

Oct. 17, 1961

B. L. BRISTOL
VENTILATOR

3,004,485

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2 Sheets-Sheet 1

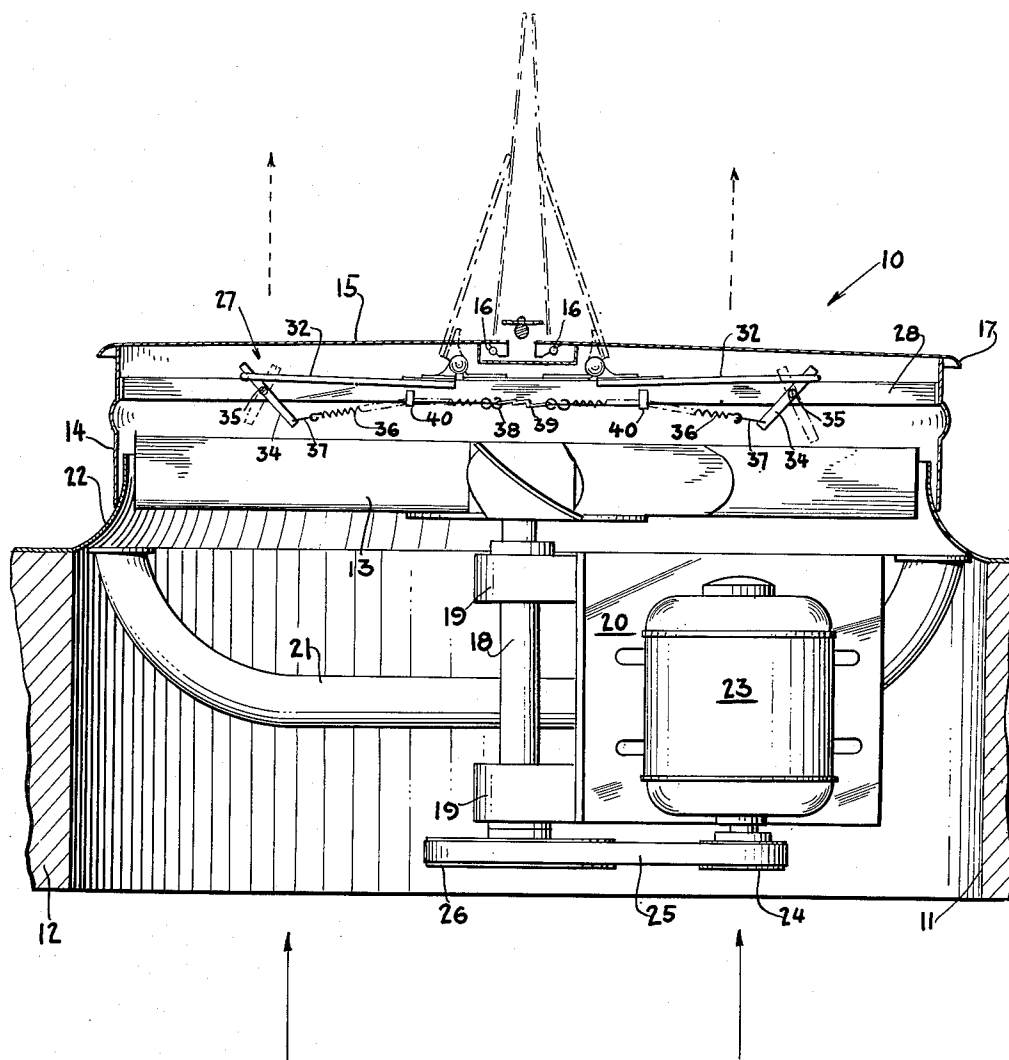


Fig. 1

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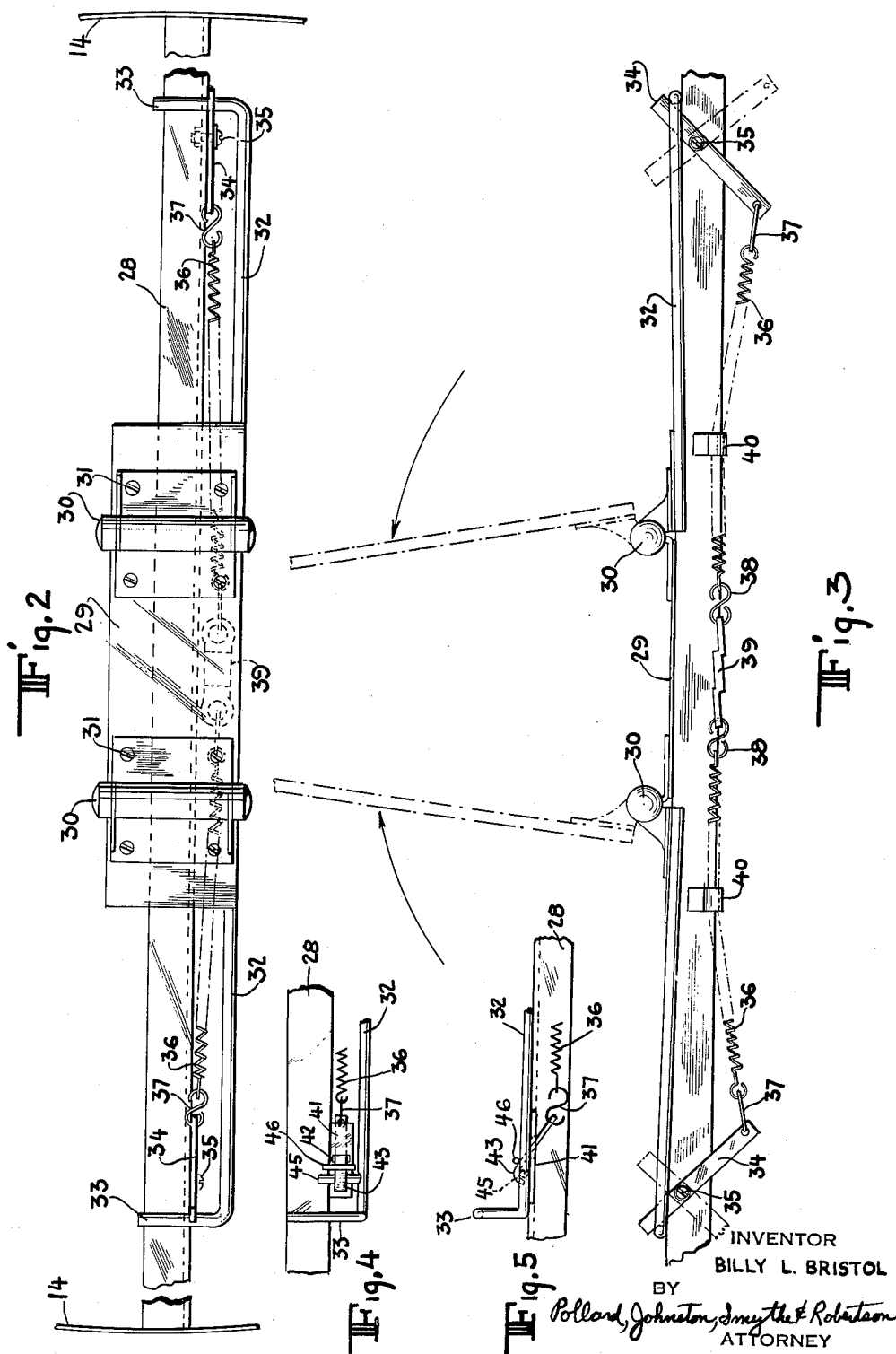
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This invention relates to roof ventilators and especially one which will exhaust smoke, hot gas, and flame from buildings such as shops, factories or mills upon the occurrence of a fire.

In certain factories where flammable materials or processes are situated, intense fires of a local nature may occur. Since the factory building is normally fire-resistant, the fire is generally not initially propagated by progressively consuming the building. Instead, the heat and hot products of combustion are dispersed to other areas where they ignite flammable material. The heat and smoke alone may cause extensive damage even if the fire does not spread. To meet this difficulty, various devices have been designed to uncover roof openings in the presence of high temperatures or fire so as to permit the fire and smoke to pass to the outside as if through a chimney. Such devices have involved complex actuating devices, coverings difficult to seal from the elements and bulky structures.

One of the objects of the invention is to provide an actuating device which is operable in response to elevated temperature conditions.

Another object of the invention is to provide a ventilating unit which is operable in response to elevated temperature conditions.

A still further object is to provide a ventilating unit normally operable in response to air flow from a fan unit and automatically operable in the event of elevated temperature conditions within a building.

The invention is particularly adapted for use as a roof ventilator for a factory building in which severe fire hazards may exist. It includes a housing having open ends to which pivoted dampers are attached so as to have a normal position with respect to the housing ends. Within the housing and near to the dampers, a support with pivoted arms is attached. The arm members are biased to move from their normal position toward the pivoted dampers. Latches for holding the arms in their normal position are secured by a lock responsive to a predetermined temperature. In the presence of such a predetermined elevated temperature, the lock releases the latches and the arms are permitted to be urged toward the dampers so as to operate them.

In another aspect, the invention is adapted for use as an actuating device responsive to a predetermined temperature. It includes a support to which are attached pivoted arms, the arms being biased for movement with respect to the support. Latches secured by locks hold the arms in their normal position. In the event of a predetermined temperature being reached, the locks release the latches, thereby permitting the biased arms to be operated from their normal position to a position urging the dampers to an open condition.

These and other objects, features and advantages of the invention will become apparent from the following detailed description and drawings which are merely exemplary.

In the drawings:

FIG. 1 is an elevational view in section of the ventilating unit.

FIG. 2 is an enlarged plan view of the actuating device.

FIG. 3 is an enlarged elevational view of the actuating device.

FIG. 4 is an enlarged fragmentary elevational view of a modification of the latch.

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FIG. 5 is an enlarged fragmentary plan view of a modification of the latch.

As shown in FIG. 1, the ventilating unit 10 is mounted over opening 11 in the roof structure 12. The ventilating unit includes fan 13, head 14 and butterfly dampers 15. The butterfly dampers 15 are semi-circular in form and are pivotally mounted by hinge 16. In the closed position, the dampers 15 rest upon the upper edge of head 14 which has a cylindrical form. Tapered edges 17 of the dampers 15 serve to deflect the elements from entering between the damper and the head.

Fan 13 is attached to shaft 18 which is supported in bearing blocks 19 attached to support member 20. Support member 20 is held by bracket 21 attached to fan or shroud ring 22. Motor 23 mounted on support member 20 is provided with drive pulley 24 over which passes belt 25. The motion of belt 25 is transmitted to shaft 18 by means of pulley 26.

In normal operation, the blast of air flow from fan 13 is sufficient to upwardly deflect butterfly dampers 15 so that the air may be freely evacuated through opening 11 from the building structure beneath.

Disposed beneath the butterfly dampers 15 is the actuating device 27 shown in detail in FIGS. 2 and 3. Support member 28 is attached to the inside surface of head 14 proximate to the upper edge of the head. Hinge plate 29 serves to support spring hinges 30 with respect to support member 28, screws 31 securing the spring hinges 30 to hinge plate 29. Attached to spring hinges 30 are arm members 32 having end sections 33 which may be at right angles to the arms.

As shown in FIG. 3, the spring hinges urge arm members 32 in an upward manner from an armed position until they reach a substantially vertical position. Levers 34 are pivotally attached to support member 28 by screws 35 at a location near the ends 33 of arm members 32 when the arm members are in their lowered position. Springs 36 are attached to levers 34 by means of hooks 37, said springs 36 also being attached by hooks 38 to fusible link 39 which is located beneath the central portion of support member 28. With arm members 32 in their downward or armed position against support member 28, levers 34 are pivoted by the restraining force of springs 36 and fusible link 39 so as to lock or restrain the arm members 32 in the downward position.

In FIG. 1, the actuating device 27 is shown mounted in head 14 slightly below the inner surfaces of butterfly dampers 15. Supporting member 28 of actuating device 27 is mounted within the head 14 at substantially right angles to hinge 16 of dampers 15. In the case of fire or high temperature gas passing upwardly through opening 11 so as to contact fusible link 39, the fusible link will melt, thereby releasing the holding force transmitted by springs 36 to levers 34. Arm members 32 being biased in an upward direction by spring hinges 30, will move upwardly against the released levers 34 and come in contact with the under surfaces of butterfly dampers 15. The further upward motion of arm members 32 will cause opening of butterfly dampers 15 until they assume a substantially vertical position with their tapered edges 17 in contact with one another. Fusible link 39 may be fabricated from fuse metal having a melting point approximately 200° F. or from a metal having a predetermined or selected melting point as desired. Following the melting of fusible link 39, guides 40 serve to support springs 36 with respect to support member 28. Said guides also prevent the links, when separated, from falling into the fan wheel. Hooks 38 will pass through the guides but the fusible link part 39, which has separated, will not.

In FIGS. 4 and 5, alternate latching means for arm members 32 is shown. Brackets 41, having openings 42, are attached to support member 28 near the location of

end section 33 of arm member 32 when it is in its downward position. Link 43, having a formed end section 44, passes through opening 42 and overlies stud 45 of arm member 32. Springs 36 are attached by means of hooks 37 to the lower ends of link 43. The spring force applied to link 43 pivots the link in opening 42 so as to bear upon stud 45 of arm member 32. In this manner, the arm members may be held in a downward position against the forces of spring hinges 30. In the case where fire conditions have effected a release of arm members 32, rod 46 attached to link 43 holds the link from passing through opening 42.

It is seen that the ventilating unit 10 is normally dependent upon operation of fan 13 to effect an opening of butterfly dampers 15. When the fan operation has been terminated, the butterfly dampers close by their own weight to provide a tight seal against head 14. With the dampers closed and the occurrence of fire conditions beneath the ventilating unit, the fusible link 39 will melt, thereby releasing the actuating device 27 so as to open butterfly dampers 15. In this state, the ventilating unit 10 will serve to exhaust the heat and flame of the fire conditions safely through roof opening 11 to the outside air. Subsequent to the fire conditions, it is merely necessary to replace the melted fusible link 39 so as to restore the actuating device to its normal condition.

It is to be understood that variations may be made in the details of construction without departing from the spirit of the invention except as defined in the appended claims.

What is claimed is:

1. A temperature responsive ventilating device comprising housing means having open ends, damper means pivotally attached to said housing means and normally covering one of said open ends, supporting means mounted within said housing means proximate to said one end, a plurality of arm members for actuating said damper means, hinge members for attaching said arm members at one end to said supporting means, said arm members in their armed position extending in substantially opposite directions with the free ends of said arm means being adjacent to and underlying said damper means in its covering position, spring means urging said arm members from said armed position, lever means pivotally mounted on said supporting means and having ends engaging said arm members substantially adjacent their free ends in said armed position, link means of material fusible at a predetermined temperature, and resilient means connecting the other ends of said lever means to said link means to lock said lever means into engagement with said arm members adjacent their free ends, so that in response to said predetermined temperature said link means will release said lever means and said arm members will be urged away from said armed position by said spring means into contact with said damper means to open said damper means.

2. A temperature responsive ventilating device comprising housing means having open ends, damper means pivotally attached to said housing means and normally covering one of said open ends, supporting means mounted within said housing means proximate to said one end, a plurality of arm members for actuating said damper means, hinge members for attaching said arm members at one end to said supporting means, said arm members in their armed position extending in substantially opposite directions, spring means urging said arm members from said armed position, stud members extending from said actuating arm members proximate to their other ends, bracket members having openings therein at

attached to said support members adjacent to said stud members when said arm members are in the armed position, hook members extending thru said openings and engaging said stud members, cross members attached to said hook members to prevent their passage thru said openings, link means of a material fusible at a predetermined temperature, and resilient means connecting said hook members to said link means, pivoting said hook means in said opening to engage said stud members, so that in response to said predetermined temperature said link means will release said hook means, and said arm members will be urged away from said armed position by said spring means into contact with said damper means to open said damper means.

3. A ventilating fan comprising housing means having open ends, a fan device being mounted at one end of said housing means and directing gas flow through it, damper means pivotally mounted at the opposite end of said housing, said damper means normally closing said housing means being operable by said gas flow, supporting means mounted within said housing means proximate to said damper means, arm members for actuating said damper means, hinge members for attaching said arm members at one of their ends to said supporting means, said arm means in their armed position, extending substantially away from one another with the free ends of said arm members being adjacent to and underlying said damper means in its closing position, spring means urging said arm member from said armed position, lever means pivotally mounted on said supporting means, one end of each of said lever means engaging said arm members substantially adjacent their free ends in said armed position, and temperature responsive material means connecting the other ends of said lever means to one another to lock said lever means into engagement with said arm members adjacent their free ends, said connecting means, in the presence of a predetermined temperature, releasing said lever means whereby said arm means will be urged by said spring means to open said damper means.

4. A temperature responsive actuating device comprising supporting means, a plurality of actuating arm members, hinge members for attaching said arm members at one end to said supporting means, said actuating arm members in their armed position extending in substantially opposite directions, spring means urging said actuating arm members from said armed position, stud members extending from said actuating arm members proximate to their other ends, bracket members having an opening therein mounted on said supporting means adjacent said stud members when said arm members are in the armed position, hook members extending thru said openings and engaging said stud members, cross members attached to said hook members to prevent their passage thru said openings, link means of a material fusible at a predetermined temperature, and resilient means connecting said hook members to said link means, pivoting said hook means in said opening to engage said stud members, so that in response to said predetermined temperature said link means will release said hook means, and said arm members will be urged away from said armed position by said spring means to an actuating position.

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