

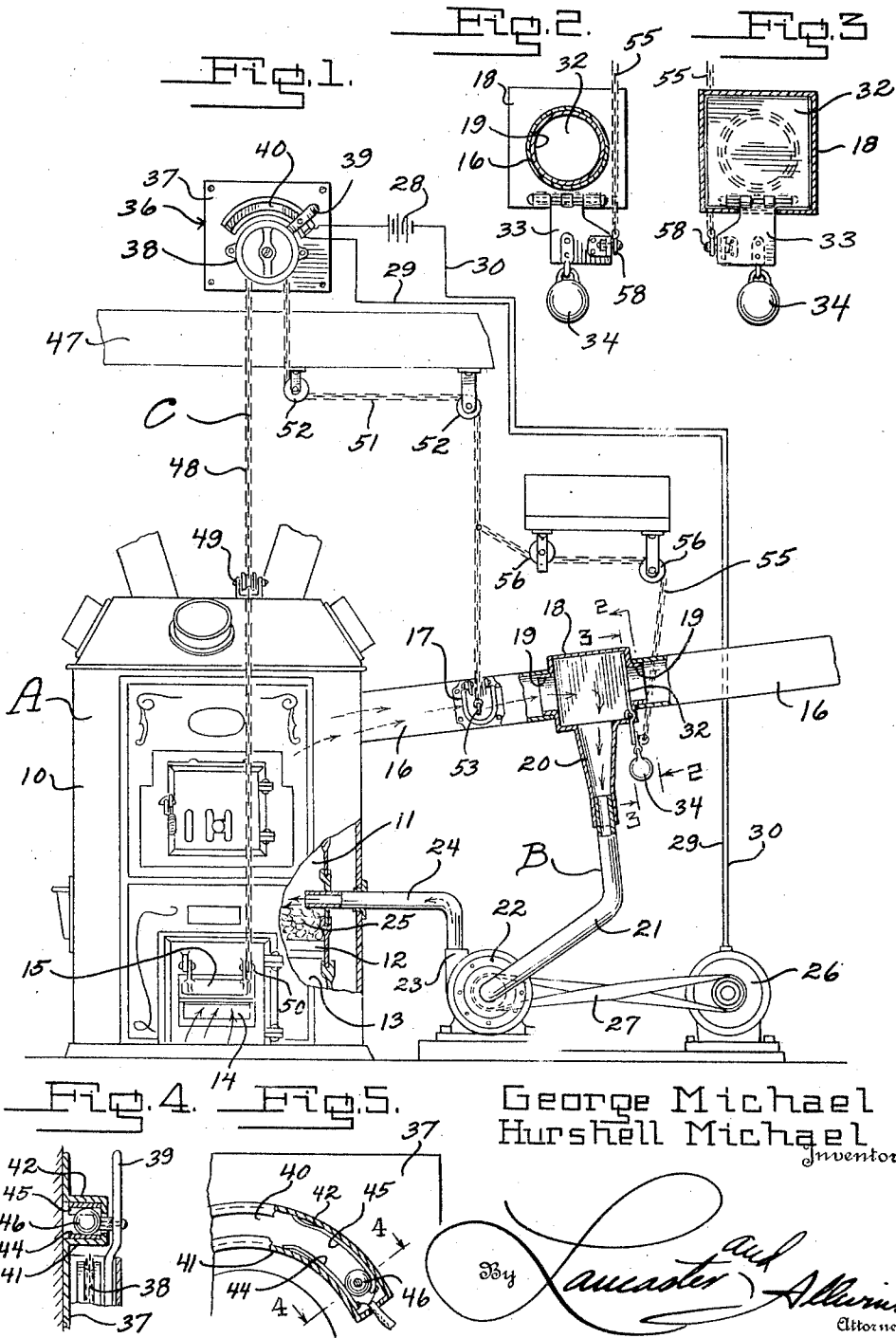
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SMOKE CONSUMER

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SMOKE CONSUMER.

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The present invention relates to improvements in smoke consumers, and the primary object of the invention is to provide a novel and efficient type of smoke consumer of a character especially well adapted for use in connection with heating systems for dwellings.

A further object of the invention is to provide a smoke consumer adapted for installation upon a furnace for permitting continuous circulation whereby smoke and other products of combustion are returned to the fire box to be consumed by the fire and thus increasing the heating efficiency of the fuel.

A further object of the invention is to provide a smoke consumer for furnaces whereby the smoke and products of combustion are returned to the fire box and directed transversely across the bed of fire for positive combustion.

A further object of the invention is to provide a smoke consumer embodying circulating means for the smoke, with control means so connected with the circulating means and draft means of the furnace as to insure proper circulation of the smoke.

A still further object of the invention resides in the provision of a smoke consumer embodying control means operable from a point remote from the furnace and operable to automatically control a blower upon actuation of the various draft means for the furnace.

A still further and important object of the invention is to provide an improved smoke consumer and operating means therefor which is of extremely simple and durable construction, and one which may be readily installed for use in connection with existing types of heating systems.

Other objects and advantages of the invention will be apparent during the course of the following detailed description, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing,

Figure 1 is a view illustrating the smoke consumer apparatus as applied to a heating system of the warm air type.

Figure 2 is an enlarged transverse section on line 2—2 of Figure 1.

Figure 3 is an enlarged transverse section on line 3—3 of Figure 1.

Figure 4 is an enlarged fragmentary section thru the control device of the apparatus for automatically completing an electric

circuit through the blower motor upon proper adjustment of the various draft means for the furnace, the section being taken substantially on the line 4—4 of Figure 5.

Figure 5 is a fragmentary section showing the arrangement of the contact members for the completing of a circuit to the blower motor.

Referring to the drawing in detail, and wherein similar reference characters designate corresponding parts throughout the several views, the letter A designates a conventional type of warm air type furnace having associated therewith a return means B serving to return smoke and products of combustion from the chimney to the furnace, and an operating or control means C for automatic control of the means B and actuation of the various draft control means.

While the furnace A may be of any suitable type, the same is shown as being of the warm air type and embodying a casing 10 in which is provided the usual fire box or pot 11 provided with the grate 12 and below which is arranged the usual ash pit 13. Opening into the ash pit 13 below the grate 12 is an air draft opening 14 and which opening is adapted to be opened or closed by means of a hingedly mounted draft door 15, and which draft doors are usually swung along the upper edge of the air draft opening so as to move by gravity into a closing position over the opening. Opening into the fire box 11 at the upper end of the casing 10 is the usual smoke pipe 16 for the conveying of smoke and gases from the fire box to a suitable chimney not shown in the drawing. Provided in one side of the smoke pipe 16 adjacent the casing 10 is the usual check draft door 17 and which doors are usually pivotally swung at their upper edge so as to readily swing by gravity to a closed position over the check draft opening into the smoke pipe. As is customary practice, and when desiring to aid combustion of the fuel of fire in the fire box 11, the draft door 15 is swung to an open position and the check door 17 is closed, thus allowing more air to pass through the opening 14 and causing the smoke and soot to pass thru the smoke pipe 16 to a chimney.

Referring now to the return means B, and which is intended to return the smoke and products of combustion from the smoke pipe 16 to the fire box 11, the same embodies a

rectangular shaped smoke box or trap 18 of hollow formation and provided at each end with tubular sleeve portions 19 of less diameter than the width of the smoke box. This smoke box 18 is intended to be interposed in the smoke pipe 16 past the check draft 17 with the sleeves 19 snugly fitting into the sections of the smoke pipe as illustrated in Figure 1. Thus it will be seen that the smoke box 18 will allow passage of the smoke through the chimney 16 from the furnace to the chimney. Depending upon the lower side of the smoke box 18 is a funnel shaped outlet 20, and connected at the lower end of the outlet is a suction duct 21 which leads to a blower 22 and which blower is preferably of the centrifugal type. Connected with the outlet 23 of the blower is an exhaust pipe or duct 24 which extends through the furnace casing 10 into the fire box 11 with the outlet end of the pipe opening above the bed of fire designated at 25. The exhaust duct 24 preferably extends horizontally into the fire box so that the smoke or products of combustion are delivered horizontally across the bed of fire 25. By so having the outlet 20 of the smoke box of conical formation and extending from the under side of the box, will cause carbon and ash particles to readily drop into the outlet and be directed to the blower for return to the fire box.

It is preferred that an electric motor 26 be employed for operating the blower 22, and which motor is shown as transmitting power to the blower thru a suitable belt 27. If so desired the motor 26 may of course be connected as by a shaft to the blower 22. A suitable source of electrical energy 28 may be employed for operation of the motor 26 and be connected with the motor thru suitable conductor wires 29 and 30.

Pivotaly mounted at the lower edge and outer end of the smoke box 18 is a damper plate 32 having an arm 33 projecting exteriorly at the under side of the smoke box. This damper plate 32 is preferably of rectangular shape and so pivotaly mounted within the smoke box that when the damper plate is in its vertical position it will close the sleeve 19 at the outer end of the smoke box as illustrated in Figure 1 for closing off communication thru the smoke pipe 16 to the chimney, and when swung to a horizontal position against the bottom wall of the smoke box, to close the opening to the outlet 20 and opening communication thru the smoke pipe from the furnace to the chimney. The normal position of the damper plate 32 is that as shown in Figure 1, and for this reason a suitable weight 34 is hung upon the arm 33 for normally retaining the damper plate 32 in a position for closing communication through the smoke pipe 16. With the smoke box disposed at a slight an-

gle as shown in Figure 1 it will be seen that the weight 34 will readily move the damper plate 32 to a closed position over the sleeve 19 at the outer end of the smoke box.

Referring now to the operating or control means C for insuring proper circulation of the smoke and gas, the same embodies a dual acting control device 36, which is mounted at a location remote from the furnace A and preferably in one of the living rooms of the dwelling. The control device 36 embodies a mounting plate 37 having rotatably mounted upon its outer face a suitable sprocket wheel 38, and connected with the sprocket wheel for rotary movement thereof is a suitable handle 39 which when swung in an arc will rotate the sprocket wheel in accordance with the direction in which the handle is thrown. Formed in the mounting plate 37 concentric with the axis of the sprocket wheel 38 is an arcuate shaped pocket 40 provided with inner and outer arcuate walls 41 and 42 respectively. The free end portion of the handle 39 is intended to extend transversely across the outer face of the pocket 40 and project a suitable distance past the outer arcuate wall 41 as illustrated in Figures 1 and 4. Arranged at the right hand end of the arcuate pocket 40, and carried respectively by the arcuate walls 41 and 42, are spring contact fingers 44 and 45 and which contact fingers are connected with the conductor wires 29 and 30 respectively. These contact fingers are normally spaced in confronting relation and arcuated to conform with the arcuation of the walls 41 and 42. The contact fingers 44 and 45 are of course insulated one from the other and from their respective arcuate mounting walls. Insulatively carried by the arm or handle 39 and adapted for movement in the arcuate pocket 40 upon swinging of the handle 39 is a metallic contact member 46 which may be of spherical formation, and which contact member when the handle 39 is swung to the right hand end of the pocket, contacts with both of the contact fingers 44 and 45 and thus completes a circuit to the electric motor 26, for operation of the blower 22. Thus it will be seen that when the handle 39 is swung to the left hand extremity of the arcuate pocket 40 that the circuit is broken to the motor 26 and that when the handle is swung to the right hand extremity of the arcuate pocket that the contact member 46 engages the contact members 44 and 45 for completing the circuit thru the electric motor.

Trained about the sprocket wheel 38 and extending through the floor construction 47 into the furnace room, is a suitable operating chain, the portion 48 of which extends over suitable pulleys 49 and has its terminal portion connected with the lower edge of the draft door 15 as at 50, while the portion 51

passing from the opposite side of the sprocket from that of the portion 48, is trained over suitable pulleys 52 and has its terminal portion connected with the lower edge of the check draft door 17 as at 53. By observing Figure 1 it will be seen that when the lever arm 39 is at the right hand extremity of the arcuate pocket 40 that the draft door 15 is open and that the check draft door 17 is fully closed. Upon swinging movement of the arm 39 in a counter clockwise direction towards the left hand extremity of the arcuate pocket 40 the chain portions 48 and 51 will be moved in a direction so that the chain section 51 swings the check draft door 17 upwardly to an open position while the chain section 48 is slackened for allowing the draft door 15 to close by gravity. It may here be well to note that when the draft door 15 is open and the check draft door 17 closed as illustrated in Figure 1, that the contact member 46 is bridging the contact fingers 44 and 45 for completing a circuit thru the electric motor 26 for operation of the blower 22.

Connected at one end to the chain portion 51 is a branch or damper operating chain portion 55 being trained over suitable pulleys 56 for attachment at its opposite end with the arm 33 of the damper plate 32 as at 58. It may here be well to note that when the draft door 15 is open and the check draft door 17 closed that the weight 34 has acted to move the damper plate 32 to a substantially vertical position for closing communication through the smoke box from the furnace A to the chimney and has opened communication to the outlet 20 of the smoke box 18. Sufficient slack is provided in the branch chain 55 to allow full closing of the damper plate 32 over the outer sleeve 19 by the weight 34.

When the lever arm 39 is swung in a counter clock-wise direction from the showing in Figure 1, and moved to the left hand extremity of the arcuate pocket 40, the draft door 15 will be moved to a closing position over the opening 14, the check draft door 17 will be opened, and the damper plate 32 will be swung about its pivot point by the branch chain 55 into a position for closing the opening leading to the outlet 20 and opening communication between the furnace and chimney thru the smoke pipe 16. Since the contact fingers 44 and 45 extend for but a short distance of the entire length of the arcuate pocket 40 it will be seen that the circuit thru the motor 26 will be broken prior to complete closing of the draft door 15 and full movement of the damper plate 32 to a closed position over the outlet 20.

This simultaneous making and breaking of the circuit to the electric motor 26 upon operation of the doors 15 and 17 and damper plate 32, insures proper circulation of the

gases and smoke created in the fire box 11 and prevents possible continued operation of the blower with the check draft door 17 in an open position. Should the check draft door 17 be open while the blower is operating, such would result in a portion of the gases and smoke being passed or ejected thru the check draft opening and result in the dwelling being filled with objectionable gases. With the contact fingers 44 and 45 terminating short of the longitudinal center of the arcuate pocket 40, it will be seen that the doors 15 and 17, and the damper plate 32 may be disposed in their intermediate positions for partially checking the draft thru the furnace without a circuit being completed to the electric motor for causing the blower 22 to operate.

From the foregoing description it will be apparent that an improved and novel type of smoke consumer apparatus has been provided embodying features whereby a blower mechanism is rendered inoperative when the draft means for the furnace is in a position such as would cause the gases to be directed into the dwelling, and embodying a novel control means whereby the furnace drafts and gas and smoke return means may be controlled from a remote location from the furnace, and one which may be readily installed upon existing types of heating systems.

Various changes in the shape, size, and arrangement of parts may be made to the specific form of the invention herein shown and described, without departing from the spirit of the invention or the scope of the following claims.

We claim:

1. In a device of the class described, the combination with a furnace including a fire box provided with a smoke pipe having a check draft, of return means connected in the smoke pipe past the check draft and opening into the fire box and including a blower and drive means therefor, a pivotally mounted damper plate for selectively causing the products of combustion to circulate through said return means or closing communication therethrough and opening communication through the smoke pipe, actuating means for simultaneous opening of the check draft upon movement of the damper plate to a position for closing communication through the return means, and means connected between the actuating means and said blower drive means for setting the drive means in motion upon movement of the actuating means to a position for closing of the check draft and movement of the damper plate for opening communication through the return means.

2. In a device of the class described, the combination with a furnace including a fire box provided with a smoke pipe having a

check draft, of return means connected with the smoke pipe past the check draft and opening into the fire box, including a blower and an electric motor for operation thereof, a pivoted damper plate for selectively causing the products of combustion to circulate through said return means or closing communication therethrough and opening communication thru the smoke pipe, a remote control device operatively connected with the check draft and damper plate for simultaneous operation thereof, and circuit completing means operable by the control device for completing a circuit through said electric motor upon movement of the control device to a position for closing of the check draft and opening communication through the return means.

3. In a device of the class described, the combination with a furnace including a fire box provided with a smoke pipe having a check draft, and a draft door, of return means connected between the fire box and smoke pipe at a location past the check draft and including a blower and drive means for the blower, a pivoted damper plate for selectively causing the products of combustion to circulate through said return means or closing communication therethrough and opening communication through the smoke pipe, and an operating means including a remote control device for simultaneous actuation of the draft door, said check draft, and damper plate, and means for imparting movement to the drive means upon movement of the control device to a position for opening the draft door and closing the check draft.

4. The combination with a furnace including a fire box, an air draft door, and a smoke pipe having a check draft door, of a return duct connecting the fire box and smoke pipe at a point past the check draft door, a pivoted damper plate for selectively allowing circulation thru said return duct or closing communication therethrough and opening communication through the smoke pipe, said damper plate normally closing circulation through the smoke pipe, a blower for causing forced circulation through the return duct, an electric motor for operation of the blower, a remote control device for simultaneous operation of each of the draft doors and the damper plate, and circuit controlling means carried by the control device for completing a circuit through the blower motor when the control device is moved to a position for opening of the draft door, closing of the check draft door, and movement of the damper plate into a position for closing communication through the smoke pipe.

5. The combination with a furnace including a fire box, an air draft door, and a smoke pipe having a check draft, of a return duct connecting the fire box and smoke

pipe at a point past the check draft door, a blower for causing forced circulation through the duct, an electric motor for operation of the blower, a pivoted damper plate for selectively causing the products of combustion to circulate through said duct for closing communication therethrough and opening communication through the smoke pipe, said damper plate being normally returned by gravity to a position for closing communication through the smoke pipe, a control device embodying a rotatable drum, a chain trained about the drum and having one end connected with the air draft door and its opposite end connected with the check draft door for opening of one door and closing of the other upon rotation of the drum, a branch chain connected with the chain portion leading to the check draft door and connected with the pivoted damper plate for movement thereof in one direction, handle means for rotating the drum, contact members disposed in the path of movement of the handle and connected with the electric motor, and a contact member carried by the handle for bridging the spaced contact members and completing a circuit through the blower motor when the air draft door and check draft door are in respectively open and closed positions and the damper plate closing communication through the smoke pipe.

6. The combination with a furnace including a fire box, and a horizontally extending smoke pipe having a check draft, of a smoke box connected in the smoke pipe past the check draft and having a depending outlet opening, a blower, a suction duct connected between the outlet opening and blower, an exhaust duct connected with the blower and opening into the fire box, an electric motor for operation of the blower, a damper plate pivotally mounted in the smoke box for selectively causing the products of combustion to circulate either to the fire box or closing communication thereto and opening communication thru the smoke pipe, and a dual acting remote control device for automatically completing a circuit thru the blower motor upon movement of the check draft to a closed position and the damper plate to a position for closing communication thru the smoke pipe, and for breaking the circuit thru the blower motor upon opening of the check draft and movement of the damper plate to a position for opening communication thru the smoke pipe.

7. In a device of the class described, the combination with a furnace including a fire box provided with a smoke pipe having a check draft opening and a pivoted door for closing said opening, of return means connected in the smoke pipe past the check draft opening and opening into the fire box and including a blower and electrically operated

drive means therefor, a damper plate oper-
able for selectively causing the product of
combustion to circulate thru said return
means or closing communication therethru
5 and opening communication thru the smoke
pipe, control means for simultaneous actua-
tion of the check draft blower and damper
plate and embodying an operating lever hav-
ing limited arcuate movement, a contact
10 member carried by the lever, and spaced
apart contact members arranged adjacent

the limit of movement of the lever in one di-
rection to be engaged by the contact member
for completing an electric circuit to the
electrically operated drive means subsequent 15
to closing of the check draft door and move-
ment of the damper plate to a position for
causing a return circulation thru the fur-
nace.

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