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2,540,191

DRAFT CONTROL

Filed July 15, 1949

2 Sheets-Sheet 1

Fig. 1.

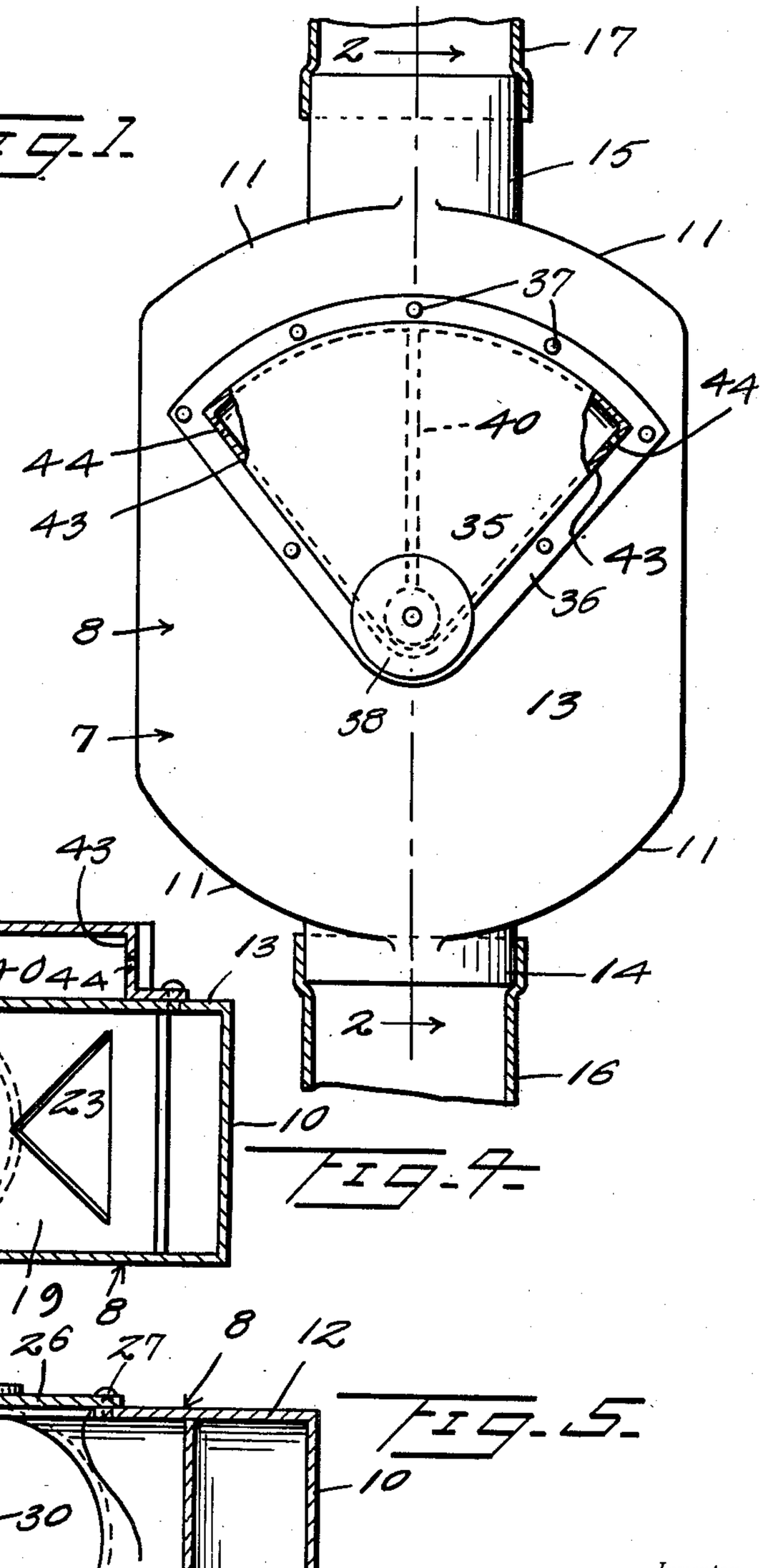


Fig. 6.

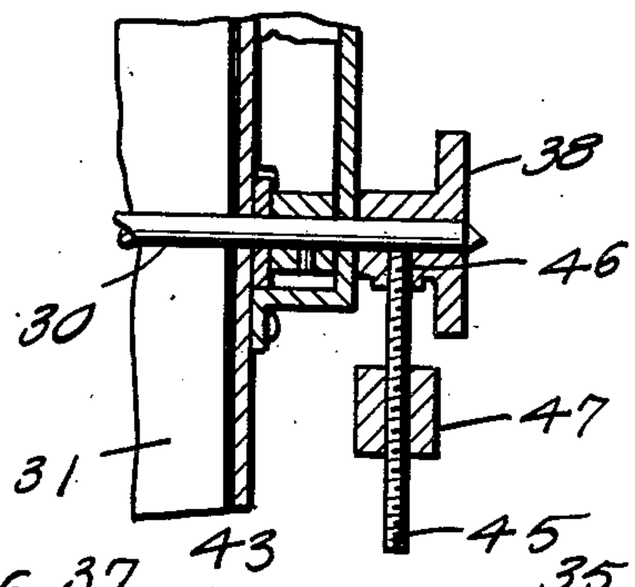


Fig. 4.

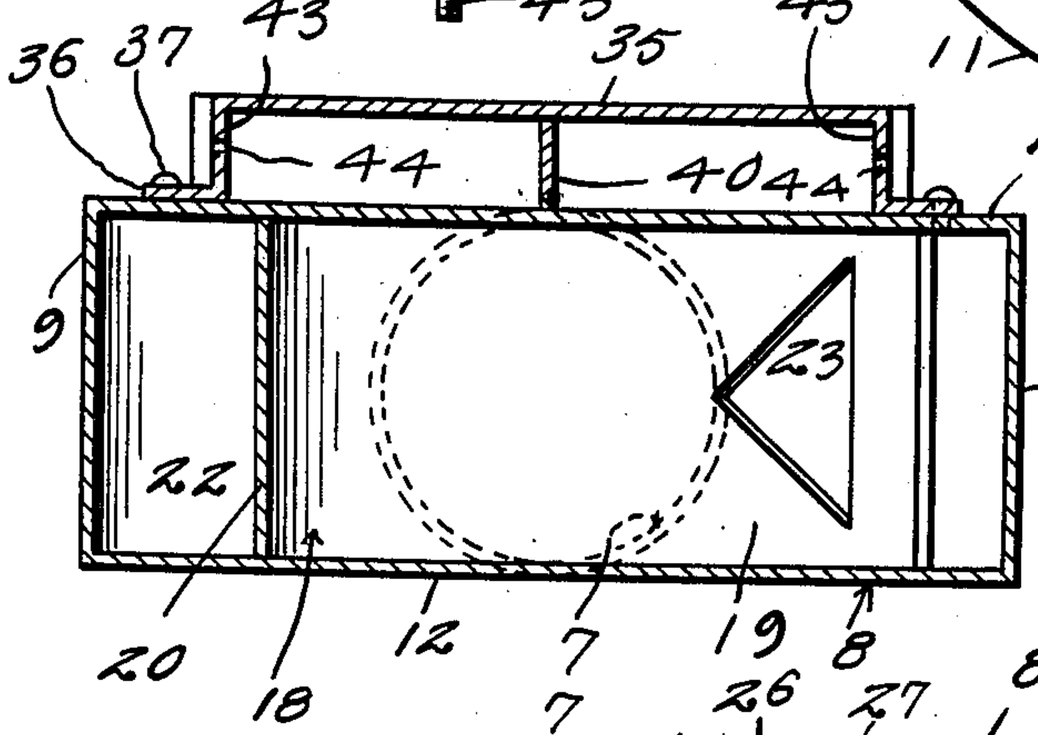
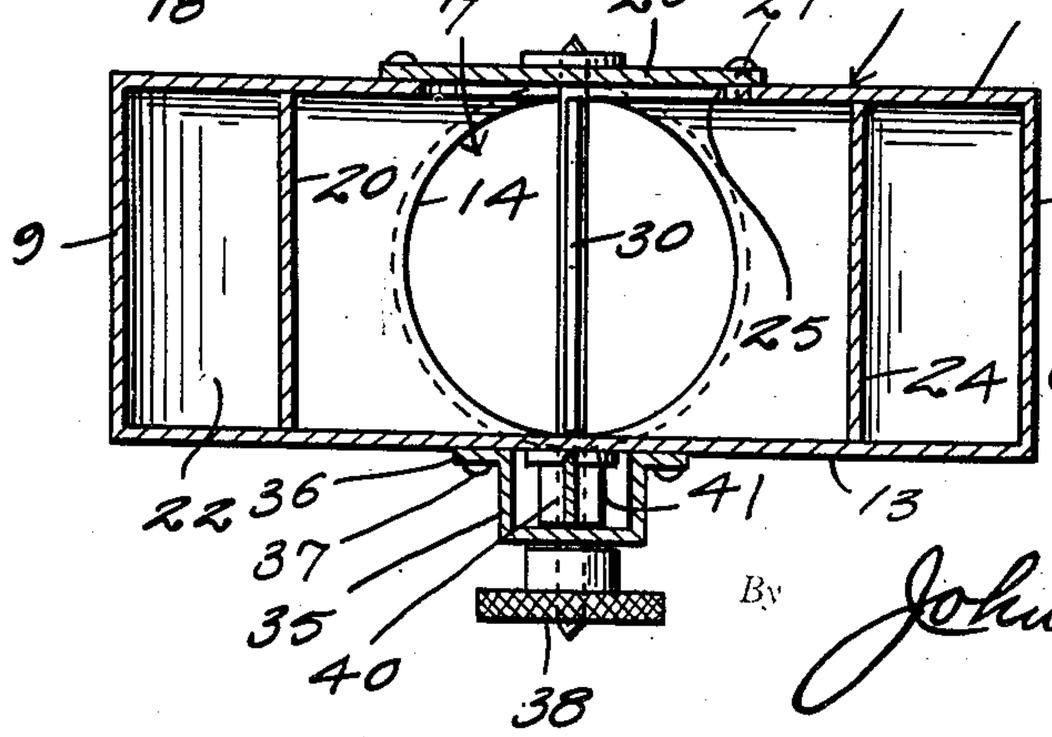


Fig. 5.



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2 Sheets-Sheet 2

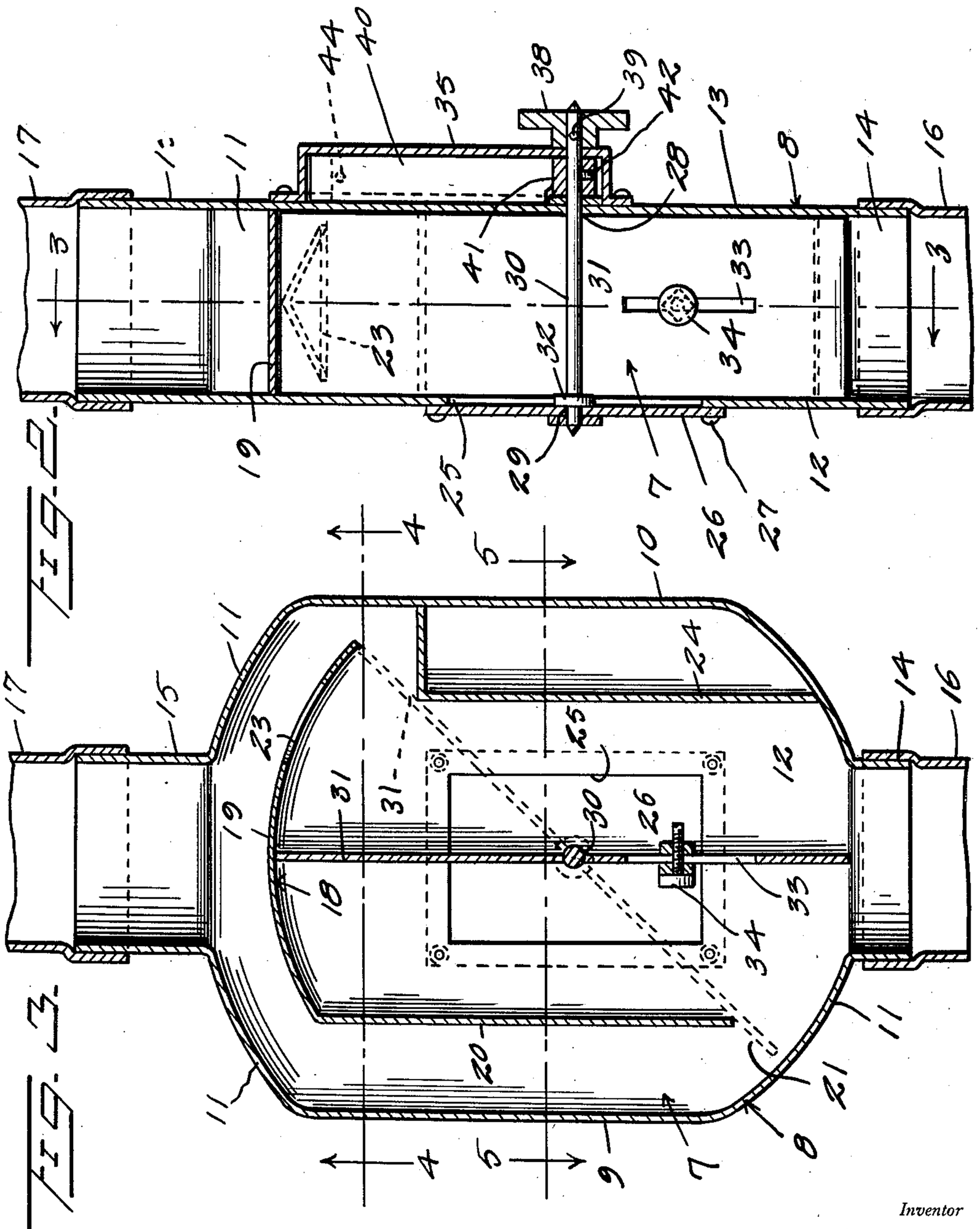

FIG. 2.

FIG. 3.

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DRAFT CONTROL

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Application July 15, 1949, Serial No. 104,945

7 Claims. (Cl. 236—45)

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This invention relates to a novel automatic damper for controlling the draft from a stove or other heating or cooking unit and will automatically restrict the outlet therethrough to the chimney or stack as the suction in the stack or chimney increases.

Another object of the invention is to provide a draft control of extremely simple construction and which may be manually adjusted to render it extremely sensitive to variations in the suction in a chimney or stack and which sensitivity of the control enables it to function as a thermostat for restricting the draft from a heating unit when the heat therein becomes excessive, due to the fact that the force of the heated products of combustion released from the heating unit are capable of actuating the control.

Still a further object of the invention is to provide a draft control or automatic damper which will substantially eliminate the escape of heat from a heating unit causing substantially all of the heat therefrom to be radiated into the enclosure to be heated thereby and which will react to even slight changes of the draft or suction in a chimney or stack.

Still a further object of the invention is to provide a draft control or automatic damper substantially all of the parts of which are enclosed yet which may be readily opened for inspection, adjustment or cleaning and which is provided with a minimum of moving parts.

Still another object of the invention is to provide an automatic damper or draft control having braking means for checking the movement thereof to prevent a moving part thereof from striking the control casing and causing a noise or vibration to thereby provide a control which will be noiseless and which will cause no vibration in operation.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating presently preferred embodiments thereof, and wherein:

Figure 1 is a side elevational view, partly in section, showing the draft control or automatic damper interposed in a flue or chimney;

Figure 2 is an enlarged longitudinal sectional view thereof taken substantially along a plane as indicated by the line 2—2 of Figure 1;

Figure 3 is a longitudinal vertical sectional view of the parts taken at a right angle to Figure 2 and substantially along a plane as indicated by the line 3—3 of Figure 2;

Figures 4 and 5 are cross sectional views of the

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draft control or automatic damper taken substantially along planes as indicated by the lines 4—4 and 5—5, respectively, of Figure 3, and

Figure 6 is a fragmentary vertical sectional view showing a slightly modified form of the invention.

Referring more specifically to the drawings, the automatic draft control or damper constituting the invention and as illustrated in Figures 1 to 5, is designated generally 7 and includes a housing designated generally 8, which is substantially rectangular in cross section, as best illustrated in Figures 4 and 5. The housing 8 is substantially wider in one direction than in the other in cross section and the opposite wall portions 9 and 10 thereof which are spaced the greater distance apart are provided with rounded inwardly curved complementary end portions 11 which merge with the more adjacently disposed opposite side walls 12 and 13. Extensions of said merging portions 11 and the side walls 12 and 13 provide integral nipples or sleeve portions 14 and 15 which project from the lower and upper ends, respectively, of the housing 8 for receiving thereon sections 16 and 17 constituting adjacent ends of sections of a flue or chimney for interposing the housing 8 therein. The lower nipple 14 constitutes the inlet end of the automatic damper or draft control 7 and the upper nipple 15, the outlet end thereof.

The housing 8 is provided with an internal shell 18 including an upper arcuate portion 19 which extends generally toward the walls 9 and 10 and which is upwardly bowed so as to be disposed substantially concentric with the upper wall portions 11 and beneath and spaced from the outlet nipple 15. The inner shell 18 also includes a depending wall 20 which is spaced from and disposed substantially parallel to the wall 9 and the upper end of which forms a continuation of one end of the arcuate upper shell portion 19 and the other end of which terminates above and spaced from the lower inwardly bowed portion 11 of said wall 9 to provide a passage entrance 21 between the bottom portion of the housing 8 and the passageway 22 defined by the wall 9 and shell wall 20 and by one end of the arcuate shell portion 19 and the upper inwardly bowed wall portion 11 of the wall 9, which passageway 22 extends from the entrance 21 thereof to the outlet nipple 15, as best illustrated in Figure 3. The arcuate shell portion 19, adjacent its opposite end, is provided with a substantially triangular-shaped opening 23, the widest end of which is located adjacent the housing wall 10. Said inner

shell 18 including its portions 19 and 20, extends between the adjacent side walls 12 and 13, as clearly illustrated in Figures 4 and 5. The housing 8 is provided with an inverted L-shaped internally disposed wall member 24 which extends between the adjacent walls 12 and 13 and which has its ends abutting against the wall 10, for a purpose which will hereinafter become apparent. The internal shell member 18 and the internal wall member 24 may be secured in any suitable manner, not shown, within the housing 8.

The wall 12 is provided with a relatively large opening 25 constituting an inspection and clean-out opening and which is normally closed by an externally disposed cover plate 26 which is secured to the outer side of the wall 12 by screw fastenings 27. The wall 13 is provided with an opening 28 which is preferably externally flanged and the plate 26 is provided with an opening 29 which aligns with the opening 28 and which openings are adapted to provide journals for a shaft 30 which is journaled therein and which is fixed to or formed integral with the intermediate portion of a damper vane 31 which is disposed within the housing 8 and which is of a width to extend substantially to the adjacent side walls 12 and 13 and of a length so that its upper end will travel along the under, concave side of the arcuate shell portion 19 while its lower end will be disposed for swinging movement adjacent the inlet nipple 14 and from adjacent the center thereof toward the lower end of the shell wall 20, as seen in full and dotted lines, respectively, in Figure 3. A collar 32 is disposed on the shaft 30 between one longitudinal edge of the vane 31 and the cover plate 26 for properly spacing said edge of the vane from the wall 12.

The lower portion of the damper vane 31 is provided with a longitudinally elongated opening or slot 33 for receiving a weighted element 34 including a nut and bolt which is slidable in the opening 33 longitudinally of the vane 31 and which is adapted to be tightened for clamping said weighted element 34 in a plurality of adjusted positions at different distances below the shaft 30 for varying the effect of said weight 34.

A segment-shaped housing 35 has an open side provided with a flange 36 which is secured to the outer side of the wall 13 by a fastening 37, which extends through the flange 36, so that a portion of said housing side 13 constitutes the other side wall of said segment-shaped housing 35. The end of the shaft 30 which extends through the journal opening 28 is elongated to extend outwardly through the lower, restricted portion of said segment-shaped housing 35, in which said shaft 30 is likewise journaled. A turning knob 38 is secured by a pin or fastening 39 to the outer, exposed end of the shaft 30, outwardly of said housing 35 and provides a means whereby the damper vane 31 may be turned in either direction manually, for a purpose which will hereinafter become apparent. A vane 40 is disposed for close fitting engagement within the housing 35 and has a hub portion 41 at its lower end which engages a portion of the shaft 30 and which is secured thereto by a fastening 42 so that when the shaft 30 is turned in its journal openings 28 and 29, the vane 40 will swing in the segment-shaped housing 35 and in close engagement with the walls thereof, including the housing wall 13. The upwardly diverging walls 43 of said housing 35 are provided with restricted openings 44 adjacent their upper ends, so that said housing 35 and its vane 40 forms a dashpot to restrict the turning movement of the shaft 30 and accordingly the swinging movement of the damper vane 31.

Assuming that the damper vane 31 is disposed in a normal, upright position, the smoke and other products of combustion from a heating unit, not shown, will pass upwardly through the flue section 16 into the housing 8 through the lower inlet nipple 14, as seen in Figure 3, on either side of the damper vane 31. The products of combustion on the right-hand side of the damper vane 31 will pass upwardly through the opening 23 in the internal shell member 19 to the outlet nipple 15 or around the right-hand end of the shell member 19. The products of combustion entering the housing 8 on the left-hand side of the vane 31 will pass upwardly through the passage 22, previously described, into the outlet nipple 15. In the event that an excess suction occurs in the flue above the housing 8, said suction will exert a pull on the ends of the vane 31 to cause it to swing clockwise with its shaft 30 from its position of Figure 3 as seen in full lines to its dotted line position of said figure. This will be partly caused by the fact that some of the products of combustion will be trapped between the shell wall 20 and the upper portion of the vane 31 to exert a pressure on said vane to swing it clockwise. The amount of pressure required to accomplish this swinging movement of the vane 31 to its dotted line position of Figure 3, will vary depending upon the location of the counterweight 34 which tends to retain the vane in its full line position of Figure 3. As the vane 31 swings from its full line to its dotted line position of Figure 3, its upper edge will pass across the opening 23 from the smaller end toward the larger end thereof and the products of combustion passing upwardly through said opening 23 to the right of the vane 31 will resist the clockwise swinging movement of the vane and thereby act as a brake to check the movement of the vane as it approaches its dotted line position and to prevent the vane from banging against the shell wall 20 and the upper corner of the internal wall 24. When the vane 31 is in its dotted line position of Figure 3, its lower end is spaced from the lower wall portion 11 of the wall 9 to permit a limited amount of the products of combustion to pass through the entrance 21 into the passage 22 and some products of combustion can pass through the opening 33 and thence to the opening 23, so that the damper or vane 31 does not completely shutoff the flow of the products of combustion in any position. However, the products of combustion are prevented from escaping beyond the upper part of the vane 31 due to the fact that the vane in its dotted line position engages the upper inside corner of the interior wall member 24 to thereby close the upper right-hand side of the casing 8, as seen in Figure 3. When the suction at the outlet nipple 15 diminishes, the weight 34 will return the vane 31 toward its full line or open position. In addition to the opening 23 functioning to restrict the swinging movement of the vane toward its closed, dotted line position, the dashpot 35, 40 is provided positively preventing the vane 31 from swinging rapidly in either direction to thereby prevent the vane from banging against any internal parts of the housing 8 to cause a noise or vibration. This is accomplished due to the fact that the vane 40 of the dashpot must swing with the vane 31 and in moving in either direction it forces air from one side of said vane 40 outwardly through the open-

ing 44 toward which it is moving and at the same time creates a suction to draw air into the dashpot housing through the other opening 44, both of which openings are sufficiently small so that air will be restricted in its passage therethrough to thereby permit the vane 40 to swing only at a very slow speed.

Obviously, the cover plate 26 can be removed for adjusting the weight 34 and for cleaning out the interior of the draft control housing 8. Soot may also be removed from the damper vane 31 by manually turning the knob 38, with the vane 31 adjacent its dotted line position of Figure 3, for bumping the ends of the vane against the internal wall portions 20 and 24 for knocking the soot from the vane.

With the weight 34 located adjacent the upper end of the opening 33, the damper vane 31 can be made sufficiently sensitive so that it will be closed by an excessive heat entering the housing 8 through its inlet 14 due to the fact that a sufficient amount of the products of combustion will then be trapped between the upper portion of the vane 31 and the internal wall 20 to swing said vane clockwise and to its dotted line position of Figure 3.

Figure 6 illustrates a slightly modified form of the invention and wherein the opening 33 and weight 34 are omitted and in lieu thereof an elongated threaded rod 45 is provided to retain the knob 38 secured to the shaft 30 in lieu of the fastening 39, said rod 45 having one end engaging a threaded opening 46 in the hub of the knob 38 and being advanced for clamping engagement with the shaft 30. The rod 45 is disposed in a depending position when the vane 31 is upright, so that said rod is in the same plane as the vane. A weight 47 is then threaded onto the lower end of the rod 45 and may be adjusted toward and away from the knob 38 for varying the extent that said weight will resist the closing movement of the vane 31, in the same manner and for the same purpose as the weight 34.

Various other modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A draft control comprising a housing having an inlet nipple at one end thereof and an outlet nipple at its opposite end, said nipples being adapted to be connected to adjacent ends of sections of a flue for interposing the draft control therein, said housing constituting a part of the flue conduit, an internal shell disposed in said housing and provided with an arcuate end wall located adjacent the outlet nipple, said internal shell having a longitudinally extending wall extending from one end of said arcuate wall portion and terminating adjacent the inlet nipple and combining with a wall of said housing to provide a restricted passage from adjacent the inlet nipple to said outlet nipple, a shaft extending through and journaled in said housing, a damper vane fixed to said shaft and swingably disposed in the housing and mounted for movement of either of its ends toward and away from said longitudinally disposed wall of said internal shell, one end of said damper vane being movable across the concave, inner side of said arcuate wall of the internal shell and the other end thereof being movable from an open position adjacent the inlet nipple and axially of the housing to a position against the adjacent end of said longitudinally disposed wall of the internal shell and having the end thereof spaced from the adjacent housing wall to provide a restricted entrance opening to said passage when the damper vane is in engagement with the longitudinal wall of the internal shell, and a fixed internal wall constituting a part of said housing for engagement with a portion of the opposite, first mentioned end of the vane when the last mentioned end thereof is in engagement with said longitudinal shell wall whereby the housing will be closed by the vane except for said limited entrance opening to the passage.

2. A draft control as in claim 1, said vane having means for normally maintaining it in a plane parallel to the longitudinal axis of the housing and of the adjacent flue sections, said vane being actuated by a suction in the outlet nipple of the housing for rocking the vane to a position for substantially closing the passage through the housing.

3. A draft control as in claim 1, said vane having means for normally maintaining it in a plane parallel to the longitudinal axis of the housing and of the adjacent flue sections, said vane being actuated by a suction in the outlet nipple of the housing for rocking the vane to a position for substantially closing the passage through the housing, said means comprising a weight mounted for vertical sliding movement on said damper vane toward and away from said shaft and having means for clamping it in a plurality of adjusted positions to the vane.

4. A draft control as in claim 1, said vane having means for normally maintaining it in a plane parallel to the longitudinal axis of the housing and of the adjacent flue sections, said vane being actuated by a suction in the outlet nipple of the housing for rocking the vane to a position for substantially closing the passage through the housing, said means comprising a threaded rod secured to and normally depending from an exposed end of said shaft and having a weight threaded thereon for vertical movement toward and away from the shaft, said threaded rod being disposed in the same vertical plane as the damper vane.

5. A draft control as in claim 1, said first mentioned arcuate portion of said internal shell having a tapered opening therein disposed near the end thereof remote to the longitudinal wall of said shell, said opening being tapered toward said longitudinal wall and forming an opening through the housing for the products of combustion, said first mentioned end of the vane being movable across said opening as the vane is moved to a closed position for closing the opening, and the enlarged end of said opening forming a brake means for checking the swinging movement of the vane toward a closed position.

6. A draft control as in claim 1, a dashpot mounted on the outer side of said housing through which an end of said shaft extends and in which said shaft portion is journaled, said dashpot including a vane having one end fixed to the shaft for checking the rotary movement of the shaft and swinging movement of the damper vane in either direction.

7. An automatic damper control comprising a housing having an inlet nipple at one end thereof and an outlet nipple at its opposite end, said nipples being adapted to be engaged by adjacent ends of adjacent sections of a flue for interposing the housing in the flue, a shell secured in said housing having a wall disposed longitudinally of the housing and combining with portions

thereof to form a restricted passage extending along one side of the housing from adjacent its inlet nipple to its outlet nipple, a vane swingably mounted in said housing, and a weight carried by said vane for normally holding the vane in a position longitudinally and centrally of the housing whereby the products of combustion can flow unimpeded through the housing, said shell having an arcuate end wall extending from one end of the longitudinal shell wall and disposed between the outlet nipple and the adjacent end of the vane, said vane being adapted to be actuated by suction in the outlet nipple of the housing for swinging said end of the vane to a position adjacent one end of the arcuate shell wall to close one part of the housing and to position the other

end of the vane adjacent the opposite end of the longitudinal shell wall to partially close the restricted passage.

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