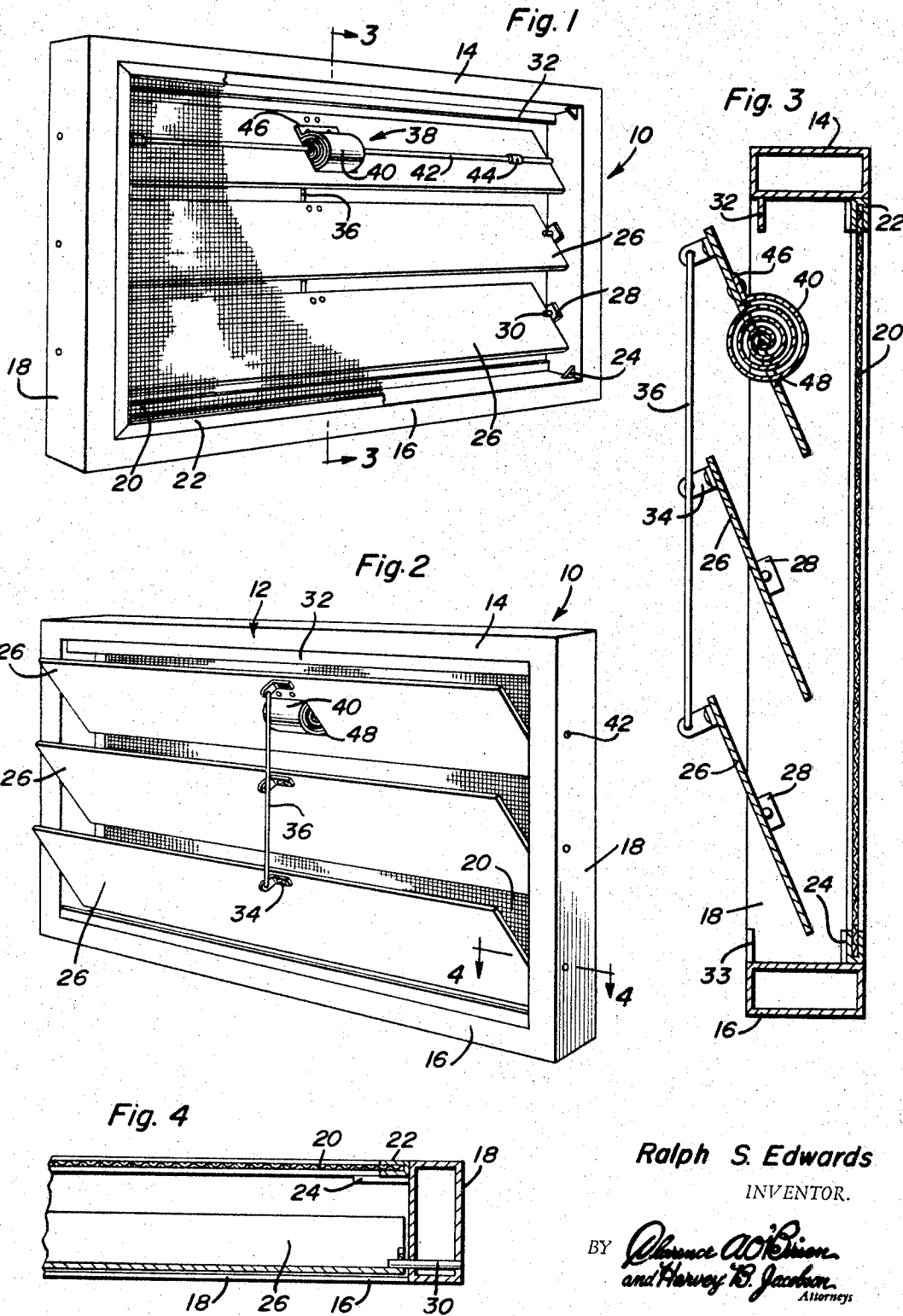
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3,436,016

TEMPERATURE RESPONSIVE VENTILATOR WITH COILED LEAF SPRING

Filed Dec. 12, 1967

Sheet 1 of 2



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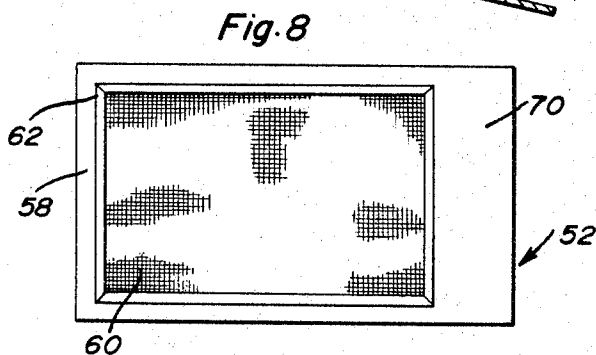
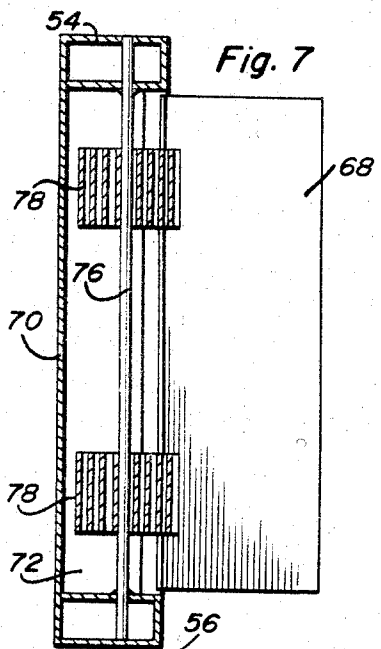
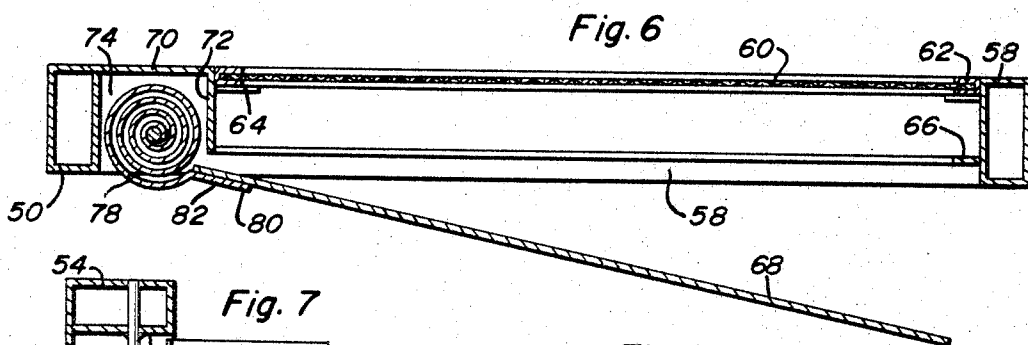
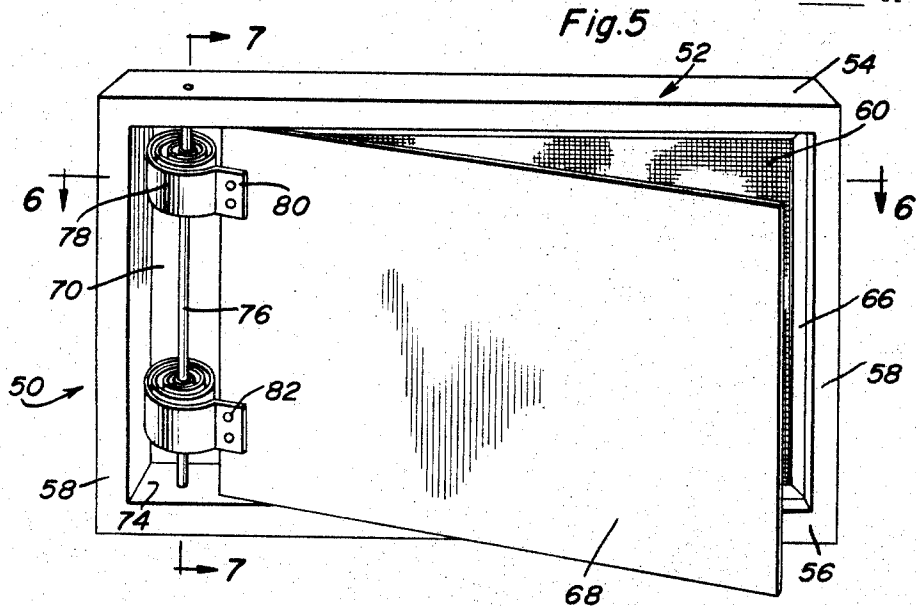
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Filed Dec. 12, 1967

Sheet 2 of 2



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3,436,016

TEMPERATURE RESPONSIVE VENTILATOR WITH COILED LEAF SPRING

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Filed Dec. 12, 1967, Ser. No. 689,865

Int. Cl. F24f 7/00, 13/00; A01k 41/00

U.S. Cl. 236-49

8 Claims

ABSTRACT OF THE DISCLOSURE

A ventilator for installation in the exterior wall of a building including a peripheral rigid frame with a shutter panel assembly forming a closure therefor together with a spiralling coil leaf spring responsive to ambient temperature to cause the shutter assembly to open or close depending upon the exterior temperature conditions. A screen is provided to close the opening defined by the frame and still permit circulation of air. In one embodiment, the shutter assembly is in the form of a single large panel attached to one end of a pair of springs fixed to a shaft. In another embodiment of the invention, the shutter assembly is in the form of a plurality of louvers interconnected by a rod with one of the louvers being operatively associated with the coil spring.

The present invention generally relates to a ventilator construction of the type normally provided in the exterior wall of a building such as to provide ventilation for the crawl space below the floor of the building and above the ground surface. In addition to use in the foundation wall of a house or building, the ventilator may have general utility wherever it is desired to enable air passage in response to a predetermined temperature condition and prevent air passage when another predetermined temperature exists.

It is conventional to provide appropriate ventilation in crawl spaces in order to avoid undesirable moisture conditions which promote growth of fungus pests and insects and also introduces a condensation problem in the house due to excess humidity conditions. One attempted solution to the problem of ventilation of the crawl space is to merely provide openings in the foundation wall with a suitable insect screen positioned thereover. Other attempts to solve this problem have involved the use of manually operated shutters and even temperature responsive shutter arrangements.

Accordingly, an object of the present invention is to provide a ventilator which is movable from a closed to an open position and vice versa in response to temperature conditions. This object is accomplished by a shutter assembly pivotally supported for movement from a closed position to an open position with a temperature responsive spring attached to the shutter assembly and a stationary frame to move the shutter assembly in response to temperature conditions sensed by the spring. The spring is a spiral coil leaf-type spring, having one end attached to the shutter assembly and the other end attached stationarily with respect to a frame. The spring itself is a thermostatic element and will expand and contract in response to temperature changes which expansion and contraction will cause the end thereof attached to the shutter assembly to move with a sufficient force to open and close the shutter assembly.

A further object of the present invention is to provide a ventilator in accordance with the preceding object in which the shutter assembly has a single panel connected to a pair of springs oriented along one edge thereof with the springs being disposed within a recess in the frame structure.

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Another important object of the present invention is to provide a ventilator in accordance with the preceding objects in which the shutter assembly is in the form of a plurality of louvers hingedly attached to the frame and being interconnected by a connecting rod with one of the louvers being attached to an end of the spring.

Still another important object of the present invention is to provide a ventilator for the exterior wall of a building or for use wherever control of air flow is desired in response to temperature changes which is simple in construction, easy to install, dependable and long lasting and relatively inexpensive to manufacture and maintain.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the ventilator of the louver type;

FIGURE 2 is a perspective view thereof from the opposite side as compared with FIG. 1;

FIGURE 3 is a vertical sectional view taken substantially upon a plane passing along section line 3-3 of FIGURE 1 illustrating the specific structural details of the ventilator;

FIGURE 4 is a fragmental sectional view taken along section line 4-4 of FIGURE 2 illustrating further structural details of the ventilator;

FIGURE 5 is a perspective view of the single shutter panel type of ventilator;

FIGURE 6 is a longitudinal, plan sectional view taken substantially upon a plane passing along section line 6-6 of FIGURE 5 illustrating the structural details thereof;

FIGURE 7 is a sectional view taken substantially upon a plane passing along section line 7-7 of FIGURE 5 illustrating the spring construction and mounting therefor;

FIGURE 8 is a view in elevation of the ventilator illustrating the insect screen as observed from the exterior thereof.

Referring now specifically to the drawings, the louver-type ventilator of the present invention is generally designated by the numeral 10 and includes a peripheral rigid frame 12 which includes a top member 14, a bottom member 16 and end members 18 which define an open frame of rectangular configuration although it is pointed out that the frame may be square or any other suitable shape. For use in building structures, the frame should be constructed with dimensions comparable to the dimensions of one or a multiple of building blocks if it is to be installed in a wall constructed of building blocks. If the wall is to be a monolithic concrete wall, then the dimensional characteristics of the frame 12 may vary as desired. Also, as illustrated, the frame 12 is constructed preferably of hollow members of metal, plastic or the like such as aluminum or any other suitable material suitable for permanent installation in building structures.

The front or outer side of the frame 12 is provided with a screen 20 having a channel frame 22 disposed peripherally thereof and secured in place against a pair of lugs or flanges 24 on the inner surface of the frame 12 so that the outer surface of the screen frame 22 will be substantially flush with the outer surface of the frame 12 to provide a smooth construction. The screen frame 22 may be frictionally secured in place or suitable screw-threaded fasteners or the like may be provided through the flanges 24 to detachably secure the screen 20 in place.

The open frame 12 is provided with a plurality of louvers or panels 26 each of which has a length substantially equal to the distance between the side members

18 and which have a transverse dimension so that when the louvers or panels 26 are in contacting engagement with each other, they will form a closure for the open frame 12 to prevent passage of air therethrough. Each of the louvers 26 have a lateral lug or flange 28 at each side edge thereof for pivotal mounting on a pin 30 which extends inwardly from the frame members 18. The lugs 28 are substantially along the center line of the louvers 26 with the louvers 26, when in open position, having their lower ends disposed inwardly and their upper ends disposed outwardly with respect to the inner surface of the frame 12 as illustrated in FIGURE 3. Thus, by pivoting the louvers 26 from their open position in FIGURE 3 toward their aligned closed positions, the louvers will either slightly overlap or matching accurately so that a closure for the open frame is provided. A stop flange 32 is provided along the inner surface of the top member 14 inwardly of the inner edge thereof to form a limit stop for engaging the inner surface of the top edge of the uppermost louver 26.

For interconnecting the louvers 26 for simultaneous movement, the center outer surface and upper edge of each louver is provided with an L-shaped lug 34 secured thereto by any suitable means such as by rivets, screw threaded fasteners or the like. A connecting rod 36 interconnects the lugs 34 with the upper and lower ends of the rod 36 being laterally extended through openings in the lugs on the uppermost and lowermost louvers 26 respectively. The center of the rod 36 is provided with a lateral pin or extension which extends through the hole in the lug 34 on the center louver. Of course, if additional louvers are employed, this structure will be repeated for all of the intermediate louvers with the upper and lower ends of the rod 36 being offset through the lugs on the upper and lower louvers. Thus, with this construction, movement of one louver 26 will result in corresponding movement of all of the louvers 26 and retain the louvers 26 in substantially parallel relation during their movement.

The temperature responsive spring assembly for operating the louvers is generally designated by the numeral 38 and includes a coiled leaf spring 40 having the center or innermost spiral thereof anchored to a stationary rod 42 which extends into and is rigid with the side members 18. The uppermost louver 26 may have lugs 44 thereon in lieu of the end lugs 28 to pivotally mount the uppermost louver 26 from the non-rotating rod 42. The outer end of the spring 40 extends laterally as at 46 and is attached to the upper louver 26 by suitable fasteners such as rivets, screws and the like. Thus, expansion and contraction of the spring 40 will cause pivotal movement of the upper louver 26 about the stationary rod 42 and at the same time cause corresponding movement of the other louvers 26. To facilitate mounting of the spring 40 and the uppermost louver 26 on the same rod 32, the central portion of the louver 26 is provided with an opening 48 of a shape and size to closely receive the spiral leaf spring 40 as illustrated in FIGS. 1-3 so that when the louvers 26 are closed, there will be very little passage of air through the opening 48.

In addition to the upper stop flange 32, a lower stop flange 33 may be provided for engaging the outer surface of the lower edge of the lowermost louver 26 thus forming a limiting means for the louvers and also means for contacting the louvers for a more effective air seal.

The frame may be constructed in various manners for use of installation and attached to the building wall in any suitable manner. For example, the screen 20 and the outer surface of the frame are flush and may be mounted flush with the exterior wall surface or recessed in relation thereto depending upon the requirements of each individual installation. Also, this device may be mounted effectively in various building walls where selective air passage is desired in response to temperature conditions. The spring 40 is a thermostatic element and may be

constructed of a metallic material having known expansion and contraction properties in response to temperature changes so that the spring may be calibrated to open the louvers at a predetermined temperature and to close the louvers at a predetermined temperature.

Referring now specifically to FIGURES 5-8, the ventilator having a single louver or shutter panel is generally designated by the numeral 50 and includes an open frame generally designated by the numeral 52 and which includes a top member 54, a bottom member 56 and end members 58. A screen panel 60 provided with a peripheral frame 62 is inserted into the outer end of the open frame against corner flanges 64 substantially in the same manner as the embodiment illustrated in FIGURES 1-4. One end member 58 of the frame 52 is provided with a vertical inwardly extending spout flange 66 spaced inwardly of the inner edge of the frame for engagement by an enlarged shutter panel 68. The other end member 58 is provided with a plate 70 extending laterally inwardly from the outer edge thereof and which extends between the top member 54 and bottom member 56 to form a partial closer for the framework. At the inner edge of the plate 70, a laterally extending flange 72 is provided which is parallel with the inner surface of the end member 58 but spaced therefrom to define a recess 74 opening toward the lateral inner surface of the frame. The lateral inner edge of the flange 72 also forms a limit for engagement by the shutter panel 68 so that the shutter panel 68 will substantially close the open area of the frame 52 when it engages the flange 66 and the inner edge of the flange 72 with the top and bottom edges of the shutter 68 being closely adjacent the inner surfaces of the top and bottom frame members 54 and 56 respectively.

Disposed in the recess 74 and extending rigidly between the top frame member 54 and the bottom frame member 56 is an elongated rigid rod 76 which has a pair of temperature responsive spiral leaf springs 78 mounted thereon with the innermost convolution of the spring 78 being fixed rigidly to the stationary non-rotative shaft 76. The outer ends of the spring 78 are disposed radially and designated by the numeral 80 and are attached to the side edge of the shutter 68 by suitable fasteners 82 such as rivets, screw threaded fasteners or the like so that expansion and contraction of the spring 78 will cause opening and closing movement of the shutter panel 68 respectively.

A flange 66 may extend not only along the end frame member 58 but also along the top frame member 54 and the bottom frame member 56 to provide a better air seal. In this construction, the springs 78 not only support the shutter panel 68 but also move the shutter panel 68 to an open position at a predetermined temperature and move the shutter panel back to a closed position at a predetermined temperature with this temperature being calibrated depending upon the particular requirements for each individual installation.

Thus, in each embodiment of the invention, there is provided a rigid frame constructed of hollow members for reduction in the transfer of heat, sound and the like with the opening defined by the frame being closed by a screen to prevent entry or passage of insects, rodents and the like. Also, the opening through the rigid frame is selectively opened and closed by a shutter or louver assembly operated by a temperature responsive spiral leaf spring assembly. In each embodiment, the spiral leaf spring assembly has the innermost convolution thereof attached to a stationarily supported rod carried by the frame and the outer end of the spring is attached to the shutter assembly for operating the shutter assembly. In one embodiment of the invention, the shutter assembly includes a plurality of shutter panels or louvers operated by a single spring while in the other embodiment, there is a single shutter panel or louver operated by a pair of temperature responsive leaf spring assemblies. Any varia-

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tion of shutter panels, louvers and springs may be employed. For example, the louvers may be vertically oriented and the shutter panel may pivot about a horizontal axis. Also, the leaf spring actuating mechanism may be connected to the frame in various ways and the operating force applied to the outer edge of the louvers.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A ventilator comprising a frame for positioning in a wall and including an enlarged opening for air passage, shutter means operatively associated with said frame for closing the opening therethrough in one position and opening the opening through the frame in its other position, an elongated stationary shaft fixed to said frame and temperature responsive means interconnecting the frame and said shutter means for moving the shutter means between its two positions, said last named means including a temperature responsive spring means, said spring means being extensible and contractible in a radial direction with one end anchored to the shaft and the other end connected directly to the shutter means.

2. The structure as defined in claim 1 wherein said shutter means includes a plurality of louvers extending in parallel direction and pivotally supported from the frame for pivotal movement about a longitudinal center line of each shutter, said spring means being a spiral leaf spring having the inner convolution thereof secured to said elongated stationary shaft which also supports one of the louvers for pivotal movement along its longitudinal center line.

3. The structure as defined in claim 2 wherein said louver having the spring connected thereto is provided with a centrally disposed opening receiving a portion of the spring with the center of the spring being substantially co-incident with the pivotal axis of said louver.

4. The structure as defined in claim 3 together with a rod interconnecting said louvers for causing the louvers to move simultaneously.

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5. The structure as defined in claim 4 wherein said frame is provided with flange means engaging the louvers when in their closed position to limit the movement thereof, said louvers being slanted upwardly and inwardly when in their open position to prevent entry of rain, and a screen attached to said frame in substantially flush condition therewith for preventing entry of insects and the like.

6. The structure as defined in claim 1 wherein said shutter means includes a single panel, said spring means including a pair of spiral leaf springs having the outer ends attached to one edge of said shutter panel, the center convolution of each spring being rigidly fixed to a rigid shaft extending across said frame in spaced parallel relation to the edge of the panel having the springs connected thereto.

7. The structure as defined in claim 6 wherein said frame is provided with a closure plate overlying the spring and rod assembly to provide a closure for this portion of the frame, said closure plate and said frame including flange means engaged by the panel when in closed position.

8. The structure as defined in claim 7 together with a screen panel on the outer surface of the frame in substantially flush condition to prevent entry of insects and the like.

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U.S. Cl. X.R.

98—40, 41; 236—5