March 12, 1940. A. C. EKMAN 2,193,274

DRAFT REGULATOR

Filed March 15, 1937 2 Sheets-Sheet 1

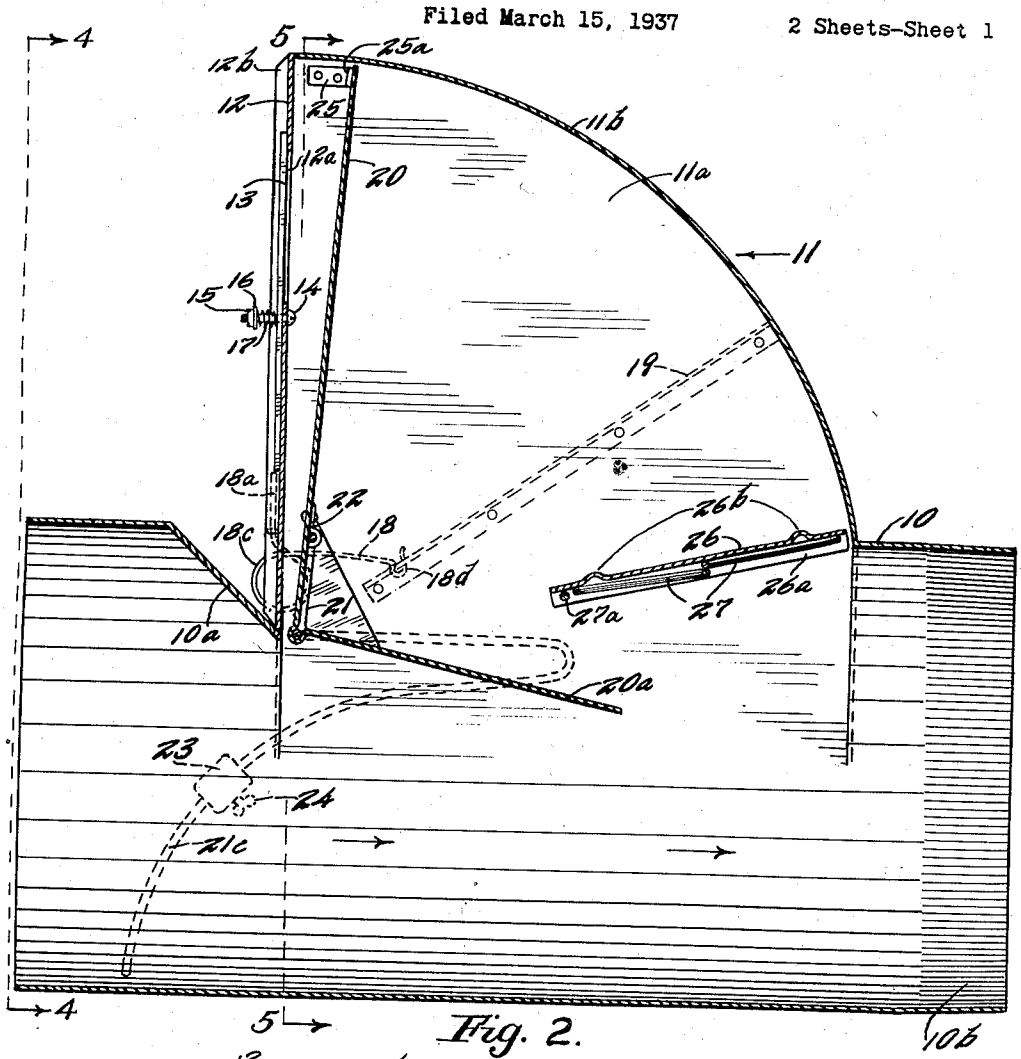


Fig. 2.

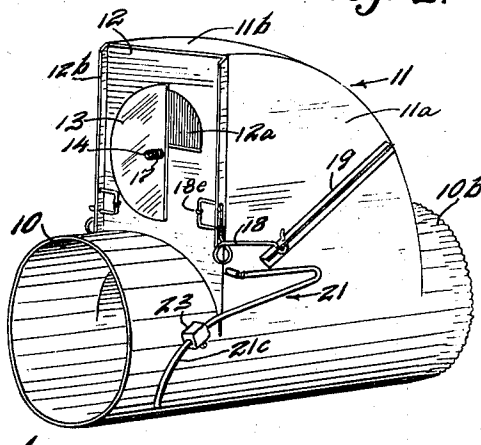


Fig. 1

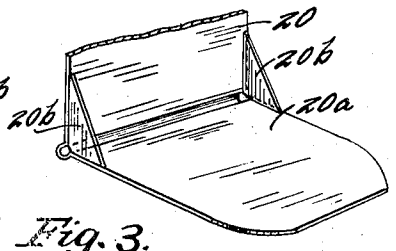


Fig. 3.

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DRAFT REGULATOR

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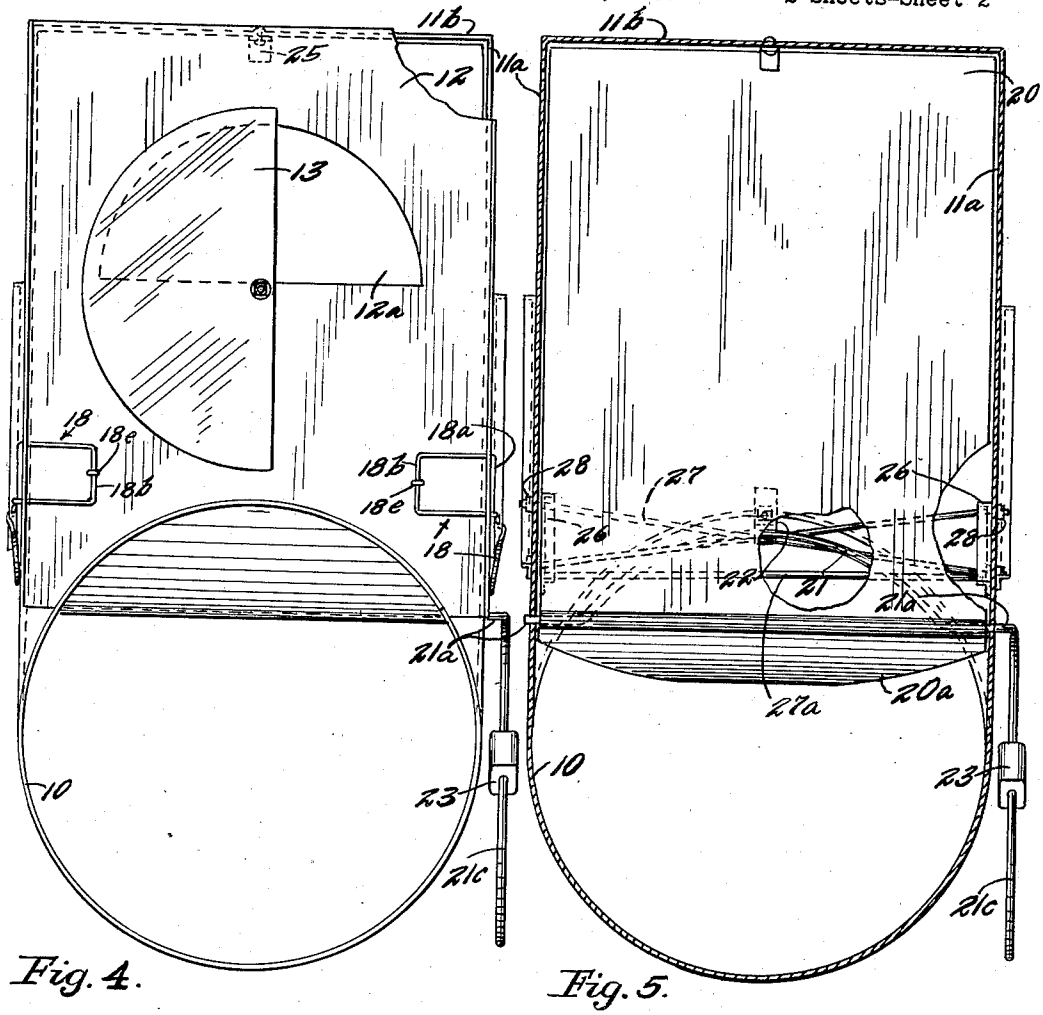


Fig. 4.

Fig. 5.

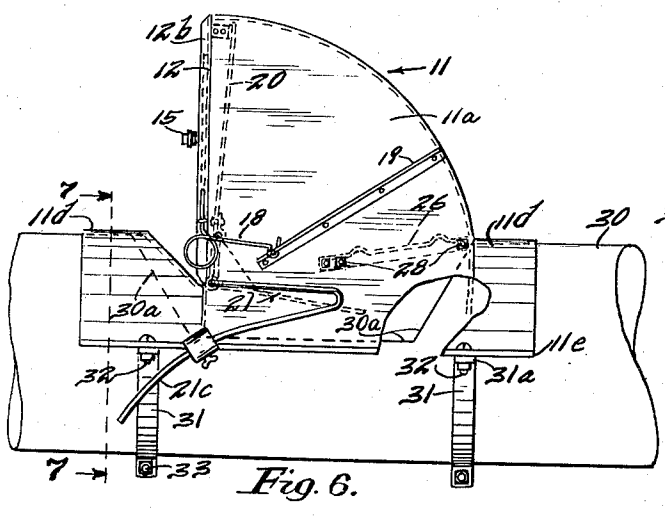


Fig. 6.

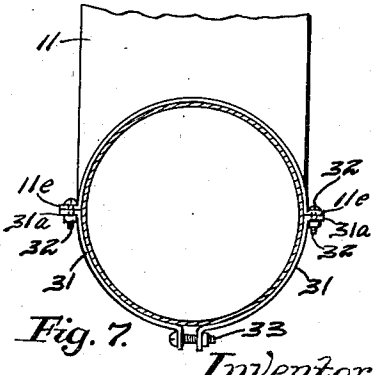


Fig. 7.

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Patented Mar. 12, 1940

2,193,274

UNITED STATES PATENT OFFICE

2,193,274

DRAFT REGULATOR

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Application March 15, 1937, Serial No. 130,816

2 Claims. (Cl. 236—45)

This invention relates to a draft regulating means and while the invention might have various applications, it particularly is designed for use in a conduit extending from a combustion chamber or furnace (either of the domestic or industrial type) to a chimney.

It is desirable to have a uniform draft in the smoke pipe leading from a furnace. This is rarely obtained as the draft through the smoke pipe is varied by many factors including the atmospheric conditions, such as the movements and pressure of the atmosphere. The draft is also varied by the combustion in the furnace. It is often desired to check the draft and this has been commonly done by opening a check damper which permits air from the furnace room to pass into the smoke pipe and out of the chimney. This constant drain of air from the furnace room is inefficient as the air is heated and allowed to pass up the chimney and is replaced in the furnace room by cold air usually coming from the outside.

It is an object of this invention to provide a draft regulating means which will permit a minimum of air to pass into the smoke pipe from the furnace room.

It is a further object of the invention to provide a draft regulating means including a damper arranged to diminish the passage through the smoke pipe and which is moved by a vane responsive to the draft from the chimney.

It is another object of the invention to provide a draft regulating means which can be nicely regulated as to sensitiveness and which will function as desired in case of any back draft through the smoke pipe.

It is still another object of the invention to provide a draft regulating means adapted to regulate the draft through the smoke pipe and which will prevent gases passing into the furnace room therethrough should any unusual pressure develop in the furnace, such as might be caused by an explosion.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which—

Fig. 1 is a perspective view of a device embodying the invention;

Fig. 2 is a vertical central longitudinal section through the device;

Fig. 3 is a perspective view of a damper and a portion of a vane used;

Fig. 4 is a view in front elevation as seen from the left of Fig. 1;

Fig. 5 is a vertical section taken substantially on line 5—5 of Fig. 2, as indicated by the arrows;

Fig. 6 is a view in side elevation of a modification; and

Fig. 7 is a vertical section taken on line 7—7 of Fig. 6, as indicated by the arrows.

Referring to the drawings, a conduit 10 is shown and while this could be any conduit in which it is desired to regulate the draft or passage of air, it will be particularly referred to as the smoke pipe which connects a furnace to a chimney. Conduit 10 is adapted to be connected to a furnace at its left hand end as shown in Figs. 1 and 2 and to a chimney at its right hand end so that the gases pass therethrough in the direction of the arrows shown in Fig. 2. Conduit 10 is shown as crimped at one end 10*b* to form a spigot to be inserted in a smoke pipe. The conduit 10 is shown as having a downwardly extending portion 10*a* and a casing 11 is provided having vertical side walls 11*a* which extend at their lower ends to the center of conduit 10 and are vertically alined with the sides of said conduit so that casing 11 is of the same width as conduit 10. The front end of casing 11 is in a vertical plane passing through the lower end of portion 10*a*. Casing 11 is open at its front or left hand end above conduit 10 save for a plate 12 which abuts the front edges of side walls 11*a* and of the top and rear wall 11*b*. It will be noted that wall 11*b* curves downwardly and rearwardly from the front of casing 11 in a substantially semi-cylindrical form to conduit 10 as clearly shown in Figs. 1 and 2. Plate 12 has an opening 12*a* therein and while this might take various forms, in the embodiment of the invention illustrated it is shown as substantially semi-circular. A plate 13 engages the front of plate 12 and is also of semi-circular form and is adapted to be moved to cover or partially cover opening 12*a*. A headed bolt 14 extends through plate 12 and through plate 13 substantially at the center of the peripheral arc of the latter and is equipped with a nut 15 and washer 16. A compression coiled spring 17 surrounds bolt 14 between washer 16 and plate 13 so that the latter is resiliently held against plate 12. Plate 13 will thus have considerable friction against plate 12 and will be held in the position to which it is moved. Plate 12 has its lower edge resting on conduit 10 at the lower end of portion 10*a* and is held in position by resilient or spring members 18. Plate 12 has a narrow outwardly projecting flange 12*b* at

either side thereof and there is one of the members 18 at each side of plate 12. Member 18 which is made of a small resilient rod or wire has one end portion secured to the front of plate 12. Said end has a portion 18a which extends upwardly along the outer side of flange 12a, then inwardly through said flange and along the front of plate 12, then downwardly at a right angle for a short distance at portion 18b, then outwardly at a right angle and again through flange 12a, the end being bent around portion 18a. Portion 18a at its lower end is bent rearwardly or to the right as shown in Figs. 1 and 2 and formed into a circular coil 18c, the end thereof then passing rearwardly along the outer side of side portion 11a of the casing and is provided with a bend or hook 18d passing through one flange of a small angle bar 19 which extends in a substantially radial direction along the side of casing 11 and acts to stiffen the same. Portion 18b is secured to plate 12 by a small clip 18e passing around portion 18b and through plate 12. With this structure it will be seen that plate 12 is held against the front of casing 11 but may swing away from said casing about an axis extending substantially along its lower edge by flexing of the members 18. A vane 20 is provided disposed in casing 11 and said vane is substantially rectangular in form having straight side edges disposed quite closely to the inner sides of side portions 11a and having a straight top edge which moves quite closely to wall 11b. Vane 20 is mounted for swinging movement about the axis of a pintle or pivot member 21 formed of a small rod or wire having portions 21a extending through apertures in side walls 11a. Member 21 is curved upwardly across the lower portion of vane 20 and secured to said vane centrally thereof by a small clip 22 bolted or riveted to vane 20. Vane 20 at its lower portion is formed into a curve extending around member 21 adjacent portions 21a and is continued to form a damper 20a extending at an obtuse angle thereto. Damper 20a is shaped as shown in Fig. 3 and when moved to a position substantially perpendicular to the axis of conduit 10 will largely cut off the passage of air therethrough. Small reinforcing plates 20b are secured to vane 20 and damper 20a. Member 21 at one side of casing 11 has a portion extending rearwardly and said portion is then bent reversely to extend forwardly and downwardly in portion 21c. Portion 21c has a weight 23 slidable thereon and which may be held in any desired position by thumb screw 24. With the described structure it will be seen that weight 23 tends to swing vane 20 in a counterclockwise direction. A small clip 25 is secured to the inner side of wall 11a adjacent the front thereof, the same having a small inwardly bent flange 25a which will be padded and act as a stop member and with which vane 20 may engage. Narrow plates 26 of substantially rectangular form extend along the inner sides of the side walls 11a adjacent the top of conduit 10, the same having small downwardly extending flanges 26a engaging side walls 11a and small rods 27 extend diagonally across the underside of plates 26 through flanges 26a and walls 11a and are equipped with nuts 28 at the outer sides of walls 11a. A rod 27a extends between side walls 11a adjacent plates 26. Rods 27 act to maintain casing 11 in its proper form and rod 27a holds side walls 11a properly spaced. Plates 26 have bent-up portions or ribs 26b adjacent their ends adapted to be engaged by vane 20 so that plates 26 limit the lower movement of vane 20.

In Figs. 6 and 7 a modified form of the invention is shown. With this modification the casing 11 is formed as a separate unit from conduit 10 and has front and rear semi-circular portions 11d which fit over and rest upon a smoke pipe 30, which smoke pipe is cut away at its top and sides along the line 30a. Portions 11d have outwardly extending flanges 11e at their lower sides and are adapted to be secured to smoke pipe or conduit 30 by the curved bands or clips 31 fitting around conduit 30 and having flanges 31a at their upper ends engaging flanges 11e and secured thereto by the headed and nutted bolts 32. Members 31 have downwardly extending flanges 31b at their lower ends which are connected by headed and nutted bolts 33. In all other respects the parts shown in Figs. 6 and 7 are identical with those already described and shown in Figs. 1 to 5.

In operation, with the conduit 10 connected as described, the weight 23 will be adjusted to hold the damper 20a in the desired position for the gases to pass through smoke pipe 10. This position will vary with different installations. Plate 13 will be moved to position to give the desired amount of opening in opening 12a. With the normal draft or the gases passing through conduit 10 as desired, damper 20a and vane 20 will maintain substantially the positions for which they are set. Should a stronger draft occur toward the chimney, this will cause vane 20 to swing in a clockwise direction since the draft tends to draw in air through opening 12a. Very little air can pass vane 20 as it moves quite close to the walls of casing 11. When vane 20 thus swings in a clockwise direction damper 20a is swung downwardly toward position to shut off the draft through conduit 10. The increased draft in the chimney, therefore, does not cause an increased draft through the furnace. If vane 20 is drawn all the way down to the stop member 26 damper 20a is substantially perpendicular to the axis of conduit 10 and there is a maximum shutoff of this conduit. The amount of this shutoff depends on the shape of damper 20a and as shown in Fig. 3 the damper does not completely close the passage through conduit 10. It will thus be seen that the draft through the furnace is checked and at the same time very little air is taken from the furnace room. There is hence not a continual drain of air from the furnace room in order to check the draft in the furnace. The device is quite sensitive and when connected in a smoke pipe it acts very frequently. The plate 13 and regulation of opening 12a is provided to make the device somewhat less sensitive and to act as a stabilizer. Plate 13 can be adjusted to attain the desired response for vane 20. It should be noted that if there is any excessive pressure outwardly or toward the chimney in conduit 11 it will swing damper 20 upwardly and can have a free outlet. Should there be any back pressure from the chimney or into the chimney end of conduit 10 it will act to swing vane 20 in a counterclockwise direction. The back draft can be relieved by passing into casing 11 and if sufficient it will swing plate 12 outwardly against the tension of members 18. As soon as the pressure is relieved plate 12 will be moved back against casing 12. Ribs 26b are provided so that plate 20 will not lie flat against plates 26 and have a tendency to hold said plates by suction.

With the form shown in Fig. 6 the device can be applied to a smoke pipe already installed by

cutting the same away as indicated and placing the device including portions 11d over the cut away portion of the smoke pipe and securing the same thereto by members 31.

From the above description it is seen that applicant has provided a very simple and efficient draft regulating device. The device acts automatically to secure the desired draft through the furnace and to check an excessive draft without permitting a large amount of air to pass from the furnace room up the chimney. The device can be nicely adjusted and is designed to take care of excessive drafts or pressures which might occur. The same has been amply demonstrated in actual practice and found to be very successful and efficient. The conduits 10 and 30 may of course be of any shape in cross section. Both cylindrical and rectangular conduits are commonly used.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. A draft regulator adapted to be used with a conduit through which gases pass from a furnace to a chimney having in combination, a casing having one end open, said end communicating directly with one side of said conduit so that said casing and conduit have a common passage, said casing having another end disposed without said conduit, a vane disposed in said casing and swingable therein, said vane being of such area that only a small amount of air may pass in said casing whereby an increased draft at the chimney end of said conduit will swing said vane toward said conduit and a damper disposed in said conduit and passage adjacent said first mentioned end of said casing movable with said vane and adapted to diminish the passage through said conduit as said vane is swung toward said conduit, said passage and damper being arranged to permit a back draft to pass into said casing and move said vane in a direction away from said conduit, said other end of said casing having an opening, a closure member for said opening having an aperture therethrough, means for adjusting the size of said aperture to regulate the sensitiveness of movement of said vane and resilient means holding said closure member in closed position whereby excessive back draft against said vane may cause movement of said closure member.

2. A draft regulator for a conduit connecting a furnace to a chimney having in combination, a casing disposed over said conduit having vertical side walls parallel to the longitudinal axis of said conduit and disposed adjacent the sides thereof, said casing having a vertical end wall, said casing being open at its bottom between said side walls and said conduit being open between said side walls so that a common passage is formed in said casing and conduit, a vane disposed in said casing being of such area that only a small amount of air can pass between it and the walls of said casing, said vane being pivoted about a horizontal axis adjacent the bottom of said end wall and adjacent the top of said conduit, a damper plate secured to said vane and adapted to extend downwardly into said conduit at a small angle to the horizontal and toward the chimney end of said conduit and adjustable means for determining the normal position of said vane and damper plate about said axis, said vertical end wall of said casing being movable outwardly and resilient means holding said end wall in normal position closing said casing whereby a strong back draft acting against said vane may force said vane away from said conduit and the air between said vane and end wall move said end wall outwardly.

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