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**Chen**

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(54) **FLOW CONTROL VALVE**

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138/43; 251/123

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See application file for complete search history.

(56) **References Cited**

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U.S. PATENT DOCUMENTS

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(TW); **Hung-Shan Chen**, Lukang  
Township (TW)

- 1,634,949 A \* 7/1927 Le Valley ..... F16K 15/16  
137/512.15
- 2,777,464 A \* 1/1957 Mosely ..... D06F 9/088  
137/516.13
- 2,851,060 A \* 9/1958 Fleischer ..... F16K 17/34  
138/46
- 2,948,296 A \* 8/1960 Thorburn ..... F16K 17/34  
137/517
- 3,216,451 A \* 11/1965 Smallpeice ..... G05D 7/012  
137/516.25
- 4,344,459 A \* 8/1982 Nelson ..... G05D 7/012  
138/41

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patent is extended or adjusted under 35  
U.S.C. 154(b) by 124 days.

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(51) **Int. Cl.**

(57) **ABSTRACT**

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- F16K 15/14** (2006.01)
- G05D 7/01** (2006.01)
- F16K 17/168** (2006.01)

A flow control valve includes a valve body, a control member and a cover. The valve body has a receiving space, a resting face, a stepped face, a positioning groove and a plurality of water outlet holes. The control member is provided with an elastic portion, a sealing portion and an abutting face. When a flow pressure of the fluid is under a normal condition, the elastic portion of the control member is contracted inward, so that the abutting face of the control member is disposed at an open state. When the flow pressure of the fluid is under an abnormal condition, the elastic portion is expanded outward and abuts the stepped face of the valve body, so that the abutting face of the control member abuts the resting face of the valve body, to seal the water outlet holes of the valve body.

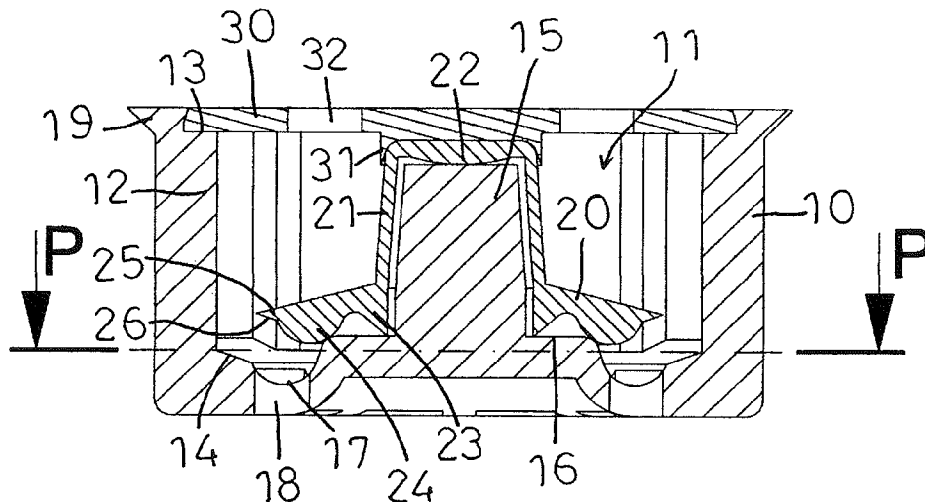
(52) **U.S. Cl.**

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**7/012** (2013.01); **G05D 7/0113** (2013.01);  
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**8 Claims, 7 Drawing Sheets**

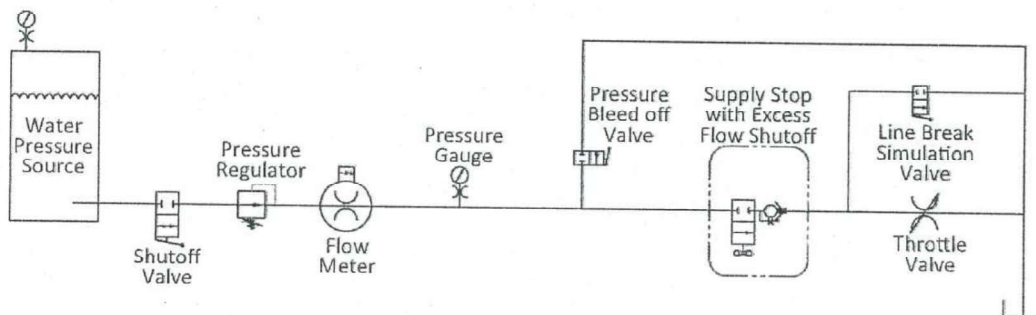


**Table 1**  
**Minimum Flow Requirements, L/min (gpm)**  
 (See Section 4.6)

Application	Minimum Flow
Faucet or Dishwasher	7.6 (2.0)
Ice Maker	3.8 (1.0)
Toilet Fill Valve	7.6 (2.0)
Washing Machine	9.5 (2.5)

**Table 2**  
**Shut-Off Flow Rates, L/min (gpm)**  
 (See Section 5.2.3)

Application	Shut-Off Flow Rate Ranges
Faucet or Dishwasher	9.5–13.2 (2.5–3.5)
Ice Maker	5.7–7.6 (1.5–2.0)
Toilet Fill Valve	9.5–13.2 (2.5–3.5)
Washing Machine	11.4–15.1 (3.0–4.0)



**Figure 1**  
**Set Up for the Shut-Off Flow Rate and Line Break Tests**  
 (See Sections 5.2.1 and 5.3.1)