

TITLE: CONTROL VALVE

FIELD OF THE INVENTION

THIS INVENTION relates to a control valve. The valve of
5 the invention is useful in exhaust systems employed in multiple dwelling buildings, or other buildings such as single dwellings wherein there is typically disposed multiple toilets and/or bathroom and other wet area vents, which each require a system whereby to effect the exhaust of vapours and unpleasant gases in the toilet area.

10 DESCRIPTION OF THE PRIOR ART

It is known to utilise an exhaust fan so as to extract gases arising in a toilet bowl. Similarly, to vent vapours in a wet area such as a shower. A variety of ducting systems have been developed which are effective to remove steam, obnoxious odours, etc from
15 bathrooms and toilets. The toilet systems often withdraw gases via a ducting system with connection for example, into the cistern pipe of a toilet bowl by which flush water is fed to the toilet bowl. It is possible to plumb this ducting or pipe work with an exhaust system comprising a pipe segment with a fan suitably inserted therein to be
20 connected into the ducting. These systems employ one fan per cistern and are commonly offered as an add-on accessory to existing toilets. In multiple dwellings, it is common to provide ceiling vents to areas such as bathrooms and toilets which vents are manifolded or connected to a common, fan powered exhaust. Whilst it is possible
25 to hook this type of system into the cistern flush pipes of the toilets of a multiple dwelling building, problems remain.

In a system where the cistern pipes of each toilet are interconnected by the exhaust ducting leading to the common fan, provision of some additional means may need to be made by which to
30 control or preclude ingress of water into the exhaust piping which

could drain down the ducting to lower levels. In a multiple connection of this kind, there is an additional need to balance the action of the exhaust system at each dwelling so as to take account of losses within the system at greater distances from the fan.

5 SUMMARY OF THE INVENTION

It is an object of the present system to provide improvements in valving by which to effect a gaseous volume flow control in an exhaust system for toilets and bathrooms. Other objects and various advantages will hereinafter become apparent.

10 The invention achieves its object in provision of a control valve for use with vents to bathrooms and toilets, said control valve comprising:

a control valve body with a bore therethrough extended between first and second ends;

15 a valve seat formed in said bore between said first and second ends;

a valve flap hingedly mounted in said bore to close, in use, against said valve seat;

20 a biasing means operative to bias said valve flap angularly away from said valve seat; and

a setting means sets the degree of angular opening of said valve flap.

25 The valve, or assembly of valves, might be connected to a cistern flush water pipe or alternately it might be connected directly into the toilet bowl.

DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to a preferred embodiment which is shown in the accompanying drawings in which:

30 FIG. 1 is a plan view of a control valve in accordance

with an embodiment of the invention;

FIG. 2 is a plan view (exploded) of valve parts which are used in the control valve of FIG. 1;

FIG. 3 is a sectional elevation of the control valve of FIG. 1;

FIG. 4 is an end view of a pipe saddle by which the control valve of FIGS. 1 to 3 can be fitted into ducting; and

FIG. 5 is a sectional elevation through a multiple level dwelling showing a manner of use of the control valve and saddle of FIGS. 1 to 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The control valve 10 of FIGS. 1 and 3 fits, in use, into pipe saddle 11 held by pipe clamp 12 to ducting as described below. The control valve 10 has a flap valve 13 pivotally mounted therein (as described below). Operation of the flap valve (described in detail below) involves the spring 14 (biasing the flap valve 13 to open position, in use, when only air is flowing in the system) and a set screw 15.

As seen in FIG. 1, the control valve 10 is formed with a control valve body 16 (circular in cross-section when the control valve is to connect to tubular section ducting) with a housing 17 wherein set screw 15 is held. The flap valve 13 (seen from below in the sense of FIG. 3) has a lug or projection 18 thereon whereat the spring 14 (not shown) is connected at one end thereof (its other end being anchored at projection 19 (seen in more detail in FIG. 3)). The flap valve 13 has hinge plates 20 and 21 which are pivotally connected (co-axially) with hinge plates 22 and 23 on hinge mounting plate 24.

As seen in FIG. 2 (showing valve plate 13 and hinge mounting plate exploded), the hinge plates 25 and 26 on hinge

mounting plate 24 have pivot pins 26 and 25 projected therefrom for receipt in complementary bores in hinge plates 21 and 20 respectively. The valve plate 13 and hinge mounting plate may be manufactured as separate items with hinge mounting plate 24 snapped or pressed into a complementary recess in control valve body 10, or glued or otherwise joined thereto to set the valve plate 13 appropriately in the bore of the control valve body 16, hinging therein to and from a complementary valve seat (see below) for the valve plate, said valve seat being formed within the bore of the valve body 16.

As seen in FIG. 3, the control valve body 16 is formed with a socket end 27 and a plug end 28 whereby the body can be mated with complementary ducting at one end and a pipe saddle (see FIG. 4) at the other end. Clearly, the male/female formations could be reversed from that which is shown. The spring 14 is shown extended between lug or projection 18 on valve plate 13 and projection 19 on the inside of the bore in the control body. The valve plate 13 is shown with its edge 49 closed against its complementary valve seat 48. Normally the valve plate is biased to an open position by the spring 14. The degree to which the valve plate 13 is opened depends on the setting of the set screw 15. The hinge plate 20 on the valve plate 13 has a ramped surface 29 which engages with the end of the set screw 15 when the valve plate is open under tension of spring 14. The degree of angular movement of the valve plate 13 is limited by engagement of ramp surface 29 on hinge plate 20 with the end of the set screw 15. Screwing the set screw 15 inwards further restricts the degree of angular opening of the hinge plate 13.

As seen in FIG. 4, the pipe saddle 11 and pipe clamp 12 are joined together conveniently by joining of lug pairs 30,31 and 32,33. Their interconnection might be by any suitable means such as

the commonly used nut and bolt (not shown). The pipe saddle 11 has a socket 34 projected thereof into which the control valve body (of FIG. 3) can be plugged or fitted in use with the plug end 28 (in FIG. 3) pushed into socket 35. As is usual, the pipe saddle 11 has a
5 projection 36 to enter a hole in ducting the saddle is connected to in use. This ducting is not shown for convenience, being well known to those utilising saddles in order to connect a passage into ducting such as pipe work to establish a T-junction.

As seen in FIG. 5, a multiple dwelling can have a number
10 of toilets 37 to 39 on different floors together with ceiling vents such as 40 (to exhaust smells, vapours, moisture, etc) all connected via ducting 42 to a fan 43 (which is conveniently mounted within a roof space above the uppermost ceiling). The toilets such as 38 may have a cistern 44 connected thereto by a flush pipe 47 to enable flushing
15 in the usual manner. The duct 42 can be connected to the cistern pipe 47 via a saddle 46 holding a control valve of the above described kind to place the control valve between the cistern pipe 47 and the duct 42 to fan 43. The fan 43 is run continuously, drawing air at all levels. The control valve will be biased open to flow of air
20 by its spring (described above). This way duct 42 is opened to the pan space of toilet 38. The set screw (described above) can then be used at each level to balance the system, being opened where pressures and flows are least and closed to decrease flows where pressures are greatest. When a cistern is flushed, water pressure
25 against the back of the flap valve (described above) will close it (when the properties of the spring 14 are appropriate). This way the control valve can perform a dual action of operating as a check valve to prevent entry of cistern flush water into the air ventilation system and as a means by which to balance the system.

30 Clearly the above described control valve can be used in

a variety of ways. It might be applied to a system venting gases from a single toilet, utilising a dedicated fan (possibly switched as is common by the presence of a user as by a pressure switch beneath a toilet seat) operating off a cistern flush pipe or a special duct into the toilet pan space. When needed, the control valve will operate as a check valve or as a flow control mechanism. Alternately, it performs well in multiple toilet combinations or bathroom combinations of ceiling vents and a toilet pan.

The parts to the control valve are ideally formed in plastic and its various attributes, connector ends, set screw housing, valve mounting, anchor points for springs etc, are all within the competence of those in the moulding art. Clearly, geometries of parts can be varied except that the particular set shown are ideal when the control valve is to interact with ducting such as plastic pipe and standard plumbing connections therefor.

CLAIMS:

1. A control valve for use with vents to bathrooms and toilets, said control valve comprising:
- 5 a control valve body with a bore therethrough extended between first and second ends;
- a valve seat formed in said bore between said first and second ends; and
- a valve flap hingedly mounted in said bore to close, in
- 10 use, against said valve seat;
- characterised in that:
- a biasing means is operative to bias said valve flap angularly away from said valve seat; and
- a setting means sets the degree of angular opening of
- 15 said valve flap.
2. A control valve as claimed in claim 1 wherein:
- the setting means is a set screw in a housing on the control valve body extended through the body to the bore, the intrusion of the screw into the bore establishing a stop selectively
- 20 limiting angular movement of said flap valve.
3. A control valve as claimed in claim 2 wherein:
- said flap valve is provided with an engagement surface stood thereof at an angle thereto, to engage, in use, with the end of said set screw.
- 25 4. A control valve as claimed in claim 1 wherein:
- the biasing means is a spring extended between said bore and said flap valve with a spring constant sufficient to hold against the pressure of an air flow but inadequate to prevent closing of said flap valve on impact of water therewith.
- 30 5. A control valve as claimed in claim 1 wherein:





the control valve is mounted to a pipe saddle whereby to fit the control valve via a T-junction connection to a pipe or duct.

6. A building incorporating one or more control valves as claimed in claim 1 wherein:

5 said control valve or valves connect respective ceiling vents or toilet pans to ducting connected to a fan drawing air therethrough.

7. A building as claimed in claim 6 wherein:

10 said fan is continuously operable and set screws to a plurality of said control valves are adjusted to establish a balanced system.



1/3

FIG 1

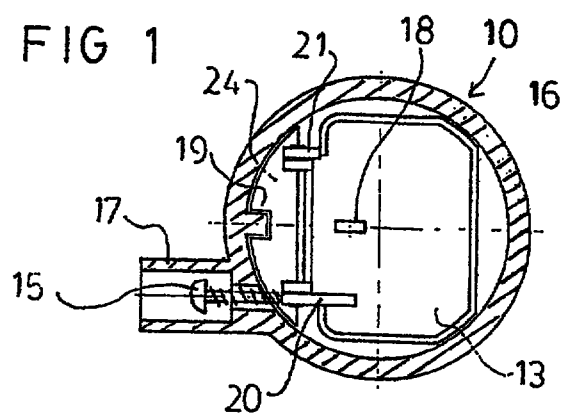
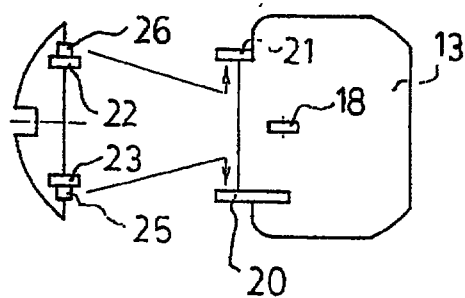
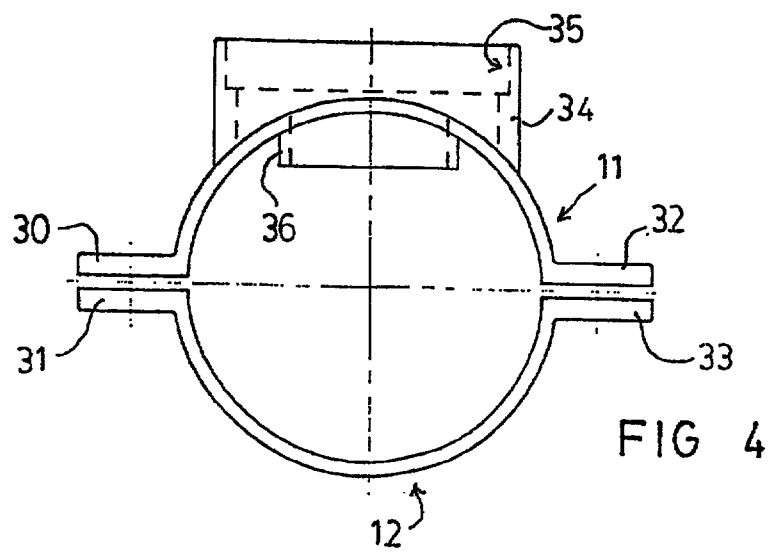
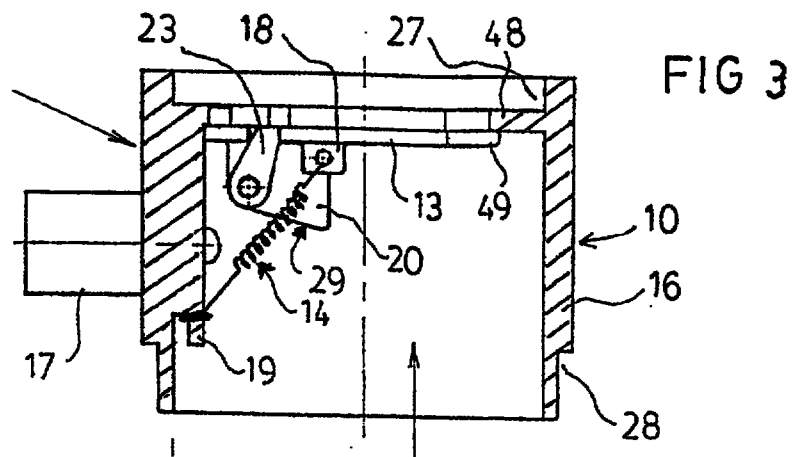


FIG 2

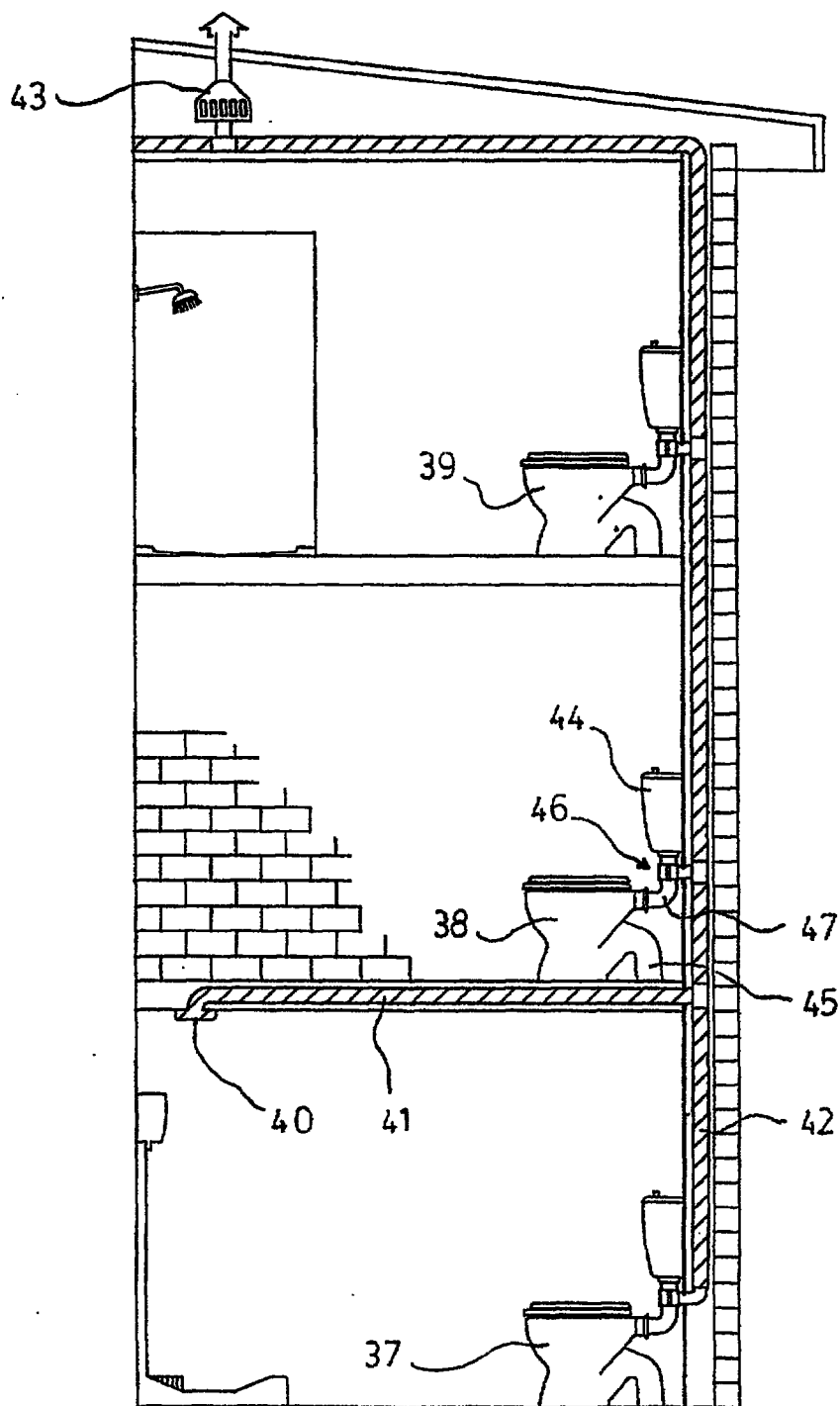


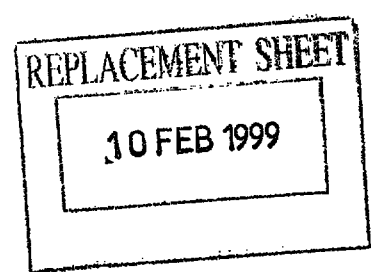
2 / 3



3/3

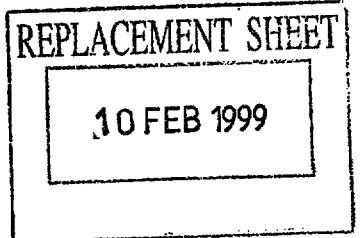
FIG 5





CLAIMS:

1. A vent control valve,
used in piping to bathrooms and toilets to vent said
5 bathrooms and toilets,
comprising:
a control valve body with a bore therethrough extended
between first and second ends adapted to connect into the piping
between toilet and vent therefrom; and
10 a valve flap hingedly mounted in said bore to be rotated
therein between a first position closing off said bore to flow of fluid
therethrough and a second position permitting flow therepast;
said valve flap being operative to permit setting to allow
a predetermined flow of air between said first and second ends.
15
2. A vent control valve as claimed in Claim 1 wherein:
a biasing means is operative to bias said valve flap
angularly away from said first position; and
a setting means sets the degree of angular opening of
20 said valve flap.
3. A vent control valve as claimed in Claim 2 wherein:
the setting means is a set screw in a housing on the
control valve body extended through the body to the bore, the
25 intrusion of the screw into the bore establishing a stop selectively
limiting angular movement of said flap valve.
4. A vent control valve as claimed in Claim 3 wherein:
said flap valve is provided with an engagement surface
30 stood thereof at an angle thereto, to engage, in use, with the end of
said set screw.



5. A vent control valve as claimed in Claim 1 wherein:
the biasing means is a spring extended between said
bore and said flap valve with a spring constant sufficient to hold
against the pressure of an air flow but inadequate to prevent closing
5 of said flap valve on impact of water therewith.
6. A vent control valve as claimed in Claim 1 wherein:
the vent control valve is mounted to a pipe saddle
whereby to fit the control valve via a T-junction connection to a pipe
10 or duct.
7. A building incorporating one or more vent control valves
as claimed in Claim 1 with a settable valve flap wherein:
said vent control valve or valves connect respective
15 ceiling vents or toilet pans to ducting connected to a fan drawing air
therethrough.
8. A building as claimed in claim 6 wherein:
said fan is continuously operable and respective vent
20 control valves are adjusted to set respective flows to establish a
balanced system.

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : F16K 24/04, 1/18, 15/03, E03D 9/04 // E04F 17/02	A1	(11) International Publication Number: WO 97/07354 (43) International Publication Date: 27 February 1997 (27.02.97)
(21) International Application Number: PCT/AU96/00520 (22) International Filing Date: 19 August 1996 (19.08.96) (30) Priority Data: PN 4858 18 August 1995 (18.08.95) AU (71) Applicant (for all designated States except US): TRUSS HOLDINGS PTY. LTD. [AU/AU]; 1/98 Islander Road, Pialba, QLD 4655 (AU). (72) Inventor; and (75) Inventor/Applicant (for US only): TRUSS, James, Walter, George [AU/AU]; 1/98 Islander Road, Pialba, QLD 4655 (AU). (74) Agent: FISHER ADAMS KELLY; Santos House, Level 15, 215 Adelaide Street, G.P.O. Box 1413, Brisbane, QLD 4000 (AU).		(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>

(54) Title: CONTROL VALVE

(57) Abstract

The control valve has a flap valve (13) biased to an open position by a spring (14). The degree of opening is set by a set screw (15) engaged against a surface (29) on the flap valve (13). Adjustment of the set screw (15) enables control of an air flow therepast. The spring (14) is selected to enable the flap to be closed against a flow of water. The control valve can be applied with a saddle (11) to a cistern pipe (47) to draw odours from a toilet pan (38).

