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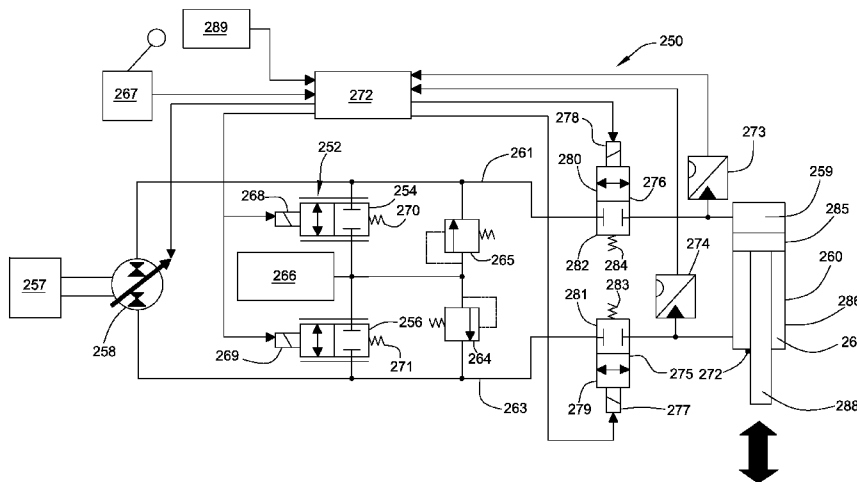
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(54) Title: LOAD HOLDING FOR METERLESS CONTROL OF ACTUATORS

FIG. 7



(57) Abstract: First and second mechanical hydraulic valves (342, 340) are disposed between a pump (180) and the cap side chamber (170) of an actuator (132) and the pump (180) and the rod chamber (168) of the pump (180). The first and second valves (340, 342) are actuated as a result of respective pressure differentials applied across the valves (340, 342). A controller (320) controls flow from a pump (180) in response to a commanded motion to control movement of the actuator (132), and cause the valves (340, 342) to open. The valves (340, 342) are disposed in their no-flow positions when the pump (180) is not operative, and when the hydraulic system (104) of off or locked out to hold a load.

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A. CLASSIFICATION OF SUBJECT MATTER*F15B 13/02(2006.01)i, E02F 9/22(2006.01)i, F15B 21/08(2006.01)i*

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)

F15B 13/02; F15B 11/02; F15B 13/00; F15B 1/02; G05D 1/02; F15B 11/00; E02F 9/22

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: hydraulic system, actuator, load holding valve

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	WO 2010-054155 A2 (PURDUE RESEARCH FOUNDATION et al.) 14 May 2010 See abstract; paragraph [16]; claims 1, 9 and figures 1, 2	1,2,9 3-8,10
Y A	US 2009-0165450 A1 (CHERNEY, MARK J. et al.) 02 July 2009 See paragraphs [17], [23] and figures 1, 2, 6	1,2,9 3-8,10
A	US 7478489 B2 (ANDERSON, ERIC R et al.) 20 January 2009 See column 3, lines 36-57 and figures 1-3	1-10
A	US 6431050 B1 (HAUSMAN, DENNIS J. et al.) 13 August 2002 See abstract; column 3, lines 23-45 and figure 1	1-10

 Further documents are listed in the continuation of Box C. See patent family annex.

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