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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

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[Continued on next page]

(54) Title: PNEUMATICALLY COUPLED DIRECT DRIVE FLUID CONTROL SYSTEM AND PROCESS

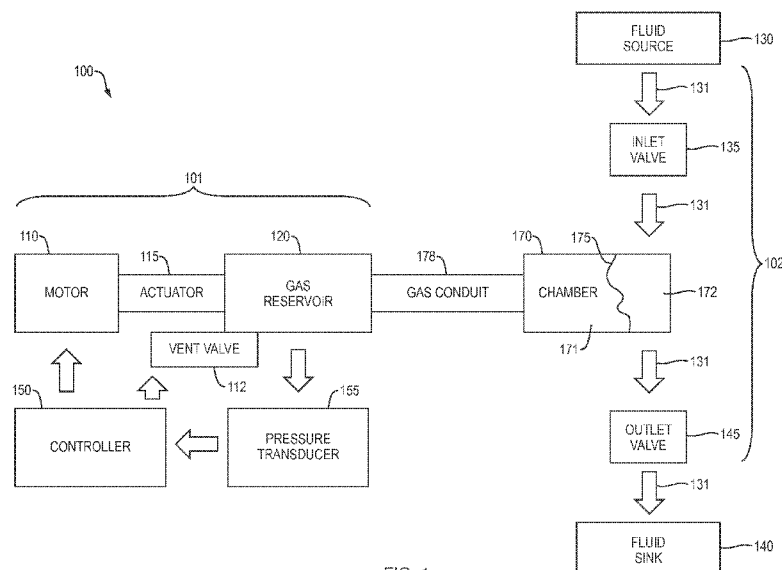


FIG. 1

(57) Abstract: A fluid control system for delivery of a liquid includes a pneumatic drive that incorporates a linear actuator to effect known volume changes in a gas reservoir. The gas reservoir is in fluid communication with a gas-side reservoir that is separated from a fluid-side reservoir by a flexible membrane. Movement of the linear actuator effects positive or negative volume differences on the gas in the gas-side reservoir, resulting in a decrease or increase in pressure of the gas that is transmitted to the fluid-side reservoir to draw fluid, primarily liquid, in from a source or deliver liquid out to a sink. In another aspect, a mechanism is provided for the detection and elimination of air bubbles in the fluid path.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 14/39207

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61M 5/142 (2014.01)

CPC - A61M 5/14208

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A61M 5/142 (2014.01)

CPC: A61M 5/14208 (USPC: 604/141)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC: F04B 43/02, F04B 43/067

CPC: A61M 5/142, A61M 5/14224, F04B 43/02, F04B 43/067; USPC: 604/146, 604/147, 604/153 (search term limited, see below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase (All), Google (Web, Patents, Scholar)

Search terms: membran*, diaphragm*, pump, infusion, bellows, actuator, pressur*, sensor*, transducer*, detect*, pneumatic, ideal gas, boyle* law

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US 2005/0069425 A1 (GRAY et al) 31 March 2005 (31.03.2005), entire document, especially Fig 1, 3a and 3b, para [0010], [0035], [0092], [0094]-[0097], [0106], [0108]-[0111], [0119]-[0121], [0138], [0146], [0150] and [0206]-[0207]	1, 2, 4, 5, 8, 10 and 13-24 ----- 6, 7, 11, 12 and 25-30
X	US 2007/0253463 A1 (PERRY et al) 01 November 2007 (01.11.2007), entire document, especially Fig 3-4, 7, 8, 12, 48 and 81, para [0154]-[0155], [0230], [0274], [0307], [0309], [0332]-[0335] and [0338]-[0340]	1, 6, 9-10 and 17-21
X	US 2009/0035152 A1 (BUTTERFIELD) 05 February 2009 (05.02.2009), entire document, especially Fig 5-6, para [0011], [0043], [0052], [0053], [0057], [0059], [0084], [0092], [0094], [0095] and [0097]	1, 2, 3 and 5
Y	US 5,669,764 A (BEHRINGER et al) 23 September 1997 (23.09.1997), entire document, especially Fig 1, col 4, 14 to col 5, ln 17	6, 7, 11, 12 and 25-30
A	US 2012/0302945 A1 (HEDMANN et al) 29 November 2012 (29.11.2012), entire document	1-30
A	US 2005/0184087 A1 (ZAGARS et al) 25 August 2005 (25.08.2005), entire document	1-30
A	US 6,109,881 A (SNODGRASS et al) 29 August 2000 (29.08.2000), entire document	1-30

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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