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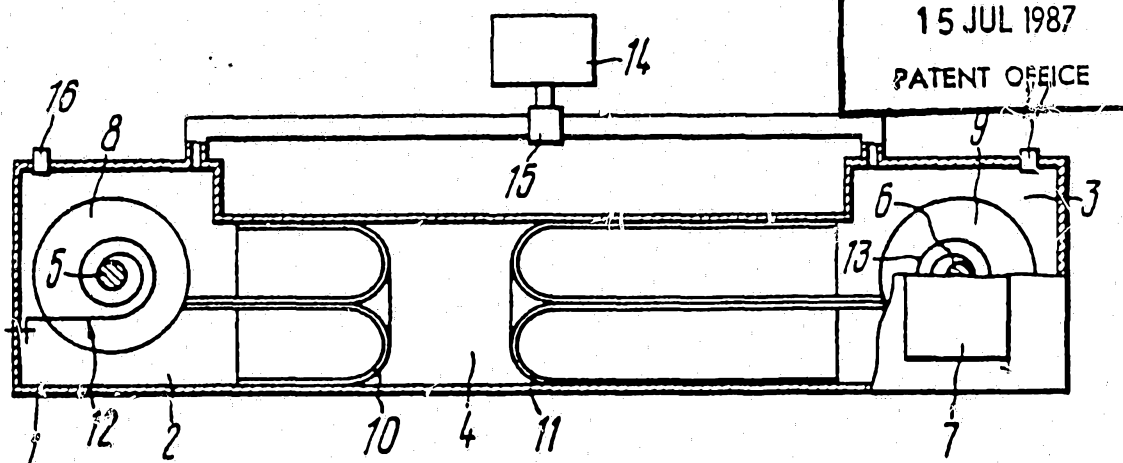
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 ВСЕМИРНАЯ ОРГАНИЗАЦИЯ  
 ИНТЕЛЛЕКТУАЛЬНОЙ СОБСТВЕННОСТИ  
 Международное бюро
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596826
 МЕЖДУНАРОДНАЯ ЗАЯВКА, ОПУБЛИКОВАННАЯ В СООТВЕТСТВИИ  
 С ДОГОВОРом О ПАТЕНТНОЙ КООПЕРАЦИИ (PCT)

AU-AI-68945/87

(51) Международная классификация изобретения 4: F15B 15/10	A1	(11) Номер международной публикации: WO 87/03939 (43) Дата международной публикации: 2 июля 1987 (02.07.87)
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(54) Title: DEVICE FOR TRANSFORMATION OF FLUID MEDIUM ENERGY INTO MECHANICAL WORK OF WORKING ORGAN

(54) Название изобретения: УСТРОЙСТВО ДЛЯ ПРЕОБРАЗОВАНИЯ ЭНЕРГИИ ТЕКУЧЕЙ СРЕДЫ В МЕХАНИЧЕСКУЮ РАБОТУ РАБОЧЕГО ОРГАНА



## (57) Abstract

The device comprises a casing (1), two oppositely oriented chambers (2, 3) located in it and interconnected through a pipe (4). Each chamber (2 or 3) houses a piston consisting of an elastic sleeve (10 or 11) one end of which is turned inside out and fixed to the internal surface of the pipe (4) at the point of its connection with the chamber (2 or 3). Each piston is kinematically connected with a working organ (7) by means of a shaft (5 or 6) mounted inside the chamber (2 or 3), one end of which is kinematically connected with the working organ (7), and by means of a drum (8 or 9) connected with the other end of the shaft (5 or 6) and provided with a reversing mechanism. The other ends of the sleeves (10 and 11) are fixed to the drums (8 and 9). A pressure chamber consisting of the cavities of the chambers (2, 3) and of the pipe (4) is connected to a system (14) for feeding the fluid medium.

COMMONWEALTH OF AUSTRALIA  
PATENTS ACT 1952

## DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT

(Name of  
applicant)

In support of an application made by: TREST "JUZHVODOPROVOD"

(Title)

for a patent for an invention entitled: DEVICE FOR CONVERTING  
ENERGY OF FLUID MEDIUM INTO MECHANICAL WORK OF WORKING MEMBER(Full name  
and address  
of signatory)I, ..... Nikolai Fedorovich Kryazhevskikh .....  
of ..... Ulitsa Krasnykh Partizan 559, Kv. 13, Krasnodar, U.S.S.R.

do solemnly and sincerely declare as follows:

(Full name and  
address of  
inventor(s))

1. I am authorised by the above mentioned applicant for the patent to make this declaration on its behalf.
2. The name and address of each actual inventor of the invention is as follows: Viktor Vasilievich Shishkin; Nikolai Fedorovich Kryazhevskikh and Jury Petrovich Shapovalov  
of ..... Ulitsa Festivalnaya 16, Kv. 5, Krasnodar, U.S.S.R.;  
..... Ulitsa Krasnykh Partizan 559, Kv. 13, Krasnodar, U.S.S.R.  
..... and Ulitsa Turgeneva 18, Krasnodar, U.S.S.R., respectively

(State whether  
by assignment  
or contract of  
employment)and the fact(s) upon which the applicant is entitled to make this application are as follows:  
the said applicant is the assignee of the actual inventors  
for the said invention.(Delete  
paragraphs 3  
and 4 for  
non-Convention  
application)

3. The basic application(s) as defined by Section 141 of the Act was(were) made as follows:  
Country ..... U.S.S.R. .... on 24 December 1985.  
in the name(s) Trest "Juzhvodoprovod"  
and in ..... U.S.S.R. .... on 24 December 1985  
in the name(s) Trest "Juzhvodoprovod"  
and in ..... U.S.S.R. .... on 24 December 1985  
in the name(s) Trest "Juzhvodoprovod"
4. The basic application(s) referred to in the preceding paragraph was(were) the first application(s) made in a Convention country in respect of the invention the subject of this application.

(Place and  
date of  
signing)Declared at Krasnodar this 15<sup>th</sup> day of June 1987

TREST "JUZHVODOPROVOD"

Nikolai Fedorovich Kryazhevskikh  
Signed: *Nikolai Fedorovich Kryazhevskikh*

Position: Trust manager

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**(12) PATENT ABRIDGMENT      (11) Document No. AU-B-68945/87**  
**(19) AUSTRALIAN PATENT OFFICE      (10) Acceptance No. 596826**

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(54) Title  
DEVICE FOR TRANSFORMATION OF FLUID MEDIUM ENERGY INTO MECHANICAL  
WORK OF WORKING ORGAN

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PETROVICH SHAPOVALOV

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GRIFFITH HACK & CO. SYDNEY

(56) Prior Art Documents  
AU 68955/87 F04B 43/00 47/02  
AU 68956/87 F15B 15/06 F01B 19/00  
AU 68949/87 F04B 43/00

(57) Claim

1. A device for converting energy of a fluid medium into mechanical work of a working member, the device comprising two chambers disposed opposite each other within a housing, each chamber having a piston connected to the working member through a kinematic connection arranged to transmit motion from the piston to the working member and there being a system having a distribution valve for supplying a first fluid medium, the device characterised by the chambers being interconnected within the housing by a pipeline and there being a pressure space communicating with the fluid medium supply system located within the housing, the kinematic connection of each piston to the working member including a shaft mounted in respective chambers, one end of each shaft being connected to the working member while the other end of

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(10) 596826

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each shaft being connected to a drum, each of the drums having a reverser to assist movement of the shaft in a predetermined direction, the pistons being in the form of first and second elastic sleeves, wherein one end of each sleeve is turned inside out and secured to the inner surface of the pipeline at the point of its connection with its respective chamber while the other end thereof is secured to its respective drum.

Original

PCT

ВСЕМИРНАЯ ОРГАНИЗАЦИЯ  
ИНТЕЛЛЕКТУАЛЬНОЙ СОБСТВЕННОСТИ  
Международный союз



МЕЖДУНАРОДНАЯ ЗАЯВКА, ОПУБЛИКОВАННАЯ В СООТВЕТСТВИИ  
С ДОГОВОРом О ПАТЕНТНОЙ КООПЕРАЦИИ (PCT)

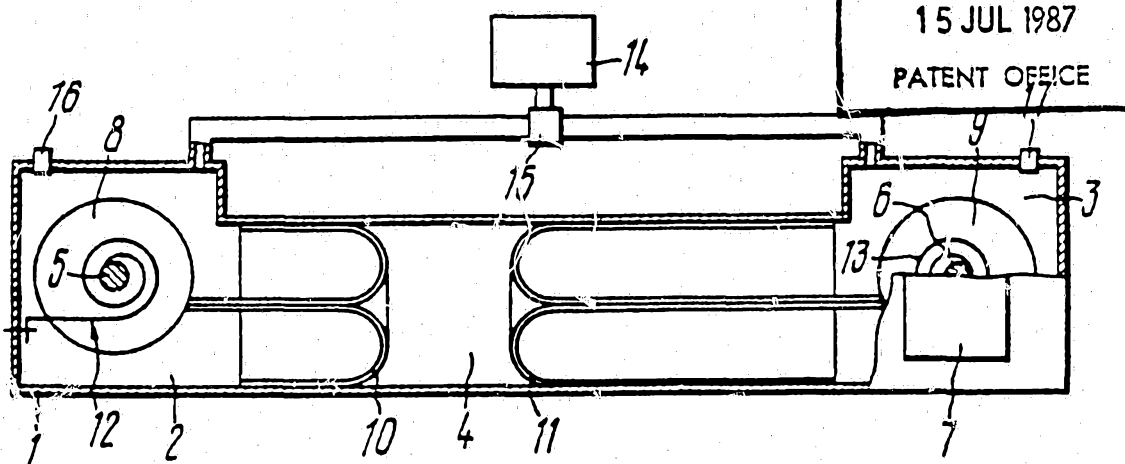
AU-A1-62245/87

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(54) Название изобретения: УСТРОЙСТВО ДЛЯ ПРЕОБРАЗОВАНИЯ ЭНЕРГИИ ТЕКУЧЕЙ СРЕДЫ В МЕХАНИЧЕСКУЮ РАБОТУ РАБОЧЕГО ОРГАНА



AUSTRALIAN  
15 JUL 1987  
PATENT OFFICE

(57) Abstract

The device comprises a casing (1), two oppositely oriented chambers (2, 3) located in it and interconnected through a pipe (4). Each chamber (2 or 3) houses a piston consisting of an elastic sleeve (10 or 11) one end of which is turned inside out and fixed to the internal surface of the pipe (4) at the point of its connection with the chamber (2 or 3). Each piston is kinematically connected with a working organ (7) by means of a shaft (5 or 6) mounted inside the chamber (2 or 3), one end of which is kinematically connected with the working organ (7), and by means of a drum (8 or 9) connected with the other end of the shaft (5 or 6) and provided with a reversing mechanism. The other ends of the sleeves (10 and 11) are fixed to the drums (8 and 9). A pressure chamber consisting of the cavities of the chambers (2, 3) and of the pipe (4) is connected to a system (14) for feeding the fluid medium.

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(57) Реферат:

Согласно изобретению, устройство содержит корпус (I), две размещенные в нем и оппозитно расположенные одна относительно другой камеры (2,3), сообщенные посредством трубопровода (4). В каждой камере (2 или 3) установлен поршень, выполненный в виде эластичного рукава (IO или II), один конец которого вывернут наружу и закреплен на внутренней поверхности трубопровода (4) в месте его соединения с камерой (2 или 3). Каждый поршень кинематически связан с рабочим органом (7) посредством вала (5 или 6), установленного в камере (2 или 3), один конец которого кинематически связан с рабочим органом (7), и барабана (8 или 9), соединенного с другим концом вала (5 или 6) и снабженного механизмом реверса. На барабанах (8 и 9) закреплены другие концы рукавов (IO и II). Полость нагнетания, образованная полостями камер (2,3) и трубопровода (4), сообщена с системой (I4) подачи текучей среды.

ИСКЛЮЧИТЕЛЬНО ДЛЯ ЦЕЛЕЙ ИНФОРМАЦИИ

Коды, используемые для обозначения стран-членов РСТ на текстовых листах брошюр, в которых публикуются международные заявки в соответствии с РСТ:

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GA Габон		

DEVICE FOR CONVERTING ENERGY OF FLUID MEDIUM INTO  
MECHANICAL WORK OF WORKING MEMBER

Technical Field

The present invention relates to volume displacement  
5 machines and, more particularly, the invention relates  
to devices for converting energy of a fluid medium into  
mechanical work of a working member.

Prior Art

At the present time the conversion of energy of a  
10 fluid medium into mechanical work of a working member is  
effected by well known piston engines comprising a cham-  
ber in which a piston made of a rigid material and pro-  
vided with movable seals moves. However, these machines have  
the following disadvantages:

- 15 - low reliability and useful life due to frequent  
breaks of the movable seals;
- high requirements imposed on the accuracy and sur-  
face finish of the chamber and piston, which do not allow  
modern technology to make the chambers with a volume ex-  
20 ceeding  $1 \text{ m}^3$ ;
- a short stroke of the piston due to a limited  
volume of the chamber and structural rigidity.

This made it necessary to develop such devices for  
converting energy of a fluid medium into mechanical work  
25 of a working member, which are provided with pistons made  
of an elastic material.

Known in the art is a device for converting energy  
of a fluid medium into mechanical work (cf. French patent  
No. 788197, NPC 46 a<sup>10</sup><sub>2</sub>, published in 1935) comprising  
30 a housing and two chambers disposed in this housing in  
opposition to each other. Each chamber has a piston made  
of a rigid material and coupled to a working member  
through a two-sided rack interconnecting both said pis-  
tons. When the pistons reciprocate, the two-sided rack  
35 rotates the working member gear wheel.

The prior art device does not provide a large stroke  
of the working member per piston stroke, which is limited



by the chamber length. The chamber cannot be made of a large length due to the high requirements imposed on the accuracy and surface finish of the chambers and pistons and due to low tolerances to the coaxial alignment of both chambers. Owing to the rigid mounting of the pistons and working member the device does not provide automatic centring of the pistons relative to the working member and simultaneous transmission of their forces to the working member and this limits the field of application of this device; for example, it cannot be used for driving the working tool of a metal drawing machine. The device also cannot be used as a motor moving along a rope since the device itself cannot move along the working member. Furthermore, the device features low efficiency due to a limited stroke of the piston inside the chamber and the absence of simultaneous transmission of the forces of the pistons to the working member, since the filling of the chambers with the fluid medium is effected alternately.

#### Essence of the Invention

It is an aim of the present invention to provide a device for converting energy of a fluid medium into mechanical work of a working member, featuring such a structural design of pistons thereof and their interconnection which ensure and increased length of the working member stroke per cycle of the piston reciprocation, simultaneous transmission of forces of the both pistons as well as their reciprocations to the working member, whereby technological facilities of the device are made broader, the efficiency thereof is raised and the design is simplified.

Therefore, the present invention provides a device for converting energy of a fluid medium into mechanical work of a working member, the device comprising two chambers disposed opposite each other within a housing, each chamber having a piston connected to the working member through a kinematic connection arranged to transmit motion from the piston to the working member and there being a system having a distribution valve for supplying a first fluid medium, the



device characterised by the chambers being interconnected within the housing by a pipeline and there being a pressure space communicating with the fluid medium supply system located within the housing, the kinematic connection of each piston to the working member including a shaft mounted in respective chambers, one end of each shaft being connected to the working member while the other end of each shaft being connected to a drum, each of the drums having a reverser to assist movement of the shaft in a predetermined direction, the pistons being in the form of first and second elastic sleeves, wherein one end of each sleeve is turned inside out and secured to the inner surface of the pipeline at the point of its connection with its respective chamber while the other end thereof is secured to its respective drum.

In order to provide continuous rotation of the working member, it is necessary that the first elastic sleeve be wound on the corresponding drum, while the other elastic sleeve extends along the pipeline throughout the entire length of the sleeve and has one end secured to the drum so that its winding on the drum is effected in a direction opposite to the direction of winding of the first elastic sleeve; the fluid medium supply system would be communicated with the spaces of the chambers, while the pipeline space between the surfaces of the elastic sleeves would be filled with a fluid medium.

In order to provide reversible rotation of the working member, it is expedient that the first elastic sleeve be wound on the corresponding drum, while the second elastic sleeve extends along the pipeline throughout its entire length and has one end secured on the drum so that its winding on the drum would be effected in a direction coinciding with the direction of winding of the first elastic sleeve; the fluid medium supply system is communicated with the spaces of the chambers,



while the pipeline space between the surfaces of the elastic sleeves is filled with a fluid medium.

This makes it possible to use the claimed device in grinding and drawing machines.

5 In one embodiment of the invention the elastic sleeves are preferably extended along the pipeline through their whole length, in which case the pipeline space must be communicated with the fluid medium supply system and with the ambient atmosphere, while the cham-  
10 bers are filled with fluid medium.

This makes it possible to simplify the design of the device having a considerable length.

Furthermore, this embodiment allows one to store energy, e.g. of a liquid or gas, in pipelines while re-  
15 ducing their consumption; when the energy consumed by the working member (e.g. centrifugal pump) increases, the fluid medium being transported can be pumped into the pipeline.

It is desirable that the kinematic connection of  
20 each shaft with the working member is effected by means of ratchet half-couplings and gear wheels mounted on the shaft and a gear wheel mounted on the working member shaft.

Such coupling of the shaft with the working member  
25 makes it possible to reduce the device length.

The reverser of each drum may be made in the form of a laminar spring, one end of which is secured on the drum while the other end is fixed to the chamber wall.

This makes it possible to simplify the design of  
30 the device.

#### Summary of the Drawings

The invention is further described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows the design of the device for conver-



ting energy of a fluid medium into mechanical work of a working member, according to the invention;

Figure 2 shows an embodiment of the device, in which the sleeves are secured on the drums in different ways, according to the invention;

Figure 3 shows another embodiment of the device, in which the fluid medium supply system is communicated with the pipeline, according to the invention;

Figure 4 shows the kinematic connection of the shaft with the working member, according to the invention.

#### Preferred Embodiment of the Invention

The claimed device for converting energy of a fluid medium into mechanical work of a working member comprises a housing 1 (Figure 1), two chambers 2 and 3 located in the housing in opposition to each other and interconnected through a pipeline 4 to form a pressure space. Mounted in the chambers 2 and 3 on shafts 5 and 6 kinematically connected to a working member 7 are drums 8 and 9. The pistons are made in the form of elastic sleeves 10 and 11 whose ends are secured on drums 8 and 9 respectively. The other ends of the elastic sleeves 10 and 11 are turned inside out and secured on the inner surface of the pipeline 4 at the point of its connection with the chambers 2 and 3. The drums 8 and 9 are equipped with reversers made in the form of laminar springs 12 and 13, one end of each spring being secured on the drum 8 or 9 and the other end being fixed to the wall of the chamber 2 or 3. The chambers 2 and 3 are communicated with the fluid medium supply system via a distribution valve 15 and have valves 16 and 17 for discharging the used fluid medium, the space of the pipeline 4 between the sleeves 10 and 11 being filled with a fluid medium, e.g. gas or liquid. The sleeve 10 is wound on the drum 8, while the sleeve 11 is extended along the pipeline 4 through the whole length of the sleeve and is



secured so that its winding on the drum 9 is effected in a direction opposite to the direction of winding of the sleeve 10.

5 To provide continuous rotation of the working member 7, the sleeve 11 (Figure 2) is extended along the pipeline 4 through the whole length of the sleeve and is secured on the drum 9 so that it is wound thereon in a direction coinciding with the direction of winding the sleeve 10.

10 To simplify the design of the device having a pipeline 4 of a considerable length (Figure 3), when both sleeves 10 and 11 are stretched along the pipeline 4, while the fluid medium supply system 14 is directly communicated with the space of the pipeline 4, the latter  
15 is provided with a valve 18 for discharging the used fluid medium, while the chambers 2 and 3 are filled with a fluid medium preliminarily, prior to installation of the sleeves 10 and 11.

The kinematic connection of the shafts 5 and 6 with  
20 the working member 7 (Figure 1) is effected by means of single-side half couplings 19 (Figure 4), e.g. ratchet couplings, and gear wheels 20 mounted on the shafts 5 and 6, and a gear wheel 21 mounted on a shaft 22 of the working member 7 (Figure 1). The gear wheels 20 are pressed to the half-couplings 19 by springs 23.  
25

The claimed device operates as follows.

In the initial position the sleeve 10 (Figure 1) is wound on the drum 8 and the spring 12 is coiled. The distribution valve 15 switches the system 14 for supply of  
30 a fluid medium, e.g. gas, into the chamber 2. In doing so, the valve 16 is closed, while the valve 17 is open. The sleeve 10 is unwound from the drum 8 transmitting a torque to the shaft 5 and coiling the spring 12.

In this case the sleeve 11 is wound on the drum 9  
35 under the effect of the gas pressure developed in the



pipeline 4 during the unwinding of the sleeve 10 and under the action of the force produced by the uncoiling spring 13. The valve 16 of the chamber 2 opens, while the valve 17 of the chamber 3 closes. The distribution  
5 valve 15 switches the system 14 for supplying the gas into the chamber 3. The sleeves 10 and 11 move in reverse directions: the sleeve 10 is wound on the drum 8, while the sleeve 11 is unwound from the drum 9. The fluid medium is fed into the chamber 2 and the whole  
10 operating cycle of the device is repeated. In this case the shafts 5 and 6 rotate in opposite directions: one of them performs a working stroke, while the other one performs an idle run.

In order to provide reversible rotation of the shafts  
15 5 and 6 (this is necessary when moving the working member during grinding, planing or soil cultivation), the ends of the sleeves 10 and 11 (Figure 3) are secured on the drums 8 and 9 in different directions, in which case the sleeve 10 is wound and the spring 12 is uncoiled,  
20 while the sleeve 11 is stretched and the spring 13 is coiled. The valve 15 switches the system 14 for supply of a fluid medium into the chamber 2, in which case the valve 16 of the chamber 2 is closed, while the valve 17 of the chamber 3 is open. The sleeve 10 is being unwound  
25 from the drum 8 transmitting a torque to the shaft 5 and coiling the spring 12. In so doing, the sleeve 11 is wound on the drum 9 under the action of the fluid medium in the space of the pipeline 4 and under the force produced when uncoiling the spring 13. The valve 16  
30 of the chamber 2 opens, while the valve 17 of the chamber 3 closes, and the distribution valve 15 switches the system 14 for supply of the fluid medium into the chamber 3. The sleeves 10 and 11 move in a reverse direction. The fluid medium is fed into the chamber 2 and the  
35 operating cycle of the device is repeated. During the working stroke the torque is transmitted to the gear



wheel 21 mounted on the shaft 22 through the single-side half-coupling 19 (Figure 4) of the gear wheel 20. The shaft 22 rotates continuously in one direction.

5 In order to provide rotation of the shafts 5 and 6 (Figure 3) in opposite directions, the sleeves 10 and 11 in their initial position are unwound from the drums 8 and 9 under the effect of compressed gas in the spaces of the chambers 2 and 3, while the springs 12 and 13 are coiled. The valve 15 is opened and the gas is fed into  
10 the space of the pipeline 4. The sleeves 10 and 11 are wound on the drums 8 and 9 under the gas pressure produced in the space of the pipeline 4 and under the action of the force arising when uncoiling the springs 12 and 13. Gas in the chambers 2 and 3 is compressed, then the  
15 valve 15 is closed while the valve 18 is opened and under the effect of the compressed gas in the chambers 2 and 3 the sleeves 10 and 11 are unwound from the drums 8 and 9, thus rotating the shafts 5 and 6 and coiling the springs 12 and 13. The valve 18 is closed, gas again is fed into  
20 the space of the pipeline 4, and the operating cycle of the device is repeated. In this case the shafts 5 and 6 rotate in opposite directions: one of them performs a working stroke while the other one performs an idle run.

25 Owing to the fact that the sleeves 10 and 11 move in the pipeline 4 without sliding along its inner surface, the claimed invention allows the following positive effects to be obtained:

30 - higher operational efficiency since there is no sliding friction of the sleeves 10, 11 with respect to the pipeline 4;

- higher operational reliability and service life of the device since the sleeves 10 and 11 are not subject to wear;

35 - a simpler design of the device due to less stringent requirements to the accuracy and surface finish;



- the power of the device is increased, because it is possible to drastically increase the pressure in the chambers 2 and 3, since the sleeves 10 and 11 are tightly connected to the chambers 2 and 3;

- 5        - the specific amount of metal needed for making the device is reduced since the volume of the chambers 2 and 3 may be equal to a few hundred cubic meters.

#### Industrial Applicability

- 10       The invention can be used both in stationary actuating mechanisms and in vehicles.

- 15       Furthermore, the invention can successfully be used as a hydropneumatic drive of drawing mechanisms or drives used in machine-tool industry and wood industry for transmitting motion to a working member, e.g. spindle of a grinding or planing machine.

The fluid medium may be gas or liquid.

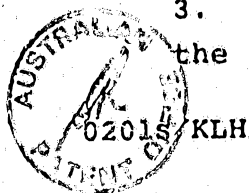


THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A device for converting energy of a fluid medium into mechanical work of a working member, the device comprising two chambers disposed opposite each other within a housing, each chamber having a piston connected to the working member through a kinematic connection arranged to transmit motion from the piston to the working member and there being a system having a distribution valve for supplying a first fluid medium, the device characterised by the chambers being interconnected within the housing by a pipeline and there being a pressure space communicating with the fluid medium supply system located within the housing, the kinematic connection of each piston to the working member including a shaft mounted in respective chambers, one end of each shaft being connected to the working member while the other end of each shaft being connected to a drum, each of the drums having a reverser to assist movement of the shaft in a predetermined direction, the pistons being in the form of first and second elastic sleeves, wherein one end of each sleeve is turned inside out and secured to the inner surface of the pipeline at the point of its connection with its respective chamber while the other end thereof is secured to its respective drum.

2. A device according to claim 1, characterised in that the first elastic sleeve is wound on its respective drum, while the second elastic sleeve extends along the pipeline throughout the entire length of the sleeve and having one end thereof being secured to its respective drum so that its winding on its respective drum is effected in a direction opposite to the direction of winding of the first elastic sleeve, the pressure space communicating with the fluid supply system being located in the chambers, and the space of the pipeline defined between the surfaces of the elastic sleeves being filled with a second fluid medium.

3. A device according to claim 1, characterised in that the first elastic sleeve is wound on its respective drum,



while the second elastic sleeve extends along the pipeline throughout the entire length of the sleeve and having one end thereof secured to its respective drum so that its winding on its respective drum it is effected in a direction  
5 coinsiding with the direction of winding of the first elastic sleeve, the pressure space communicating with the fluid medium supply system being located within the chambers, and the space of the pipeline defined between the surfaces of the elastic sleeves being filled with a second  
10 fluid medium.

4. A device according to claim 1, characterised in that both the first and second elastic sleeves extend along the pipeline through their whole length, the pressure space  
15 communicating with the fluid medium supply system being located in the space in the pipeline defined between the surfaces of the elastic sleeves and this space in the pipeline also communicating with the ambient atmosphere, and the chambers being filled with a second fluid medium.

5. A device according to claim 2, characterised in that each shaft is connected to the working member by a ratchet half coupling and a gear wheel mounted on each shaft, and a gear well mounted on a shaft of the working member.

6. A device according to any one of claims 1 to 5, characterised in that the reverser of each drum is made in the form of a laminar spring, one end of which is secured to its respective drum, while the other end is fixed to the  
30 wall of its respective chamber.

7. A device for converting energy of a fluid medium into mechanical work of a working member substantially as hereir defined with reference to the accompanying drawings.

35 DATED this 14th day of February, 1990

TREST "JUZHVOVOPROVOD"

By their Patent Attorneys

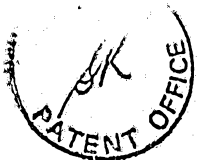
GRIFFITH HACK & CO.



DEVICE FOR CONVERTING ENERGY OF FLUID MEDIUM INTO  
MECHANICAL WORK OF WORKING MEMBER

ABSTRACT

According to the invention, the device comprises a  
5 housing (1), two chambers (2, 3) interconnected through  
a pipeline (4) and disposed in the housing opposite to  
each other. Each chamber (2 or 3) has a piston made  
in the form of an elastic sleeve (10 or 11), whose one  
end is turned inside out and secured to the inner surface  
10 of the pipeline (4) at the point of its connection to  
the chamber (2 or 3). Each piston is kinematically con-  
nected to the working member (7) via a shaft (5 or 6)  
mounted in the chamber (2 or 3), one end of which is  
kinematically connected to the working member (7), and a  
15 drum (8 or 9) connected to the other end of the shaft  
(5 or 6) and provided with a reverser. Secured on the  
drums (8 and 9) are the other ends of the sleeves (10  
and 11). The pressure space formed by the spaces of  
the chambers (2, 3) and the space of the pipeline (4) is  
20 communicated with a fluid medium supply system (14).



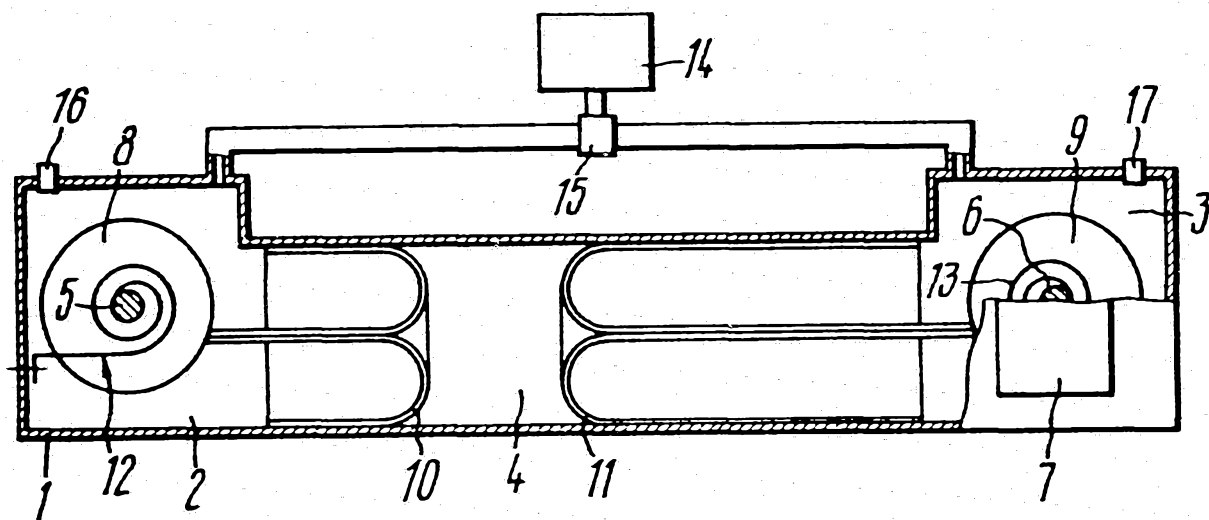
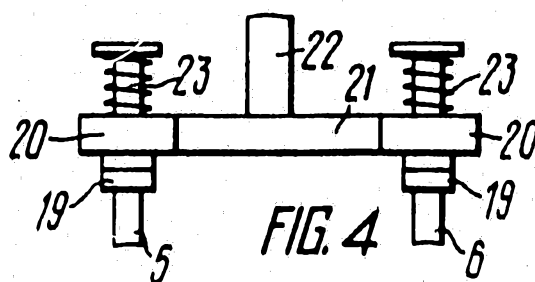
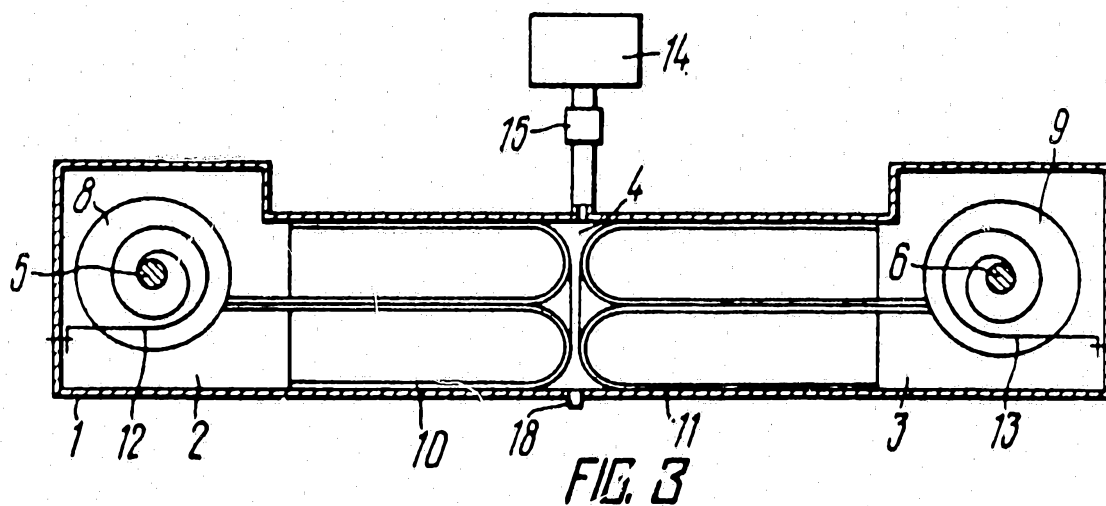
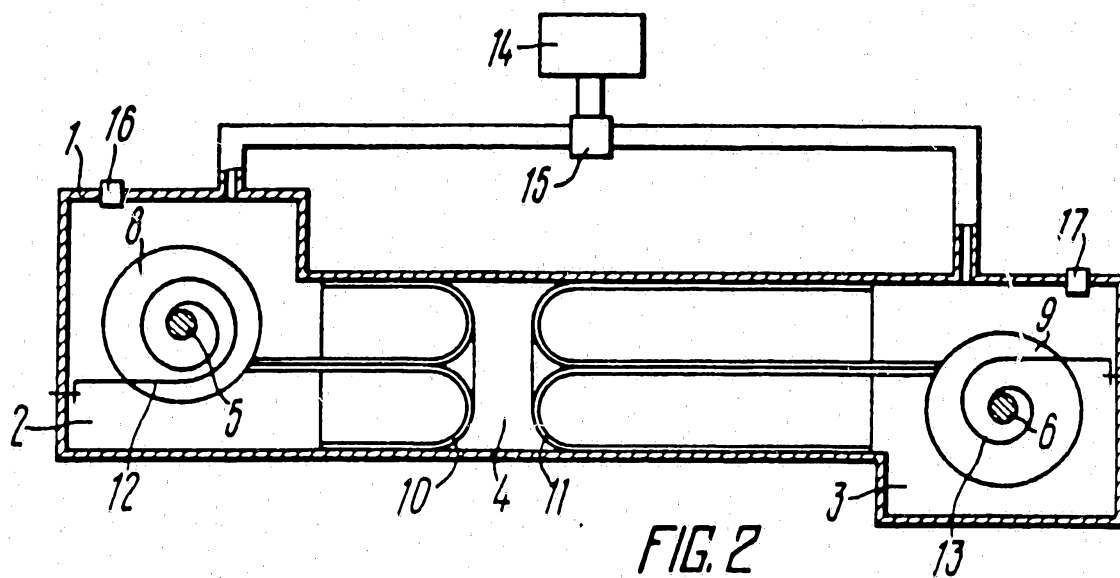


FIG. 1

1/2

2/2



# INTERNATIONAL SEARCH REPORT

International Application No. PCT/SU 86/00134

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC <sup>4</sup> : F 15 B 15/10		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC <sup>4</sup> : F 15 B 15/10		
Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched *		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT *</b>		
Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	SU, A1, 861727, (V.N. Uryadko), 07 September 1981 (07.09.81), see figures 3,4, column 3, line 10	1
	--	
A	SU, A1, 703680, (R.Z. Kozhevnikov), 18 December 1979 (18.12.79), see figures 1,2, column 3, line 25	2
	--	
A	SU, A1, 918590, (V.N. Uryadko), 07 April 1982 (07.04.82), see figure 2, column 3, line 10	4
	--	
A	SU, A1, 1097822, (V.N. Uryadko), 15 June 1984 (15.06.84), see figure 1, column 1	1
	--	
A	Elektrosvyaz, N <sup>o</sup> 3, 1973 (Svyaz, Moscow), G.Z. Aizenberg et al. "Pnevmaticheskie anteny", page 24, figures 6,7	1
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"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.</p> <p>"A" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
27 March 1987 (27.03.87)		13 April 1987 (13.04.87)
International Searching Authority		Signature of Authorized Officer
ISA/SU		

# ОТЧЕТ О МЕЖДУНАРОДНОМ ПОИСКЕ

Международная заявка № PCT/SU 86/00134

<b>I. КЛАССИФИКАЦИЯ ОБЪЕКТА ИЗОБРЕТЕНИЯ</b> (если приспосаиваются несколько классификационных индексов, укажите все) <sup>8</sup>		
В соответствии с Международной классификацией изобретений (МКИ) или как в соответствии с национальной классификацией, так и с МКИ		
<b>МКИ<sup>4</sup> - F 15 B 15/10</b>		
<b>II. ОБЛАСТИ ПОИСКА</b>		
Минимум документации, охваченной поиском <sup>7</sup>		
Система классификации	Классификационные рубрики	
<b>МКИ<sup>4</sup></b>	<b>F 15 B 15/10</b>	
Документация, охваченная поиском и не входившая в минимум документации, в той мере, насколько она входит в область поиска <sup>8</sup>		
<b>III. ДОКУМЕНТЫ, ОТНОСЯЩИЕСЯ К ПРЕДМЕТУ ПОИСКА<sup>9</sup></b>		
Категория	Ссылка на документ <sup>11</sup> , с указанием, где необходимо, частей, относящихся к предмету поиска <sup>12</sup>	Относится к пункту формулы №1 <sup>13</sup>
A	SU AI, 861727, (В.Н.Урядко), 07 сентября 1981 (07.09.81), смотри фиг. 3, 4, колонку 3, строка 10	I
A	SU AI, 703680, (Р.З.Кожевников), 18 декабря 1979 (18.12.79), смотри фиг. 1, 2, колонку 3, строка 25	2
A	SU AI, 918590, (В.Н.Урядко), 07 апреля 1982 (07.04.82), смотри фиг. 2, колонку 3, строка 10	4
A	SU AI, 1097822, (В.Н.Урядко), 15 июня 1984 (15.06.84), смотри фиг. 1, колонку 1	I
A	Электросвязь, №3, 1973, (Связь Москва), Г.З. Айзенберг и другие "Пневматические антенны", с. 24, рис. 6.7	I
* Особые категории ссылочных документов <sup>10</sup>		
.A* документ, определяющий общий уровень техники, который не имеет наиболее близкого отношения к предмету поиска.		
.E* более ранний патентный документ, но опубликованный на дату международной подачи или после нее.		
.L* документ, подвергающий сомнению притязание(я) на приоритет, или который приводится с целью установления даты публикации другого ссылочного документа, а также в других целях (как указано).		
.O* документ, относящийся к устному раскрытию, применению, выставке и т. д.		
.P* документ, опубликованный до даты международной подачи, но после даты испрашиваемого приоритета.		
.T* более поздний документ, опубликованный после даты международной подачи или даты приоритета и не порочащий заявку, но приведенный для понимания принципа или теории, на которых основывается изобретение.		
.X* документ, имеющий наиболее близкое отношение к предмету поиска; заявленное изобретение не обладает новизной и изобретательским уровнем.		
.Y* документ, имеющий наиболее близкое отношение к предмету поиска; документ в сочетании с одним или несколькими подобными документами порочит изобретательский уровень заявленного изобретения, такое сочетание должно быть очевидно для лица, обладающего познаниями в данной области техники.		
& документ, являющийся членом одного и того же патентного семейства.		
<b>IV. УДОСТОВЕРЕНИЕ ОТЧЕТА</b>		
Дата действительного завершения международного поиска	Дата отправки настоящего отчета о международном поиске	
<b>27 марта 1987 (27.03.87)</b>	<b>13 апреля 1987 (13.04.87)</b>	
Международный поисковый орган	Подпись уполномоченного лица	
<b>ISA/SU</b>	<b>В.Балов</b>	