(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 039 133 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
27.09.2000 Bulletin 2000/39

(21) Application number: **98946465.6**

(22) Date of filing: **05.10.1998**

(51) Int. Cl.[7]: **F04B 47/04**, F04B 9/107

(86) International application number:
PCT/ES98/00274

(87) International publication number:
WO 00/20758 (13.04.2000 Gazette 2000/15)

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV RO SI

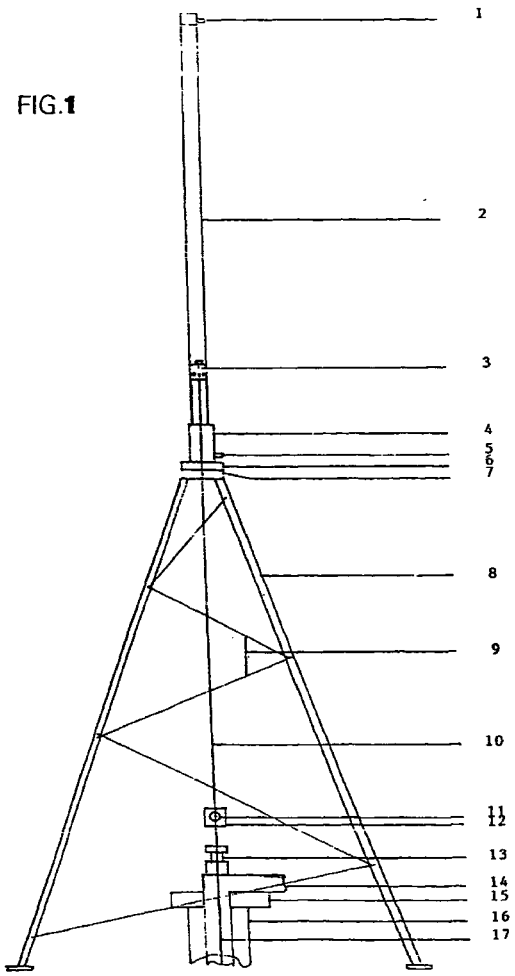
(71) Applicant:
Alquezar Gazulla, Manuel
44500 Andorra (ES)

(72) Inventor:
Alquezar Gazulla, Manuel
44500 Andorra (ES)

(54) BOB SYSTEM FOR ALTERNATING PUMPS

(57) The bob system for alternating pumps comprises a pyramidal tower (8) (fig. 1) with a truncated summit (5 and 6) (fig. 1) wherein a single acting hydraulic cylinder (2) (fig. 1) can rest, which are installed at the vertical of a water or oil well (16) (fig. 1). The piston (3) (fig. 1) of the hydraulic cylinder (2) (fig. 2) has a prolongation with holes (19) (fig. 2) which, during its down stroke, is introduced inside the support tube thereby producing a choking effect and forcing the oil to pass through the holes and slowing down gently the rod (10) (fig. 2) at the end of its down stroke. In the up stroke of the rod (10) (fig. 2) the contrary occurs, that is an acceleration up to the freeing of the piston extension (19) (fig. 2) inside the support tube (4) (fig. 2) thereby creating an overpressure which is compensated by an accumulator (23) (fig. 3).

FIG.1



EP 1 039 133 A1

Description

OBJECTIVES OF THE INVENTION

[0001] The present invention refers to an actuating rod system for alternating pumps. It comprises a pyramidal structure with a truncated summit, within which a single effect hydraulic cylinder is supported for the movement of the rod system and the operation of the alternating pump - located in a well - which actuates the extraction fluid, water as well as oil.

[0002] This system provides great precision and stability at the center of gravity and pull, since the center of gravity and the force applied are located at the same point, providing a greater running of the pumping rod system. These characteristics include a simplification of the machinery's construction.

PRECEDENTS OF THE INVENTION

[0003] It is recognized that in oil wells of great depth there exists a rod pulling system, called a working beam, based on the lever law which, by means of a circular movement with reducers and connecting rods, is transformed into a linear system, thus moving the rod that actuates the fluid extraction pump installed within the pump.

[0004] Because of the dimensions, support point and force applications in the working beam, limitations are created to the forces applied and to the running of the pumping rod.

[0005] The invention hereby presented resolves this situation in a simpler manner than with a working beam system.

[0006] The innovation in this new system is that the force applied to the pumping rod, as well as to the running, are both located in the same center of gravity.

DESCRIPTION OF THE INVENTION

[0007] The rod actuating system for alternating pumps proposed in the present invention consists of a pyramidal structure with a truncated summit upon which a single effect hydraulic cylinder is installed vertically.

[0008] The structure and the hydraulic cylinder are installed vertically at the center of the water or oil well, which causes the force originated by the cylinder, for pulling the pumping rod, to be at the same center of gravity; thus allowing for a considerably greater running and speed for the pumping rod and, therefore, greater fluid extraction within the same work period. This is not possible with the working beam system, which applies force to one end of the beam, describing a circumference arc, hooked to a flexible towline, located at the pumping rod. In this manner, the rod running, and the force applied to it, are limited.

[0009] The movement in this new system proposed is generated by a hydraulic station with a motor, which moves the oil pump that drives volume and pressure through the pipes towards a pressure limiting electronic valve and inverter which directs the oil to the cylinder while in a closed position, and to the tank while in an open position.

[0010] Below are detailed the various functions performed by the rod actuating system for alternating pumps during operation.

Description of the electrical process.

[0011] When the system is off and the operation of the system is desired, an electrical switch is activated together with a timer, an electronic panel for turning on motors and a cyclical relay of double independent timing, puts the hydraulic motor pump in operation. This cyclical relay with independently regulated timings, and at will, sends the pressure limiting electronic valve and inverter an electrical signal for the closing or opening of the hydraulic circuit, sending the oil flow to the hydraulic cylinder or to the tank, thus initiating the pumping cycle.

[0012] By means of the timer programming, the system remains on automatic during the time desired. It is responsible for providing or discontinuing current to the system, running or stopping its operation.

[0013] During operation the rod will begin to ascend or retract, penetrating the single effect hydraulic cylinder and pulling the rod. This will occur when the cyclical relay drives the closing of the pressure limiting electronic valve and inverter during a determined time period. When said period terminates, it will open the pressure limiting electronic valve and invader, and the rod will begin to descend, by means of gravity and a timer, and when said period terminates, it will close the pressure limiting electronic valve and inverter again, driving the ascension of the rod that will pull the rod system.

Description of the hydraulic system.

[0014] The rod will begin to descend at great speed, but controlled by a variable volume regulator. When the rod is almost fully deployed, the piston extension will meet a choke in the single effect hydraulic cylinder support. The piston extension has a hollow space between it and the rod, and another hollow space between it and the sleeve. It also has various holes that allow the oil flow in such a manner that, when the piston extension reaches the choke, the holes are gradually closed off, producing a smooth and gradual deceleration of the rod. During the ascension of the rod the piston extension gradually frees the holes, thus producing a smooth acceleration.

[0015] Since the rod inversion is performed at great speed during ascension and the holes are covered by the piston extension choke, overpressure is produced, which is corrected by oil accumulator installed.

SUMMARY DESCRIPTION OF THE DRAWINGS

[0016] To facilitate the compression explained in the present record, descriptive drawings are attached, of the rod actuating system for alternating pumps, which illustrate the most significant details of the invention.

Figure 1: Overview of the elevation of the rod actuating system for alternating pumps, illustrating a single effect hydraulic cylinder with joint plates, installed vertically on a structure, with its bracings, joint sections between the stem and the rod system, stuffing boxes, oil intake-outlet pipe, clamp holding the drive pump for the fluid to be pumped, and the pipe for the well shoring.

Figure 2: Sectional view of the single effect hydraulic cylinder.

Illustrates that the cylinder piston has an extension with holes. Said extension is not in contact with the stem nor with the hydraulic cylinder sleeve existing between both spaces.

Also illustrates that there is a support pipe for the hydraulic bottle and its closing plug which, internally, has a smaller diameter than the hydraulic cylinder sleeve, through which the stem passes during the choke, placing the hydraulic piston extension with holes plugging only the external section, which is the section facing the cylinder sleeve, allowing the passage of oil only through those holes towards the stem during descent.

Figure 3: Represents the hydraulic drive of the rod actuating system for alternating pumps, with the following items necessary for operation: a motor, an oil actuating pump, an oil deposit, an oil accumulator, a pressure limiting electronic valve and inverter, an oil volume regulator, and a single effect oil cylinder.

DESCRIPTION OF IDEAL PERFORMANCE

[0017] In view of the aforementioned drawings and in accordance with the numbering system employed, it is noted that the bob system for alternating pumps, is comprised of a single effect hydraulic cylinder (2), with an air intake-outlet in the upper section (1). This intake-outlet is connected to the oil deposit (18) (Figure 3) by means of a pipe, - this pipe reaches the oil deposit because internal air is filtered and impregnated with oil, providing lubrication for the piston joints (3) (Figure 2).

[0018] Figure 1 illustrates that the hydraulic cylinder (2) is installed over a support pipe (4) with an oil intake-outlet (5). The support pipe (4) is in turn supported over a plate (6) which is, in turn, supported by another plate (7) joined to the structure (8).

[0019] The structure (8) with its braces (9) and the single effect hydraulic cylinder (2) and its stem (10) is joined to the rod by means of an articulation head (11) which, in turn, is hooked to a fork (12) which, in turn, is threaded to the pumping rod (17).

[0020] This setup is installed over a water or oil well (16), in a vertical and centered position.

[0021] The stuffing box (13) is adjusted to the rod (17), preventing the fluid pumped from exiting the side of the rod (17), driving the fluid through the pipe (14). The pipe setup (14), which is where the internal fluid of the well exits, is supported by a clamp (15).

[0022] The following description with shed additional light on Figure 2. It is noted that the single effect hydraulic cylinder (2) has a piston (3) with an extension (19) and a space between the single effect hydraulic cylinder sleeve (2) and another space between the stem (10) and the piston extension (19). This extension (19) has various holes (20) so that it may be introduced into the interior of the support pipe (4) at the end of the descending run, producing a choking effect and a closing of the oil, forcing the oil to pass through the holes (20), directing the oil to the space between the stern (10) and the piston extension (19). This is done in such a manner that, while the piston extension (19) is introduced to the choke in the support pipe (4), the holes are gradually closed, producing a very smooth deceleration of the stem (10). This is necessary since the stem is lowered at great speed, due to the effect of gravity on the rod being pulled behind it, once it begins its descent.

[0023] The stem's (10) ascending movement is also done very smoothly, since the holes (20) are gradually freed during its ascending run, directing the oil to the single effect hydraulic cylinder (2) and producing an overpressure, which is corrected by the accumulator (23) (Figure 3). When the piston extension (19) is freed from the choke in the support pipe (4), the accumulator (23) (Figure 3) gives in to the overpressure accumulated during descent, further decelerating the stem.

[0024] The oil intake-outlet pipe (15) also joins the pressure limiting electronic valve and inverter (22) to the support pipe (4), where the single effect hydraulic cylinder (2) is supported.

[0025] Figure 3 illustrates the hydraulic cylinder with its main components and comprises a single effect hydraulic

cylinder (2), with its air intake (1) to the tank (18), the oil pipe joining the single effect hydraulic cylinder (2) to the pressure limiting electronic valve and inverter (22), the oil accumulator (23) and the oil pressure and volume supply pump (24). The entire setup providing the electrical functions and automation causes the movement of the alternate pump that extracts the fluid from the well.

Claims

1. This is a bob system for alternating pumps characterized by a single effect hydraulic cylinder (2) (Figure 1), joined to a support pipe (4) with an oil intake-outlet (5), with an interior choke and, , a plug with joints closing the single effect hydraulic cylinder (2).

It is supported by a plate (6), which is in turn supported over another plate joined to the pyramidal structure (8) truncated at the summit by means of braces (9). The structure (8) along with the single effect cylinder (2) and both are installed along the vertical of the water or oil well (16), completely benefiting the running of the rod (17) by means of the stem (10), since both are located at the center of gravity, where the force originated by the single effect hydraulic cylinder (2) is applied.

2. The bob system for alternating pumps, in accordance with Claim 1, is characterized by having, a piston (3) with an extension (19) containing various holes (20) for controlling the oil. When the stem is lowered, the piston extension (19) enters the support pipe (4) where it meets a choke, forcing the oil to pass through the holes towards the stem. As the stem is lowered, the holes are gradually closed and less holes remain open for oil to pass through, producing a gradual and smooth deceleration of the stem.

When inverting the stem run, the opposite takes place. In other words, during ascension oil is transferred from the side of the stem, through the holes on the side of the oil sleeve (2) of the hydraulic cylinder, until the piston extension (19) and the holes (20) are freed. This produces an overpressure, which is corrected by the oil accumulator (23).

3. The bob system for alternating pumps, in accordance with Claim 1, is characterized by the fact that it presents a hydraulic circuit with the following characteristics:

- A single acting hydraulic cylinder (2), which, when supplied with flow and pressure, the rod (10) retracts, drawing the pump link (17).
- An inverte and pressure limiting solenoid valve (22) which, when open, makes the rod (10) go down, sending the oil to the tank (18) and when closes, makes the rod go up (10).
- An oil flow regulator (21), which by opening and closing, makes the rod go up or down more or less quickly.
- An oil accumulator (23) which, when the rod (10) starts its up stroke, produces an overpressure, absorbing it and transferring it later to the circuit.
- A pump (24), which transmits flow and pressure to the circuit
- An oil tank (18).
- A motor, which transfers power to the pump.

Amended Claims under Article 19.1 PCT

1. This is a bob system for alternating pumps characterized by a single effect hydraulic cylinder (2) (Figure 1), joined to a support pipe (4) with an oil intake-outlet (5), with an interior choke and, at the end of the support pipe (4) a plug with joints closing the single effect hydraulic cylinder (2). It is supported by a plate (6), which is in turn supported over another plate (7) joined to the structure (8) with a seat at the summit by means of braces (9) and with ones of its facings open to facilitate assembly and disassembly of boring pipes. The single effect cylinder (2) is mounted vertically at the summit of the structure (8) and both are installed along the vertical of the water or oil well (16), completely benefiting the running of the rod (17) by means of the stem (10), since both are located at the center of gravity, where the force originated by the single effect hydraulic cylinder (2) is applied.

2. The bob system for alternating pumps, in accordance with Claim 1, is characterized by a single effect cylinder (2), a piston (3) with an extension (19) containing holes (20) for control of the oil. When the stem is lowered, the piston extension (19) enters the support pipe (4) where it meets a choke, forcing the oil to pass through the holes (20) towards the stem (10). As the stem is lowered, the holes are gradually closed and less holes remain open for oil to pass through, producing a gradual and smooth deceleration of the stem (10).

When inverting the stem (10) run, the opposite takes place. In other words, during ascension oil is transferred from the side of the stem (10), through the holes (20) on the side of the oil sleeve (2) of the hydraulic cylinder, until the piston extension (19) and the holes (20) are freed. This produces an overpressure, which is corrected by the internal piloting and double dampener cartridge valve.

Under the joints that rub against the stem (10), - installed on the support pipe (4) (Figure 2) that makes up the closing plug for the hydraulic cylinder (2)- we have installed a vessel shaped part attached to the closing plug of the hydraulic cylinder (2) by internal joints that also rub against the stem (10), in order to pick up, by atmospheric pressure, any possible loss in hydraulic oil that may escape from the closing plug of the hydraulic cylinder (2).

The aforementioned vessel has a hole with a pipe on the lower section and over its internal joints, which directs any possible escape of hydraulic oil through the pipe (1) to the tank (18).

3. The bob system for alternating pumps, in accordance with Claim 1, is characterized by the fact that it presents a hydraulic circuit and an electrical-electronic circuit (which will be claimed below).

Hydraulic circuit with the following characteristics:

A single effect hydraulic cylinder (2) that, as volume and pressure are supplied to the stem (10), is retracted pulling with it the pumping rod (17) (Figure 1).

Between the oil intake-outlet pipe (5) and the pump (24) a collector is installed, in order to install within it an oil control by means of subtraction from the stem (10) operation. In said collector, an internal piloting and double dampener cartridge valve is installed. This internal piloting is controlled by two calibrated holes and an electronic valve, in such as manner that the electronic valve without electrical current remains open and the piloted oil passes directly through it to the tank (18), maintaining also open the internal piloting and double dampener cartridge valve, passing through it the greater oil volume supplied by the pump (24), through the cartridge valve and a variable volume regulator to the tank (18).

When the electronic valve receives an electrical signal, the internal piloting and double dampener cartridge valve gradually closes the piloting, by zone differential or by spring mechanism, since it has a greater area and, therefore, a greater oil volume on the side of the electronic valve. This side gradually fills with oil, controlled by a calibrated hole on the internal piloting and double dampener cartridge valve, which closes slowly and smoothly, without any ramming, directing oil through the pipe (5) to the cylinder (2), retracting the stem (10), which then pulls the pumping rod (17). When the stem (10) run is completed, the electrical signal to the electronic valve is cut and the valve causes the opening of the internal piloting and double dampener cartridge valve. However, the piloting oil is controlled by a calibrated hole in the electronic valve, sending the piloting oil to the tank (18) and opening the internal piloting and double dampener cartridge valve smoothly, without any ramming, since the stem (10) is lowered by gravity but controlled by the variable volume regulator, sending oil to the tank (18) by means of subtraction.

A pressure regulation device ("presostato") is also installed in the collector, so that when there is any overpressure in the hydraulic circuit - for example, by the pulling of the alternating pump - it sends an electrical signal to the motor's starting and protection panel, stopping it immediately.

A subtraction variable volume regulator is also installed in the collector which, if opened or closed, decelerates or accelerates the stem (10) during its rise, adjusting the load pressure to the hydraulic cylinder and also to the pair in the motor. This variable volume regulator diverts oil to a filter which passes through a cooler and, once cooled, returns to the tank (18).

4. The electrical-electronic circuit, in accordance with Claim 3, is characterized by the use of a programmable timer for the startup of the motor pump, in combination with a motor startup and protection electronic panel that may be remotely set in such a manner that, when the programmable timer by contact closes the remote command position of the electronic panel, the electronic panel then causes the startup of the motor. When the motor pump is started and in full revolutions, without hydraulic load, a timed contact from the electronic panel begins a timer and, after a few seconds, passes electrical current to introduce the hydraulic load in the hydraulic circuit, with the automation of three laser photocells with mirrors, a relay with two open contacts and the coil for the electronic piloting control valve for the the internal piloting and double dampener cartridge valve, with the following description:

Three cells emitting laser spread, two with open contacts and one with a closed contact, receiving electrical current from the timer contact of the electronic panel.

These three photocells are positioned along one face of the structure (8) and the mirrors are faced one on one to each cell on the opposite face, so that the stem (10) in the hydraulic cylinder (12) with the rod (17) with the greater diameter passes between and cuts through the laser spreads.

When the motor pump is started but has no hydraulic load, the stem (10 will be deployed and in the lower section. The first photocell, or the lowest, for the pump startup will be faced by the joint (12) and the cut laser spread, having the part (12) in the middle of the photocell and the mirror closing the contact on the first photocell, or the lowest, activating a relay coil with two contacts that close and lock said relay by the closed contact on the third photocell, or the highest, and by a contact of that same relay. The other relay contact sends electrical current to the coil of the hydraulic piloting control electronic valve, closing it and, by means of a calibrated hole and greater area, gradually closes, smoothly and without ramming, for the the internal piloting and double dampener cartridge valve, sending the oil to the single effect hydraulic cylinder (2), beginning the rising of the stem (10) for said cylinder and starting the pumping action.

When the joint (12) (Figure 1) reaches the front of the third or highest photocell, it will cut that laser spread, opening its contact and cutting the relay's electrical current, opening the relay and, therefore, that of the piloting electronic valve, sending it to the tank (18) by means of a calibrated hole, opening smoothly and without ramming, the internal piloting and double dampener cartridge valve, sending it the oil from the hydraulic cylinder (2) and the pump (24), through the collector and the variable volume

regulator and the stem (10) lowering control, to the tank (18), initiating thus the lowering of the stem (10). When reaching the joint (12) reaches the second or middle photocell, - which is slightly higher than the first or lowest one - it cuts the laser spread, closing its contact and repeating the electrical and hydraulic function described for the first or lowest photocell, creating a repetitive up and down pumping movement, similar to that of a yo-yo.

5. The structure (8), in accordance with Claim 1 is characterized by having one of its faces open, and therefore without braces, facilitating on said face the assembly or disassembly of the boring piping, by the following procedure:

On the point of the stem (10) a flange or other mechanical hook is installed, and this is then installed to the pipe to be placed and removed from the column of pumping pipes and to actuate the hydraulic system by the force of the hydraulic cylinder (2). The stem (10) raises or lowers the pumping pipe column, making unnecessary the use of a crane for the boring assembly or disassembly.

On the face opposite the open face of the structure (8), a guide profile is installed from top to bottom, with said profile having a skid with horizontal rollers and flange fixed to the stem (10) point

When the stem (10) is placed in motion - in an ascending or descending run, during the boring assembly or disassembly -, it drags the horizontal flange attached to its point, and the point to the skid, sliding it on the guide profile. All of this prevents - when entering or removing a pipe from the boring column, using the open face of the structure (8)- the stem from bending, since it receives lateral forces and, being as long as the guide profile, the horizontal skid and flange, the stem is kept firmly attached and always in a vertical position, even when receiving lateral forces.

6. The stuffing box (13) adjusted to fit the pumping rod (17) is characterized by preventing the pumped fluid from exiting the higher side of the rod (17). A vessel shaped part is installed with a hole and a pipe on the lower section, to pick up and direct any possible fluid escape through the stuffing box (13), depositing it into a container and returning it again to the well.

At the base of the stuffing box part (13) or at the higher section of the last pipe in the pumping column, anchoring is installed attached to hooks, which are then anchored to the ground or to a concrete base. By this process the forces originated in the fluid outlet pipe column are fixed during the pumping action.

Statement under Article 19.1 PCT

• Declaration on Claims 1 and 5.

The structure does not have to have a pyramidal shape. It may take various shapes, such as one or two parallel columns with a braced facing and a seating on the summit for positioning the cylinder.

When the structure is presented, independently from the number of faces it may have, one of the faces must always be an open face to facilitate the assembly and disassembly of the boring pipes in the hydraulic setup.

We consider that the structure, with one of its faces open and opposite the stem guide profile claimed, is not represented in any of the patents remitted in the international search report.

• Declaration on Claim 2.

With the long-term operation of the stem (10) it was observed that the closed joints lost some oil drops that fell to the ground. For this reason the vessel claimed was installed to reroute it to the tank. This includes a substantial lengthening of the life of the stem (10) closure joints.

• Declaration on Claim 3.

Various modifications have been performed on the hydraulic circuit, deleting from it the oil accumulator (23), the pressure limiting electronic valve and inverter (22) and a bypass valve with oil volume regulator (21). These hydraulic elements have been substituted by an internal piloting and double dampener cartridge valve, a piloting control electronic valve, a pressure regulation device ("presostato"), two variable volume regulators and a collector. The entire setup is installed within the pipe collectors and operates by subtraction without any ramming in the stem (10) inversions.

The entire setup harmonizes the hydraulic operation with greater smoothness and efficiency, compared to the prior proposal.

We consider that the hydraulic circuit claimed does not have any particularly relevant similarity in respect to the patents remitted with the international search report.

• Declaration on Claim 4.

Upon reviewing the international search report, the electrical-electronic circuits - which appear in the patents referred to in said report - are much more complicated than the one we claim, since with seven elements we form an electrical-electronic circuit of great precision and quality.

• Declaration on Claim 6.

Upon reviewing the international search report we have not noticed stuffing box patents with the characteristics such as the ones we claim, nor the fluid outlet pipe column attachment.

FIG.1

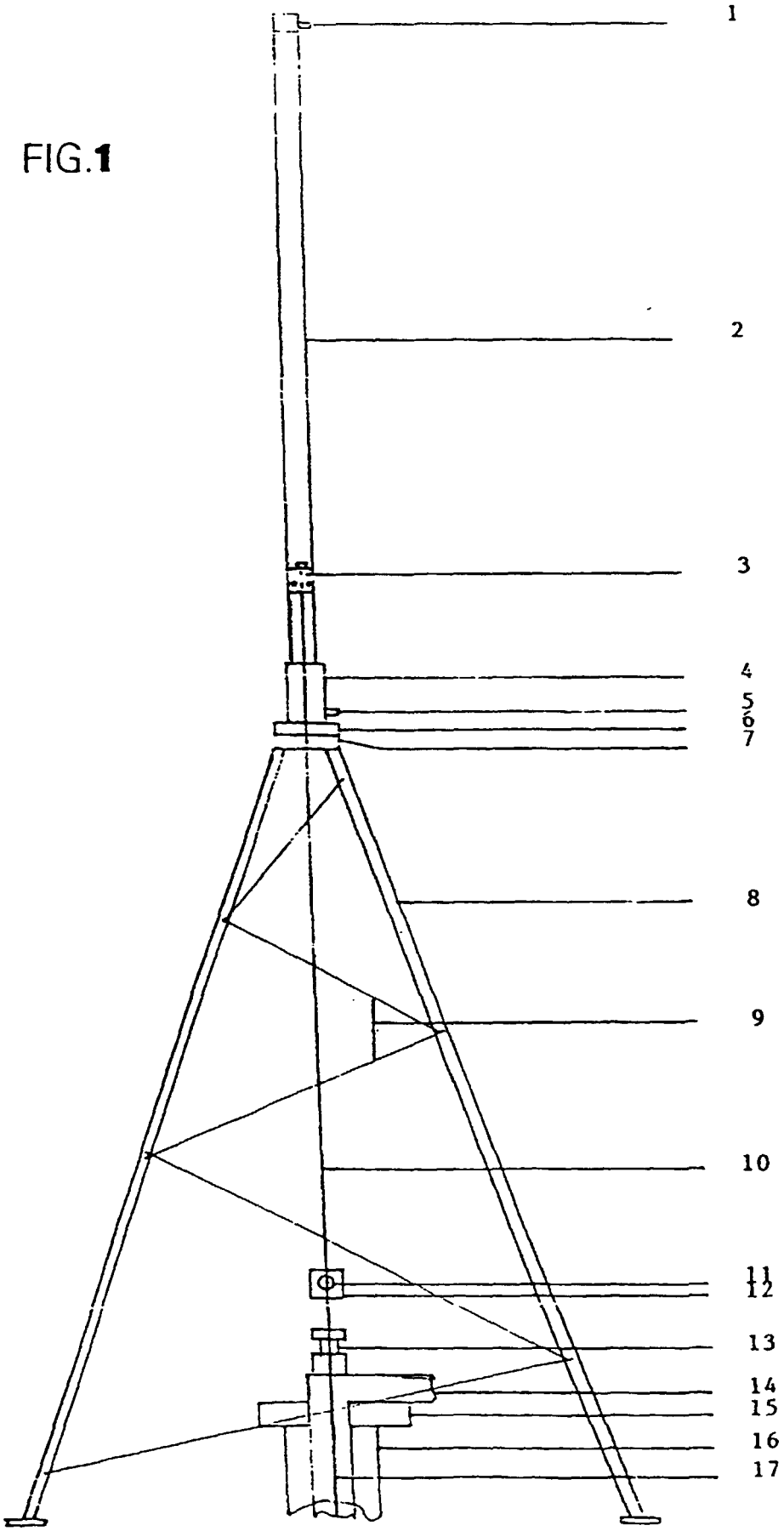


FIG.2

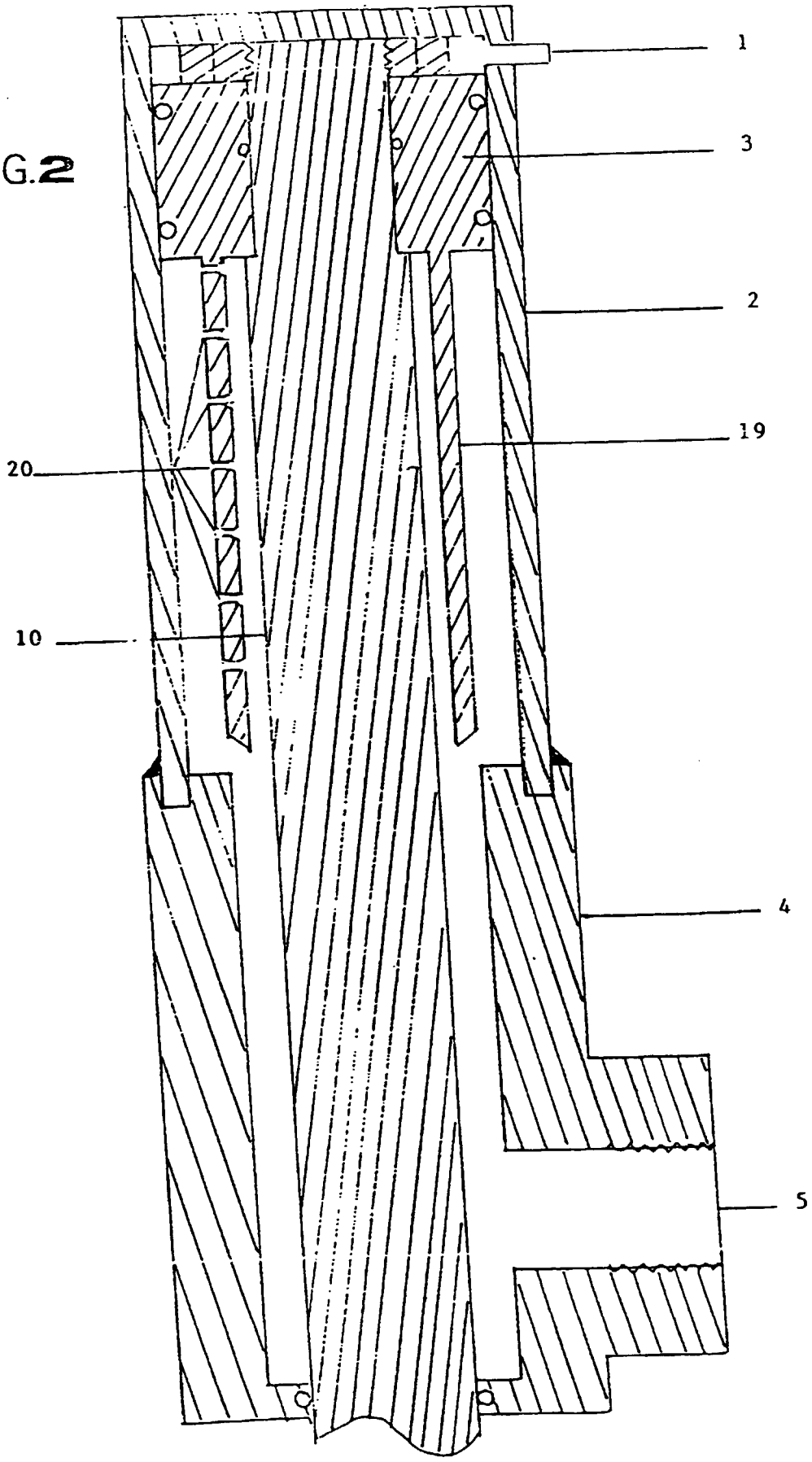
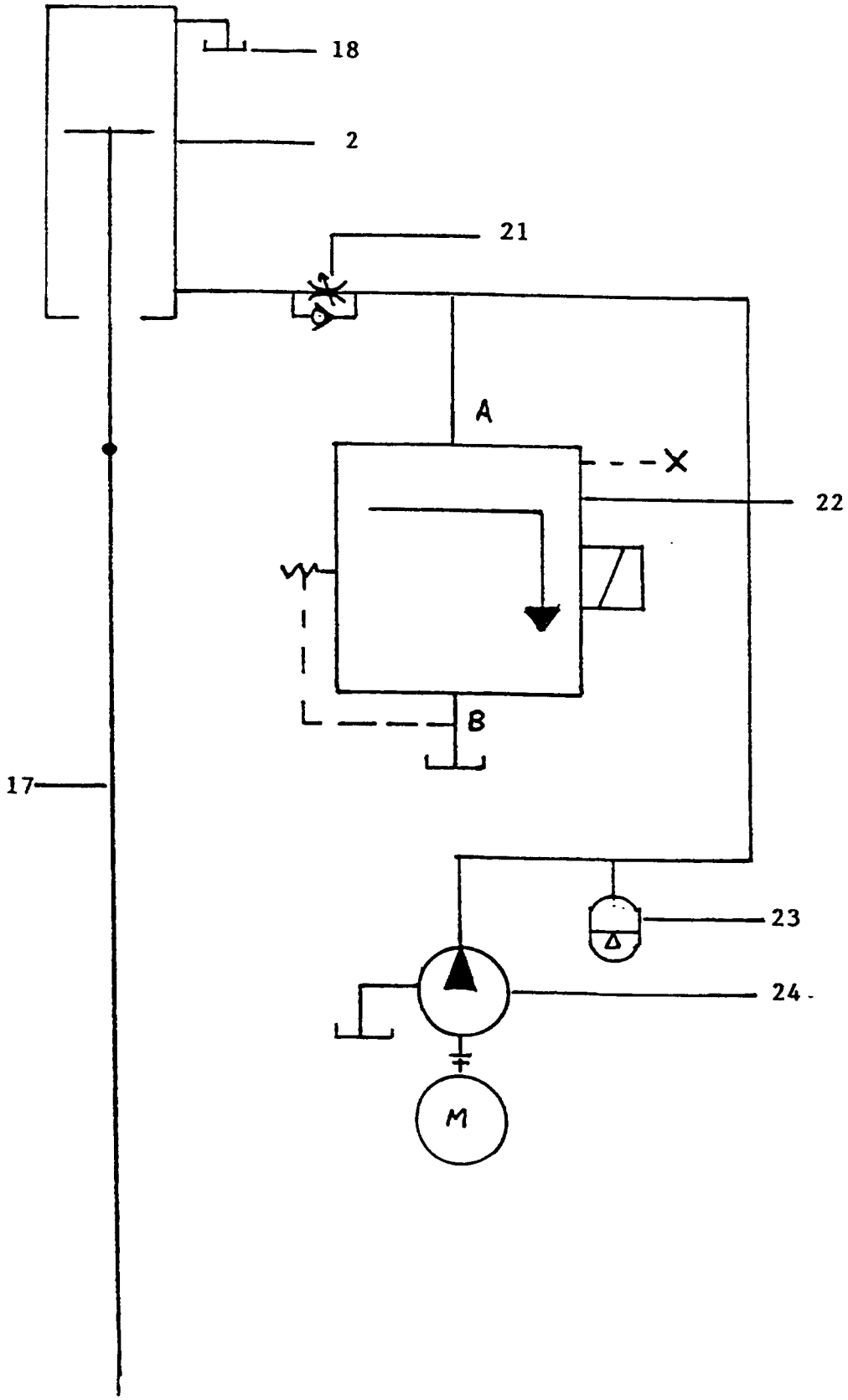


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 98/00274

A. CLASSIFICATION OF SUBJECT MATTER [6]:

IPC 6 : F04B 47/04 F04B 9/107

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 6 : F04B47 F04B 9

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)

EPODOC, WPI, CIBEPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4631918 A (ROSMAN), 30 December 1986 (30.12.86), column 2, line 55-column 3, line 16 ; figures 1,2.	1,3
A	US 3038310 A (G.H.WILLIAMS), 12 June 1962 (12.06.62), column 3, line 14-column line 37, column 6, lines 21-29 ; figure 2.	1,3
A	GB 776905 A (ZEPHYR LAUNDRY MACHINERY COMPANY), 12 June 1957 (12.06.57), page 2, line 24-line 37, line 84-line 87. Page 3, line 37-line 49, page 5, line 1-line 23, figures 1,2,6.	1,3
A	US 3163005 A (J.A.REED II), 29 December 1964 (29.12,64), column 2, line 9-line 23, figures 1,2.	1,3
A	US 4320799 A (GILBERTSON), 23 March 1982 (23.03.82), column 6, line 26-line 42, column 11, line 31-column 12, line 40 : figures 1,10.	1,3
A	US 4698968 A (MESTIERI), 13 October 1987 (13.10.87), column 2, line 42-column 4, line 24 ; figures 1,3. -/--	1,2

[X] Further documents are listed in the continuation of Box C. [X] 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
15 February 1999 (15.02.99)	24 February 1999 (24.02.99)
Name and mailing address of the ISA/ S.P.T.O	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992) page 1 of 2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/ ES 98/00274

Patent document cited in search report	Publication date	Patent familiy member(s)	Publication date
US 4631918 A	30.12.1986		
US 3038310 A	12.06.1962		
GB 776905 A	12.06.1957		
US 3163005 A	29.12.1964		
US 4320799 A	23.03.1982	US 4480685 A WO 8200859 A WO 8103206 A EP 0059213 A EP 0051665 A CA 1172908 A CA 1167696 A	06.11.1984 18.03.1982 12.11.1981 08.09.1982 19.05.1982 21.08.1984 22.05.1984
US 4698968 A	13.10.1987	CA 1286152 A	16.07.1991

Form PCT/ISA/210 (patent family annex) (July 1992)