VENTILATION TECHNOLOGY - RESEARCH AND APPLICATION

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FLOWRATE MEASUREMENTS WITH A PRESSURE COMPENSATING DEVICE.

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Introduction

In the past years the need has grown for a sensitive flowrate meter with a very low pressure drop. Such a device can be used to measure flowrates of airflows through the grilles of mechanical ventilation systems with low duct pressures. Another application would be the measurement of flowrates through the different rooms of a dwelling during a blower door test.

A prototype was developed based on the very simple principle of a throttled fan. The prototype proved to be accurate and capable of measuring flows on ducts with natural ventilation. Now the device has been redesigned and is produced by an instrument manufacturer.

Some of the specifications

Flowrate 0 to 0.063 m^3/s (230 m^3 per hour or 130 ft^3 per minute)
Flow error < 5% of the reading or +/- 0.0005 m^3/s (2 m^3 per hour or 1 ft^3 per minute)
Supply and Exhaust
Manual pressure compensation resolution < 1 Pa
Fast response << 1 s
Battery operated

Applications

*Duct in- and outlets
Commissioning, balancing, line diffusors
*Excellent use at low duct pressures
Passive shafts, natural ventilation
*Direct crackflow measurements
*Distribution of flowrates over internal doors
*Fast determination of the distribution of flowrates during blower door or pressurisation tests

Crackflow measurements (Figure 1)

A box is placed over the area in which the cracks are situated. The flowmeter is placed on the opening in the box and will indicate the crackflow. This box does not have to be airtight. Near pressure compensation the unwanted leak flows will be minimal.

Flowrate distribution during pressurisation tests (Figure 2)

Rooms with a low leak flow through the facade can easily be measured by placing a shield of cardboard in the opening of the internal door. The flowmeter is pressed on the opening in the board and will indicate the flow through the facade. Bypass flows through adjacent internal walls will be minimal near pressure compensation. However large internal leak paths will make it impossible to see when compensation is reached.

The flowmeter has a limited range. Large leaks in the facades cannot be measured. In such situations the method of closing the internal door can be used. This method has been developed by P Wouters from Belgium. The pressure will drop in the room with the closed internal door and thus the flow through the facade of that room will decrease. To keep the pressure in the rest of the house constant, one has to reduce the blower door flowrate. This reduction is equal to the reduction of the flowrate through the facade in the room concerned. With the pressure drop in that room the leakage can be calculated. For full determination this has to be done on different pressure levels in the house. Extensions on this procedure can yield results for leakage of internal walls by opening a window during the pressurisation and closing the internal door.

Both methods - the flowmeter and the internal door - are supplementary. If the range of the flowmeter is insufficient the method of the internal door will give a reasonable pressure drop. And if the method of the internal door creates no pressure drop in the room the flow will be small enough for the flowmeter to measure it. However, large bypass leakage paths in the adjacent internal walls can spoil both methods.

Concluding remarks

The Flowmeters have a large applicability in the research field but also in the field of commissioning.
The zero pressure indicator could be somewhat more sensitive in the research field. At high magnetic fields this zero pressure meter will not work as it uses magnets to be forced back in the zero position.
A flexible hood can enlarge the number of grilles the meter will fit on.

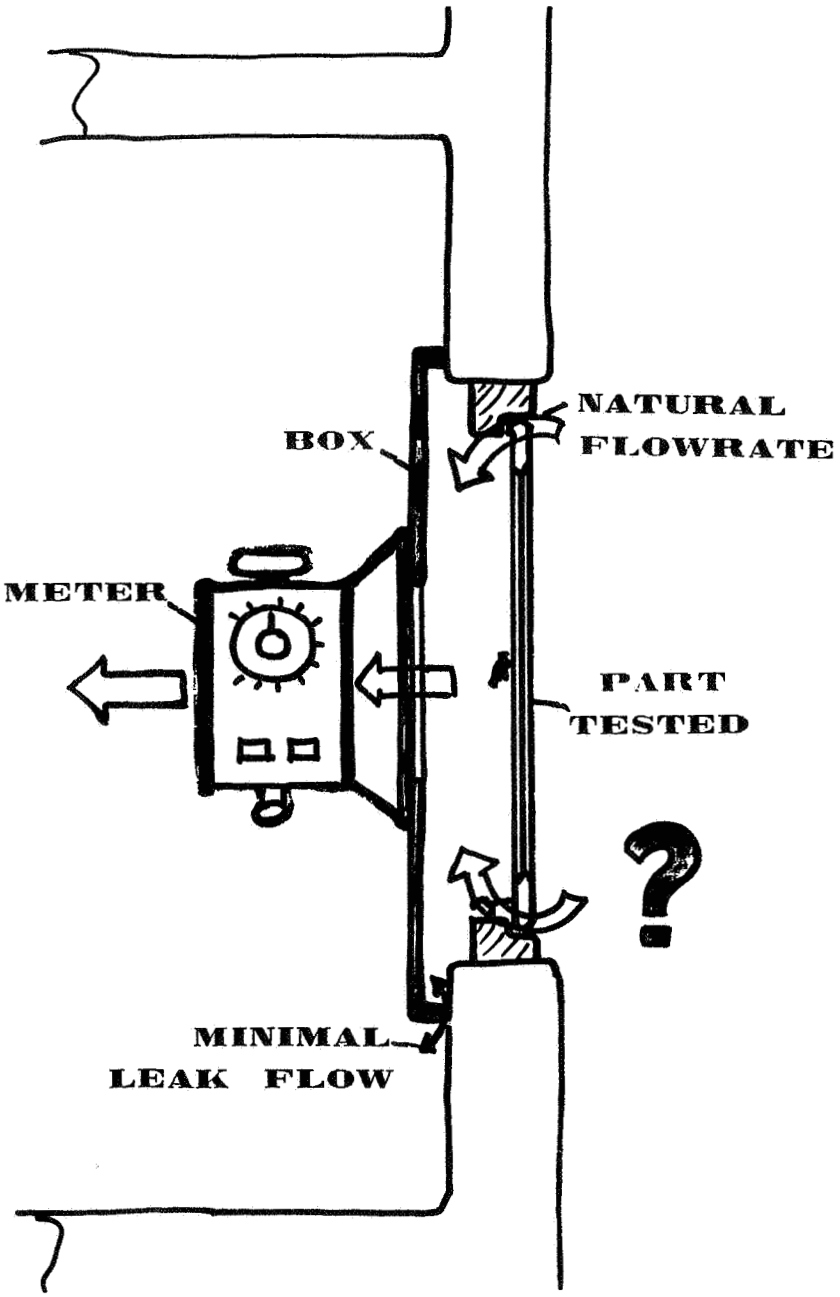

Fig. 1

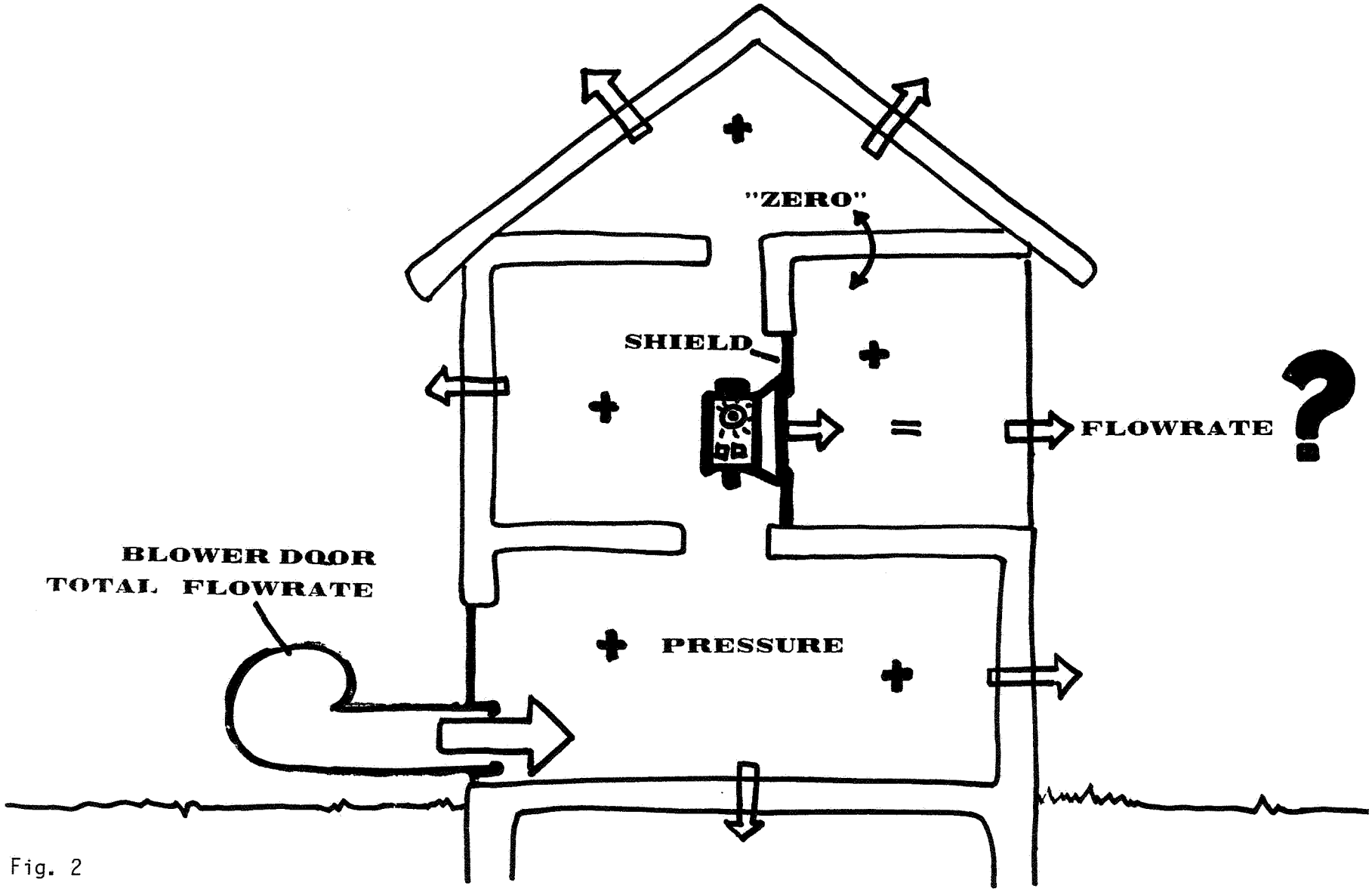

Fig. 2