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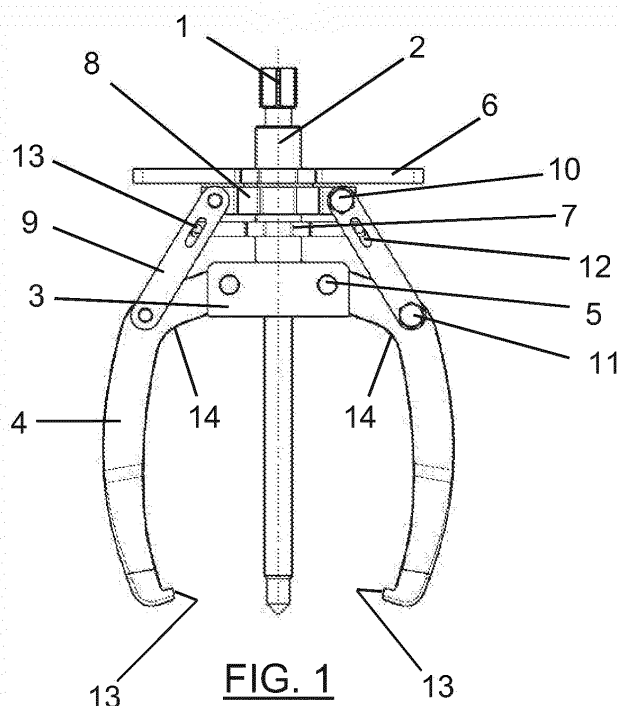
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(54) **SELF-CENTERING PART EXTRACTOR**

(57) The invention relates to a self-centering part extractor comprising a first spindle (1) and a second spindle (2), said spindles being coaxial to, and independent of one another. A body (3) is screwed to the first spindle (1). The body (3) is secured to the second spindle (2) which supports: a handle (6) that is screwed to the spindle, a lower ring (7) independent of the second spindle

(2), and an annular support (8) which is also independent of the second spindle (2) and is secured to the upper handle (6) such that it can rotate freely relative to same. Connecting rods (9) are hinged between the annular support (8) and the legs (4), which rods are connected to the intermediate ring (7) by means of pins (13) and grooves (12).



Description

Technical field of the Invention

[0001] The present disclosure relates to a self-centering part extractor, more particularly, a mechanical extractor designed to facilitate the extraction of parts, such as bearings, bushings, etc., which are common parts in a very large set of industrial machines and equipment.

[0002] The extractor of the invention is of the type that consists of an off-center spindle onto which a body is screwed, which itself has a set of articulated arms that hang around the spindle.

Background of the invention

[0003] Currently there exist mechanical extractors consisting of separable or interchangeable arms, for example to extract parts of various sizes, which are fixed in a sliding fork. This fork is part of a transverse frame in which a spindle is located. By centering the spindle and rotating it, the parts can be removed. This type of extractor is very basic and new extractors have since been developed, such as those described in the following documents:

ES 2042353. This patent describes a mechanical extractor comprising a body into which an off-center spindle is screwed and which carries a set of arms which hang around the spindle. The central body has radial arms to which the arms are connected, through a support. Although this extractor has a good coupling between the arms and the central body and it is very robust, it has the inconveniences of not being able to be used to extract pieces by grasping the interior and the centering of the device to the part to be extracted is not reliable.

ES 2113250. This patent is for an extractor in which each arm has an associated radial connecting rod which links the movement of each arm with respect to eccentric points on a collar which is mounted such that it can rotate and move axially relative to the off-center spindle. With this extractor it is possible to align the axis of the spindle with the axis of the part to be extracted. Each piece is joined to a radial arm such that it can move by means of articulated flanges and each arm can move independently. A collar mounted on the actuating spindle provides a coaxial guide to each arm. However, this extractor' extraction process is not simple and effective.

Disclosure of the invention

[0004] The invention is a part extractor of the previously described type, which, because it is self-centering, achieves the movement of all the arms in unison by means of a mechanism that is regulated from the top of

the extractor, thus providing a simpler and more effective use in the extraction of parts.

[0005] The extractor of the invention comprises a first spindle, through which the centering to the part to be extracted is achieved, onto which is screwed a body to which the arms are articulated, being two or more, which hang from the body, spaced around the spindle. On this first spindle, in its upper part and coaxial with it, there is a second regulating spindle, which is fixed at its lower end to the aforementioned body. The first and second spindles are independent and the second spindle is externally threaded.

[0006] On the second spindle are mounted: an upper handle that is screwed onto this second spindle; a lower ring, which rotates freely and moves along the second spindle; and an intermediate annular support, also independent of the second spindle, on which it can rotate and move freely, and which is fixed to the upper handle which can turn freely but cannot move axially along it.

[0007] To the intermediate annular support are articulated, at one end, a series of radial connecting rods, equal in number and position to the arms, which hang towards those arms, to which they are articulated at their free end. The articulation axes of the connecting rods to the intermediate annular support and to the arms are parallel and perpendicular to the axis of the spindles. Each connecting rod has an intermediate longitudinal slot through which passes a pin that is fixed to the lower ring.

Brief description of the drawings

[0008] Next, a series of drawings will be briefly described which will help to better understand the invention and which are expressly related to one embodiment of it, which is presented as a non-exclusive example of it.

- Figure 1 shows an elevation view of an extractor constructed according to the invention.
- Figure 2 shows the same extractor in cross-section, according to the cut line II-II of Figure 1.
- Figure 3 shows one variation of it, corresponding to a three arm extractor.
- Figure 4 shows the extractor of Figure 1, in the fully open position of the arms.
- Figure 5 shows the extractor of Figure 1 with the arms partly open.
- Figure 6 shows the extractor of Figure 1 with the arms fully closed.

Detailed description of an embodiment of the invention

[0009] The features, operation and advantages of the extractor of the invention will be better understood from the following description of the example embodiment shown in the drawings.

[0010] Figures 1 and 2 show a two-arm extractor, constituted in accordance with the invention, which compris-

es a first spindle (1), around which a second, tubular, independent spindle (2) is disposed coaxially, which is externally threaded. The second spindle (2) is shorter than the first spindle (1) and is arranged around the top of the first spindle (1).

[0011] A body (3) is screwed onto the first spindle (1) to which are articulated a series of angularly equidistant arms (4), two in the example shown in the drawings, located opposite each other, hanging around the first spindle (1). Each arm (4) is hinged to the body (3) along an axis (5) perpendicular to the spindle (1).

[0012] The second spindle (2) is fixed at its lower end to the body (3), and cannot rotate or move axially relative to it.

[0013] To the second spindle (2) are fixed:

- An upper handle (6) which is screwed onto said second spindle.
- A lower ring (7), which is independent of the second spindle, such that it can freely rotate and move over it.
- An intermediate annular support (8) which is also independent of the second spindle (2), such that it can freely rotate and move over it, but is linked to the upper handle (6) with the freedom to rotate but with no axial mobility relative to it, so that when rotated in one direction or the other, the handle (6) will move the annular support (8) along its axis.

[0014] The extractor further comprises a series of radial connecting rods (9), equal in number and position to the arms (4), which are hinged at their upper end to the annular support (8) and at the lower end to the facing arm (4), through axes (10 and 11) parallel and perpendicular to the spindles.

[0015] Each connecting rod (9) has an intermediate longitudinal slot (12), through which a pin (13), fixed to the lower ring, passes, which can move along that slot (12).

[0016] In Figures 1 and 2 the extractor includes two arms (4), located diametrically opposite each other. Figure 3 shows an extractor with three pairs of arms (4), located 120° apart, using the same reference numbers to designate equivalent elements or components.

[0017] With the composition described, the upper handle (6) rotates in one direction or another, causing the axial displacement of the intermediate annular support (8) (freely rotating relative to the upper handle (6)) which pulls the connecting rods (9) in the same direction which, in turn, pull or push on the arms (4), at the same time as the pins (13) and the intermediate ring (7) move, also in the same direction, securely controlling the movement of the connecting rods (9) to ensure the opening or closing of the arm assembly.

[0018] The operation of the extractor is described with reference to Figures 4 to 6. In Figure 4, with the handle (6) at the top of the second spindle (2), the arms (4) are in the fully open position. Turning the handle (6) clock-

wise, for example manually, it moves downwards along the first spindle (1), pushing the connecting rods (9) in the same direction, causing the arms (4) to pivot about the axis of their hinges (5). During this movement the connecting rods (9) move and partially pivot around their axes (10), which movements are controlled by means of the slots (12) and pins (13), as the longitudinal edges of those slots press on the pins, pushing them downwards and also moving the lower ring downwards.

[0019] By moving all the connecting rods (6) simultaneously, with linear movement and pivoting around the axes (10 and 11), all the arms progressively close, Figure 5, until they are fully closed, Figure 6.

When the lower ring (7) reaches its lowest position, Figure 6, it touches the body (3) and the upper handle (6) can no longer turn in the same direction.

[0020] To open the arms (4), reverse the process described by turning the upper handle (6) counterclockwise. The motive power for the extractor of the invention could be provided automatically, for example by hydraulic systems.

[0021] The movement of the arms (4) driven by the upper handle (6) is transmitted through the connecting rods (9) and is controlled by the action of the pins (13) on the edges of the slots (12). The arrangement of the connecting rods (9) is applicable however many arms (4) the extractor may have.

[0022] The use of two spindles in the extractor of the invention, with the positioning of the second spindle (2) relative to the first, allows both spindles to be easily accessible, which facilitates the possibility of connecting the extractor to hydraulic drive systems.

[0023] The body (3) can be formed from two separate semi-circular parts, joined together, with the arms (4) between them for the case of a two-arm extractor, Figure 1, or by three equally shaped parts, for the case of three arms, Figure 3.

[0024] The arms (4) have a longitudinal elbow (14), close to the point of articulation (5) with the body (3), which point is also where the articulation axis (11) is for the arms (4) and the connecting rods (9).

Claims

1. Self-centering part extractor, comprising a first spindle (1) onto which a body (3) is screwed on which a series of arms (4) are hinged around the first spindle (1), **characterized by** having a second, externally threaded, tubular spindle (2) coaxial with, and independent of, the first spindle, which is fixed at its lower end to the body (3) and having fitted, above that body, an upper handle (6), screwed onto the second spindle (2), a lower ring (7) that rotates freely around, and slides over, the second spindle (2), and an intermediate annular support (8) which is fixed to the upper handle (6), with can freely rotate around it, which is independent of the second spindle (2) and

is free to rotate and move over it, whose annular support (8) is articulated to a series of radial connecting rods (9), equal in number and position to the arms(4), each of whose connecting rod is hinged at its free end to the facing arm (4) and which has an intermediate longitudinal slot (12) through which passes a pin (13) fixed to the lower ring (7). 5

2. Extractor according to claim 1, **characterized in that** the arms (4) have, near the point of articulation (5) with the body (3), an elbow (14) in the same place as the articulation axis (11) of the arm and the connecting rod (9). 10
3. Extractor according to claim 1, **characterized in that** each arm (4) is connected to the annular support (8) through a single connecting rod (9). 15
4. Extractor according to claim 1, **characterized in that** each arm (4) is linked to the annular support (8) through two close and parallel connecting rods, articulated around points on the arms (4) and on the annular support (8) and provided with facing longitudinal slots through which pass two pins (13) fixed to the lower ring (7). 20 25

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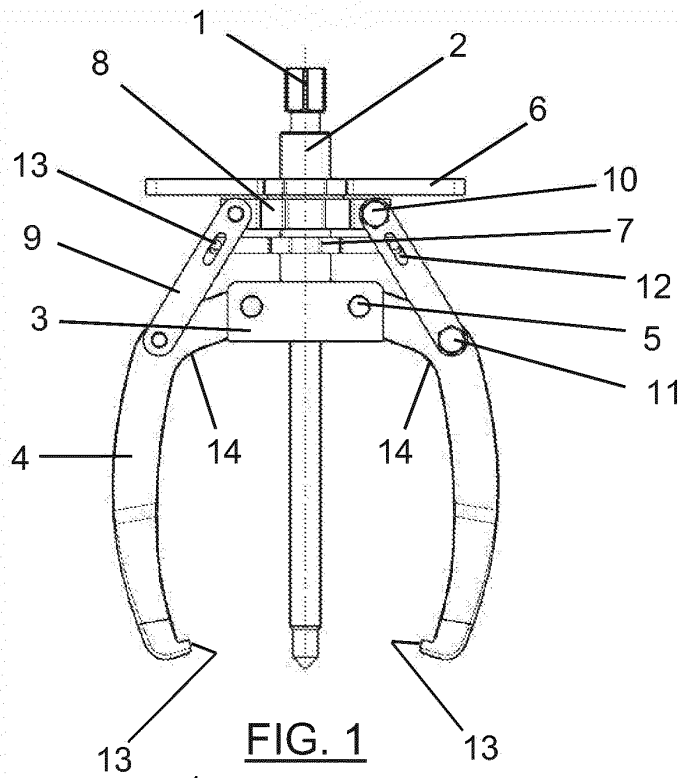


FIG. 1

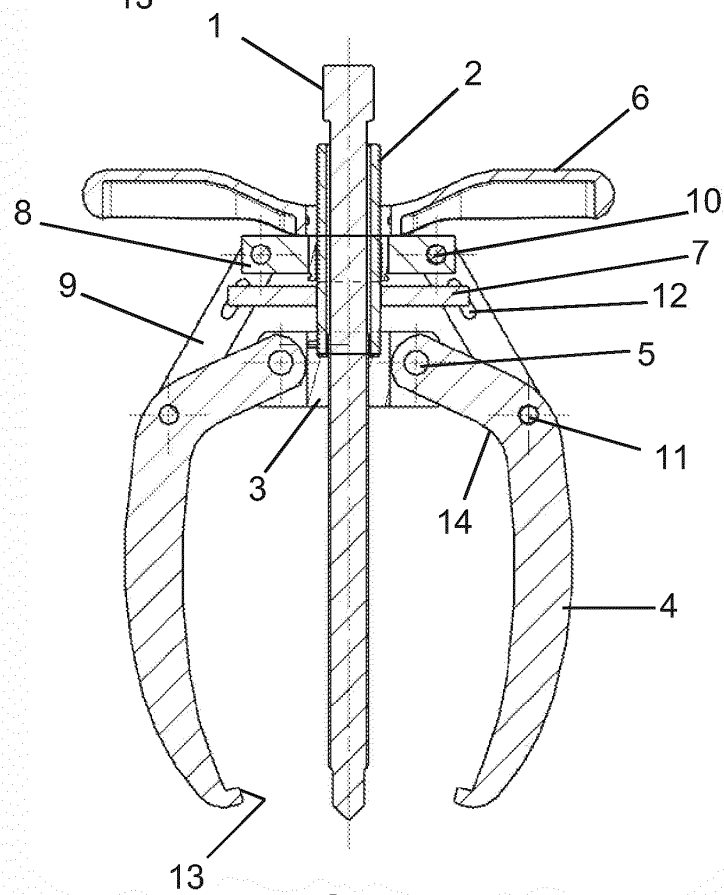


FIG. 2

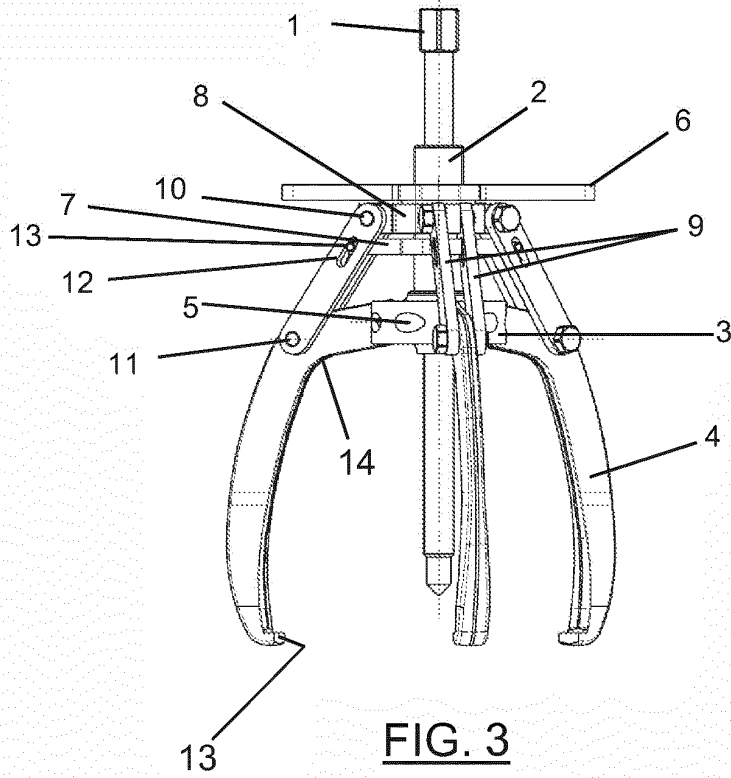


FIG. 3

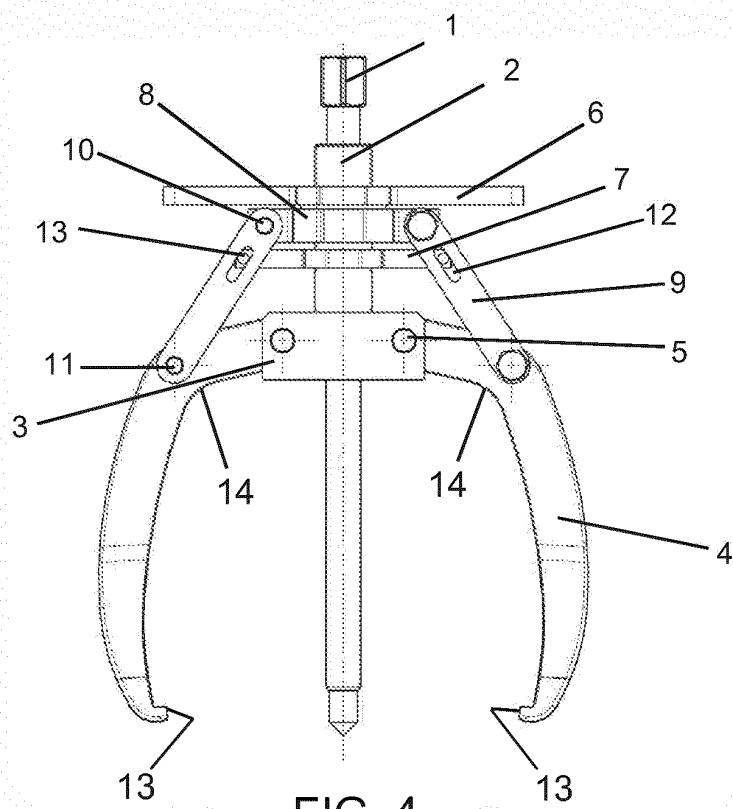


FIG. 4

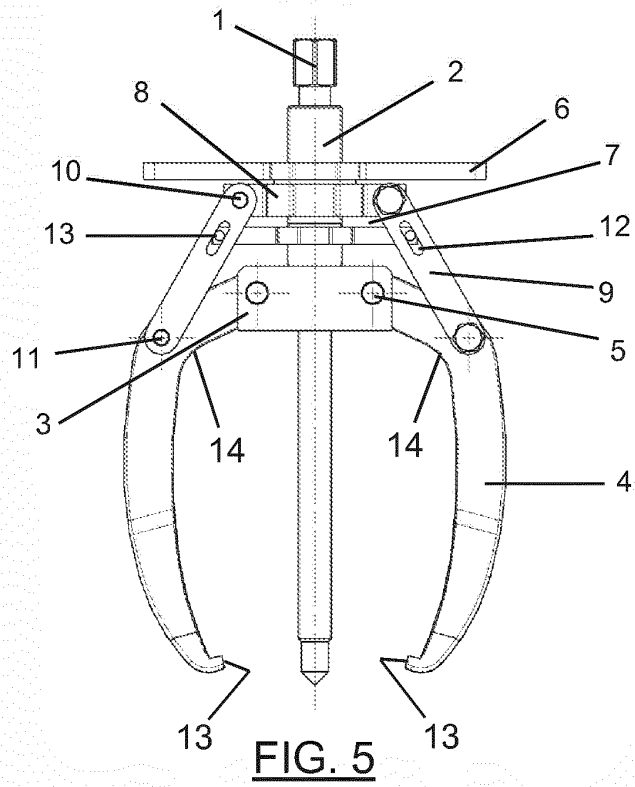


FIG. 5

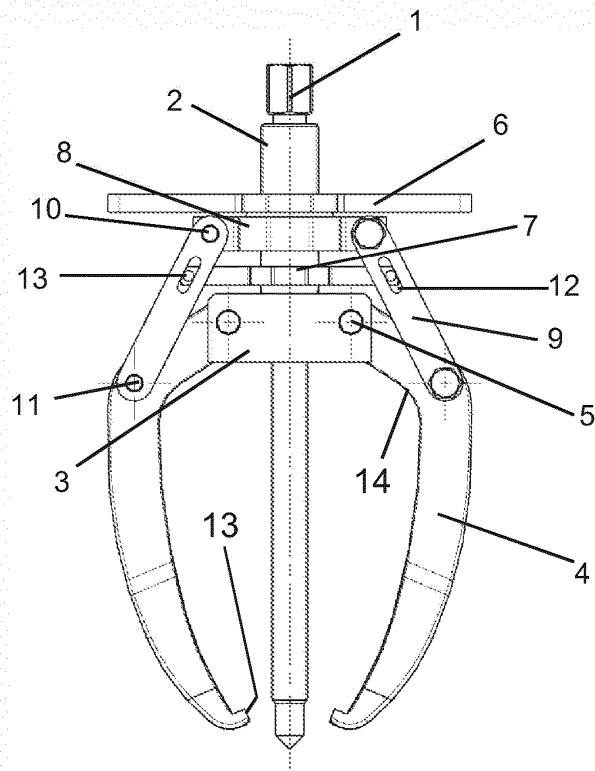


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2016/070182

5	A. CLASSIFICATION OF SUBJECT MATTER	
	<i>B25B27/02</i> (2006.01)	
	According to International Patent Classification (IPC) or to both national classification and IPC	
10	B. FIELDS SEARCHED	
	Minimum documentation searched (classification system followed by classification symbols) B25B	
	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched	
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC	
	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages
		Relevant to claim No.
	A	US 1682956 A (DAWSON VERNON B ET AL.) 04/09/1928, page 1, line 68 - page 2, line 48; figures 1 - 4.
25	A	US 1470310 A (WINCHELL ERNEST E) 09/10/1923, the whole document.
	A	US 5174005 A (SOMERVILLE DEAN S) 29/12/1992, the whole document.
30	A	US 4068365 A (BRANDT PAUL W ET AL.) 17/01/1978, the whole document.
35		
40	☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.	
45	* 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 documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
50	Date of the actual completion of the international search 01/08/2016	Date of mailing of the international search report (03/08/2016)
55	Name and mailing address of the ISA/ OFICINA ESPAÑOLA DE PATENTES Y MARCAS Paseo de la Castellana, 75 - 28071 Madrid (España) Facsimile No.: 91 349 53 04	Authorized officer A. Andreu Cordero Telephone No. 91 3493055

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

PCT/ES2016/070182

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
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US1470310 A	09.10.1923	NONE	
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 2042353 [0003]
- ES 2113250 [0003]