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(72) Inventor: **Vidal Ramo, Enrique Angel**
46970 Alaquas-Valencia (ES)

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(74) Representative: **Urizar Anasagasti, Jesus Maria**
Po de la Castellana, 72 - 1o
28046 Madrid (ES)

(71) Applicant: **Vidal Ramo, Enrique Angel**
46970 Alaquas-Valencia (ES)

(54) **SYSTEM FOR CONTROLLING A MECHANICAL ARM**

(57) The invention relates to a control system for a mechanical arm formed by an arm (1) articulated with only one degree of freedom. The assembly is completed with two cylinders (2 and 3) integrally joined to one another, together with a hydraulic accumulator (4) joined to

the pressurized hydraulic cylinder (2) such that it can accumulate the energy dissipated by the pressurized hydraulic cylinder (2), upon compressing the oil and leading it to the accumulator, increasing the pressure and therefore accumulating energy.

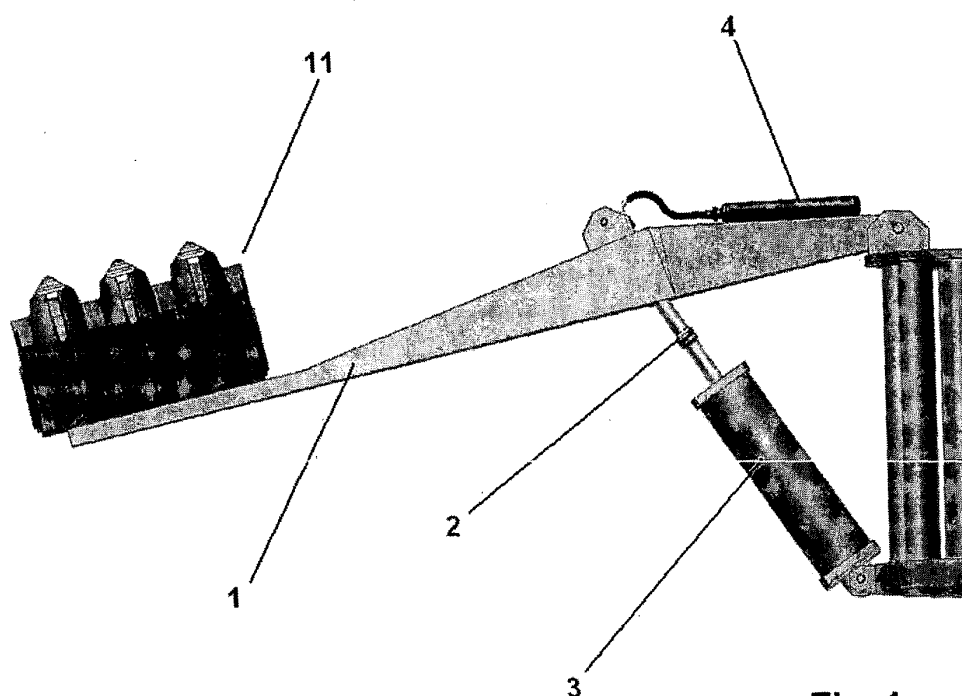


Fig. 1

Description

OBJECT OF THE INVENTION

[0001] The object of the present invention patent is to provide a new control system for an articulated mechanical arm, of the type moved by a pneumatic-hydraulic system. A considerable energy saving is achieved by means of this control system, and the arm is kept within very restrictive safety parameters since the downward movement is cushioned.

[0002] The main field of application of this invention is the control of mechanical arms moved by pneumatic-hydraulic elements such as, for example, the arms of amusement rides.

BACKGROUND OF THE INVENTION

[0003] Until now, control of the movements of mechanical arms was reduced to the control of the pneumatic and hydraulic elements of the arm itself, trying to keep the operating parameters adequate according to the regulations. Nevertheless, in certain cases control elements for the mechanical arm have even broken, causing serious operating problems, and in the case of mechanical arms in amusement rides, injuring the users of said ride.

[0004] In addition, these control systems waste a large amount of energy since they are unable to utilize the energy dissipated in the downward movement of the arm, to utilize this energy in the upward movement.

DESCRIPTION OF THE INVENTION

[0005] The control system for a mechanical arm, object of the present invention patent, is essentially formed by an arm itself, provided with only one degree of freedom.

[0006] The movement of the arm is facilitated by two cylinders, a pneumatic cylinder and another pressurized hydraulic cylinder joined to one another, such that in the vertical downward movement of the arm due to gravity, the pneumatic cylinder reaches its maximum compression point when closing the air exhaust, the hydraulic cylinder starting to operate, upon compressing the oil increasing the pressure and sending it to the accumulator pushed by the mechanical arm in its falling movement. This assembly provides better stability and safety to the assembly in the event of malfunction of any of the components.

[0007] While the pressurized hydraulic cylinder operates in the downward movement, it furnishes this surplus energy to a hydraulic accumulator located on the mechanical arm. When the arm reaches its minimal position (point of zero velocity in the arm), the accumulator will return its retained energy utilizing the inertia of the arm itself and deploying the pressurized hydraulic cylinder first to subsequently deploy the pneumatic cylinder.

[0008] By means of this system a considerable energy saving is achieved since the downward movement is uti-

lized to accumulate energy which will subsequently be utilized in the upward movement. Likewise, in the event of breaking or accidents, the structure formed by the two cylinders provides the system a much greater level of safety than current systems since the hydraulic system would cushion the downward impact. Finally, by utilizing the inertia of the assembly a response rate is obtained that is much greater than that of systems currently in use.

DESCRIPTION OF THE DRAWINGS

[0009] To complement the description being made and for the purpose of aiding to better understand the features of the invention, one figure is attached to this specification as an integral part thereof, in which the following is shown with an illustrative and non-limiting character:

Figure 1 shows a view of the control system of a mechanical arm object of this invention patent.

PREFERRED EMBODIMENT OF THE INVENTION

[0010] As can be seen in the attached figure, the control system of a mechanical arm object of this invention patent is formed by an arm (1) articulated with only one degree of freedom, in the preferred embodiment of which as a mechanical arm for amusement rides it has been provided with a car (11). The assembly is completed with two cylinders (2 and 3) integrally joined to one another, together with a hydraulic accumulator (4) joined to the pressurized hydraulic cylinder (2) such that it can accumulate the energy dissipated by the pressurized hydraulic cylinder (2).

[0011] In the downward movement of the arm (1), the pneumatic cylinder (3) reaches its maximum compression point, the pressurized hydraulic cylinder (2) starting to operate, which cylinder transfers the dissipated energy to the accumulator (4) which stores said energy until the arm (1) reaches the point of zero velocity. At this point, the accumulator (4) returns the accumulated energy to the pressurized hydraulic cylinder (2) thanks to the inertia of the arm itself, the assembly formed by the cylinders (2 and 3) extending.

[0012] Having sufficiently described the nature of the present invention, as well as a way of implementing it, it can only be added that said invention can be subjected to certain variations in shape and materials, provided that said alterations do not substantially change the features claimed below.

Claims

1. A control system for a mechanical arm **characterized in that** it is formed by an arm (1) articulated with only one degree of freedom; the assembly is completed with two cylinders (2 and 3) integrally joined to one another, together with a hydraulic ac-

cumulator (4) joined to the pressurized hydraulic cylinder (2) such that it can accumulate the energy dissipated by the pressurized hydraulic cylinder (2), pushed by the mechanical arm upon gravitational fall, upon compressing the oil increasing the pressure and sending it to the accumulator for the subsequent use of this energy. 5

2. A control system for a mechanical arm according to claim one, **characterized in that** in the downward movement of the arm (1), the pneumatic cylinder (3) reaches its maximum compression point, the pressurized hydraulic system (2) starting to operate, which cylinder transfers the dissipated energy to the accumulator (4) which stores such energy until the arm (1) reaches the point of zero velocity; at this point, the accumulator (4) returns the accumulated energy to the pressurized hydraulic cylinder (2) thanks to the inertia of the arm itself, the assembly formed by the cylinders (2 and 3) extending. 10 15 20

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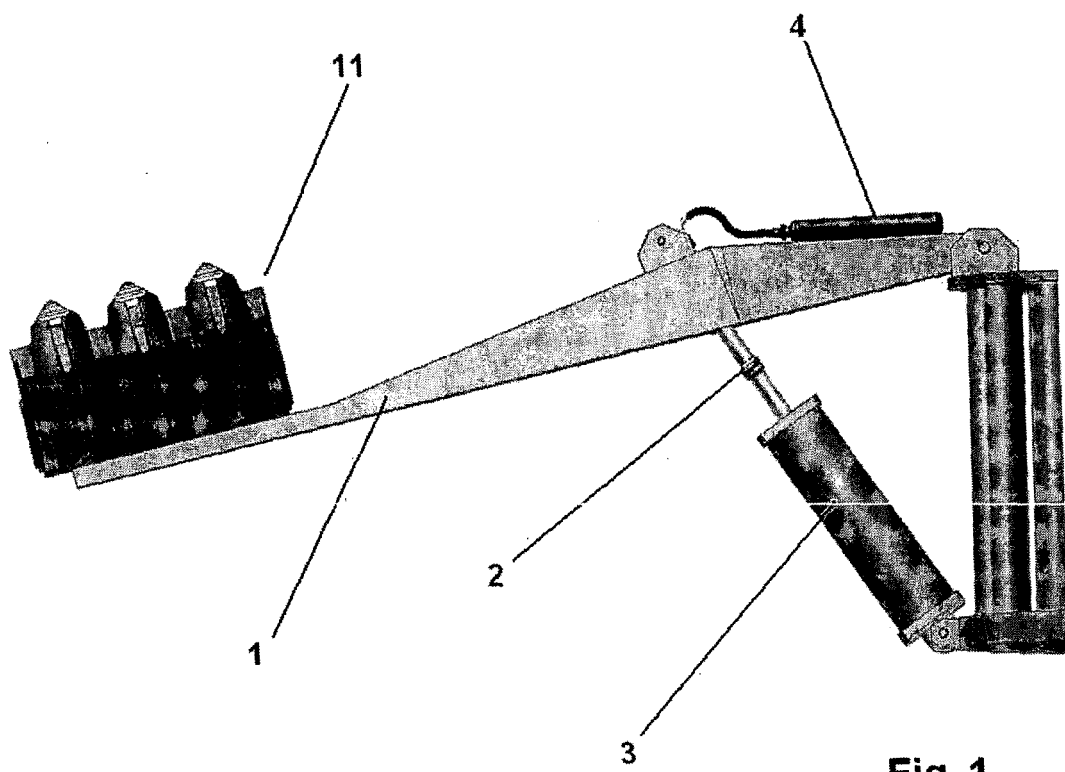


Fig. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2005/070184

A. CLASSIFICATION OF SUBJECT MATTER see on additional page		
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+, A63G+, B25J+		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched <u>CIBEPAT,EPODOC,WPI,PAJ</u>		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 2550192 A1 (HUSS & CO HEINR W) 18.05.1977, abstract WPI; figures 1 and 3	1-2
X	WO 0166958 A1 (KONTEC GMBH ; LOECHT HEINRICH VAN DE ; JAESCHKE HOLGER) 13.09.2001, abstract ; figures	1
A	US 3904194 A (SCHWARZKOPF ANTON FA) 09.09.1975, the whole document	1-2
A	US 2983509 A (MATHIAS HAUG) 09.05.1961, the whole document	1-2
☐ Further documents are listed in the continuation of Box C. ☒ 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 "E" earlier document but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "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 "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		
Date of the actual completion of the international search		Date of mailing of the international search report 23 February 2006 (23.02.2006)
Name and mailing address of the ISA/		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/ ES 2005/070184

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE2550192AB A B C	18.05.1977	none	-----
-----	-----	-----	-----
WO 0166958 A	13.09.2001	DE 10011002 A	27.09.2001
		EP 1261808 A	04.12.2002
		EP 20010915078	06.03.2001
		AT 265623 T	15.05.2004
		DE 50102134 D	03.06.2004
-----	-----	-----	-----
US 3904194 A	09.09.1975	DE 2350821 A	17.04.1975
		JP 50065340 A	03.06.1975
-----	-----	-----	-----
US 2983509 A	09.05.1961	DE 1053987 B	26.03.1959
		GB 831338 A	30.03.1960
-----	-----	-----	-----

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IPC

F15B 1/02 (2006.01)

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