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- (81) **Designated States** (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
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BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR,

KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
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DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
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Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

Published:

— with international search report (Art. 21(3))

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(54) Title: SERVOMECHANISM WITH CONTROLLABLE FORCE OF ACTION

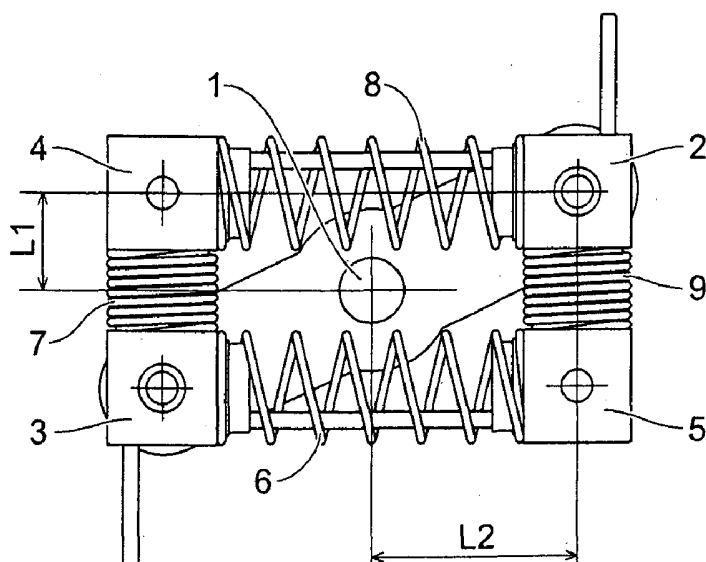


Fig. 1

(57) **Abstract:** The invention is related to servomechanisms with internal feedback to control torque. The invention allows expansion of the range of controlled force values. The invention is realized in several ways: by combining different measuring methods of acting forces, combining resilient members with different deformation coefficients in the coupling, using different types of motors in combination. Optionally a force sensor with non-linear dependency is used. Additionally it is possible to change the mode of operation by changing the feedback signal coefficient of the acting force. Areas of application: remote-controlled light machines, robots, manipulators, radio-controlled models, steering parts for cameras, interfaces to interact with living organisms. When invention is used to rotate camera, high rotation speed and high precision of position is maintained.

WO 2015/119489 A3

INTERNATIONAL SEARCH REPORT

International application No PCT/LT2014/000016

A. CLASSIFICATION OF SUBJECT MATTER INV. G05D17/00 F16D3/00 ADD.		
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) G05D F16D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/074635 A1 (THORSON IVAR [US]) 28 March 2013 (2013-03-28)	1
Y	paragraphs [0002], [0003], [0011], [0014], [0038] claim 1	2

X	WO 2012/038931 A1 (FOND ISTITUTO ITALIANO DI TECNOLOGIA [IT]; PANE GIANLUCA [IT]; TSAGARA) 29 March 2012 (2012-03-29)	1
Y	page 1, lines 13-19 claim 1	2

Y	US 4 224 807 A (CHIVARI ILIE) 30 September 1980 (1980-09-30) column 6, lines 52-61	2

<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance	"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	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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	
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	
"P" document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search	Date of mailing of the international search report	
9 June 2015	02/09/2015	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Westholm, Mats	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/LT2014/000016

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1, 2

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/LT2014/000016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013074635	A1	28-03-2013	NONE
WO 2012038931	A1	29-03-2012	EP 2619469 A1 31-07-2013
			US 2013178297 A1 11-07-2013
			WO 2012038931 A1 29-03-2012
US 4224807	A	30-09-1980	DE 2703481 A1 03-08-1978
			JP S5395455 A 21-08-1978
			JP S5525293 B2 04-07-1980
			SU 704474 A3 15-12-1979
			US 4224807 A 30-09-1980
			US 4307585 A 29-12-1981

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2

a moment arm changing lever.

2. claims: 1, 3

pairs of mutually repulsive magnets.

3. claims: 1, 4

resilient members having different deformation coefficients being mounted in series.

4. claims: 1, 5

a non-linear force sensor.

5. claims: 1, 6

a linear electric motor.

6. claims: 1, 7

force measuring by means of a force sensor during small loads, and by means of a current consumption of a motor during higher loads.

7. claims: 1, 8

linearization by means of a digital controller.

8. claims: 1, 9

control of the increase rate of the acting force by means of a computer program.

9. claims: 1, 10

an additional control signal that influences the feedback signal transmitted between the force sensor and the electric motor controller.

10. claims: 1, 11

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

a motor temperature sensor that reduces the feedback signal
as the motor temperature increases.
