



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
15.07.2020 Bulletin 2020/29

(51) Int Cl.:
B25D 17/00 (2006.01)

(21) Application number: **17924085.8**

(86) International application number:
PCT/RU2017/000755

(22) Date of filing: **12.10.2017**

(87) International publication number:
WO 2019/050428 (14.03.2019 Gazette 2019/11)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **06.09.2017 RU 2017131321**

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(54) **HYDRAULIC HAMMER**

(57) The invention relates to the mining and construction industry and is directed toward increasing the operating efficiency and reliability of a hydraulic hammer by increasing heat transfer (cooling) and lowering the temperature both of the hydraulic hammer as a whole and of a liner thereof without complicating the structure of the hydraulic hammer. This technical result is achieved in a hydraulic hammer consisting of a housing having a pressure port and a drain port and having a liner disposed in said housing that has a pressure groove and a pressure port, a head that is disposed inside of the liner such that it can move reciprocally and that interacts with a working instrument, and a pressure line and a drain line, moreover, on the outer surface of the liner, there are annular grooves and two longitudinal canals, said canals being diametrically opposite one another.

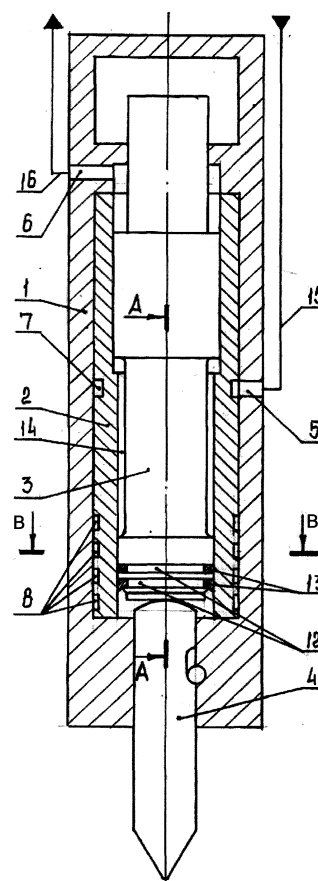


Figure 1

Description

[0001] This invention relates to the mining and construction industry, in particular, to hydraulic impact mechanisms, and is intended for use as removable equipment for construction and road-building machines for the destruction of coherent rocks, road surfaces, concrete structures and the like.

[0002] A hydraulic hammer containing a bushing, in the wall of which there are many passages for communication with the first set of holes and the second set of holes and the supply of fluid medium is known from the prior art. The passages contain a porous medium to ensure the flow of hydraulic fluid through it. The porous structure is a honeycomb structure used to increase surface area, which increases the heat dissipation rate (US 2017080554, March 23, 2017).

[0003] The disadvantage of this impact mechanism is the complexity and high cost of the structure, low efficiency, and the lack of heat removal directly from its source.

[0004] The submitted invention is intended to solve a technical problem, which is the expansion of the technical means of hydraulic hammers, the characteristics of which provide an effective, durable and reliable hydraulic hammer by reducing heat loads directly in the zone of their occurrence with a simple design.

[0005] The technical effect achieved by the implementation of this invention is an increase in the efficiency, durability, and reliability of operation of the hydraulic hammer by increasing heat transfer (provision of cooling) from the heating zone and lowering the temperature of both the sleeve and the hydraulic hammer as a whole without significantly complicating the design of the hydraulic hammer.

[0006] The specified technical effect is achieved by a hydraulic hammer comprising a housing with pressure and drain holes and with a sleeve located in it, made with a pressure cut and a pressure hole, a head located in the sleeve and configured to reciprocate and interact with the working piece, pressure and drain lines, wherein the outer surface of the sleeve has circular cuts and two diametrically opposite longitudinal channels.

[0007] One of the longitudinal channels is connected to the pressure hole of the sleeve, and the other channel is connected to the pressure line through the pressure cut of the sleeve and the pressure hole of the housing.

[0008] In the bottom part on the outer surface of the head there is at least one circular groove with a seal installed in it.

[0009] Both longitudinal channels are made with the possibility of intersection with at least one circular cut of the sleeve.

[0010] Circular cuts and two diametrically opposite longitudinal channels made on the outer surface of the sleeve with a simultaneous increase in the area of the outer surface of the sleeve to accelerate heat dissipation, and the organization of the hydraulic fluid flow through

them, eliminate overheating of the working surfaces of the sleeve preventing its failure, as well as failure of the head, the seals and the hydraulic hammer as a whole, which increases the efficiency, durability, and reliability of operation of the hydraulic hammer without significantly complicating the design of the hydraulic hammer.

[0011] The essence of the invention is explained in the drawings, where Fig. 1 shows a general arrangement of the hydraulic hammer; Fig. 2 shows section A-A in Fig. 1; Fig. 3 shows section B-B in Fig. 1.

Adopted designations:

[0012]

- 1 - housing,
- 2 - sleeve,
- 3 - head,
- 4 - working piece,
- 5 - pressure hole,
- 6 - drain hole,
- 7 - pressure cut,
- 8 - circular cuts,
- 9 - first longitudinal channel,
- 10 - second longitudinal channel,
- 11 - pressure hole,
- 12 - circular grooves,
- 13 - seals,
- 14 - cocking cavity,
- 15 - pressure line,
- 16 - drain line.

[0013] The hydraulic hammer includes housing 1, sleeve 2, head 3 and working piece 4.

[0014] Pressure hole 5 and drain hole 6 are made in housing 1.

[0015] On the outer surface of sleeve 2 there is a pressure cut 7, cuts 8 and diametrically opposite first longitudinal channel 9 and second longitudinal channel 10. The wall of the sleeve has a pressure hole 11 connected to longitudinal channel 10.

[0016] In the lower part of head 3, there are circular grooves 12 in which seals 13 are installed.

[0017] Sleeve 2 is installed in housing 1. Head 3 is located in sleeve 2, where it reciprocates and forms a cocking cavity 14 with it.

[0018] Pressure hole 5 is connected to pressure line 15, and drain hole 6 is connected to drain line 16.

[0019] Working piece 14 is installed at the bottom of hydraulic hammer 4.

[0020] When operated, head 3 reciprocates. Due to friction of the head and seals 13 on the inner surface of sleeve 2, the parts are heated, which reduces the reliability of the hydraulic hammer.

[0021] To reduce the heat load, the actuating fluid from pressure line 15 flowing through pressure cut 7 and the first longitudinal channel 9 into the second longitudinal channel 10 and further through pressure hole 11 into the

cocking cavity 14 passes through cuts 8, washing the lower part of sleeve 2 and cooling it.

[0022] The claimed invention increases the range of hydraulic hammer capabilities and the efficiency, durability, and reliability of the hydraulic hammer operation. 5

Claims

1. A hydraulic hammer comprising a housing with pressure and drain holes and with a sleeve located in it, made with a pressure cut and a pressure hole, a head located in the sleeve and configured to reciprocate and interact with the working piece, pressure and drain lines, wherein the outer surface of the sleeve has circular cuts and two diametrically opposite longitudinal channels. 10 15
2. The hydraulic hammer of claim 1 comprising one of the longitudinal channels connected to the pressure hole of the sleeve, and the other channel connected to the pressure line through the pressure cut of the sleeve and the pressure hole of the housing. 20
3. The hydraulic hammer of claim 1 comprising both longitudinal channels configured to intersect with at least one circular cut of the sleeve. 25
4. The hydraulic hammer of claim 1 comprising the bottom part on the outer surface of the head having at least one circular groove with a seal installed in it. 30

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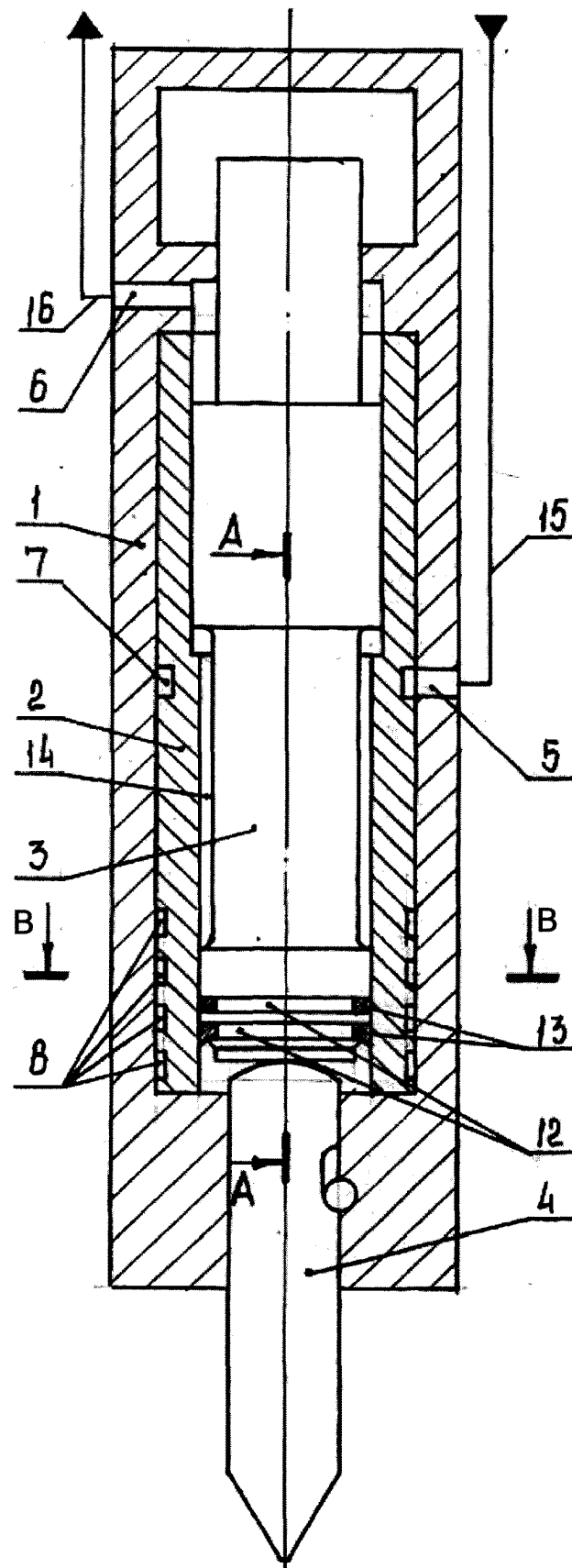


Figure 1

A-A

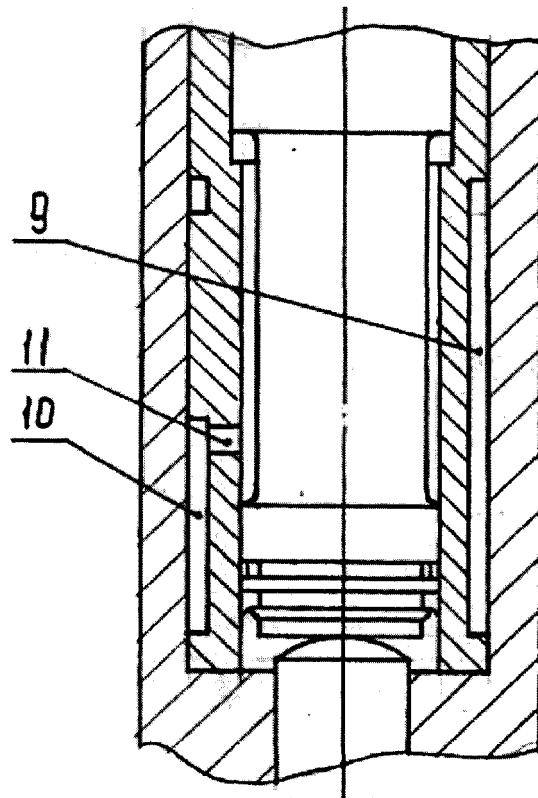


Figure 2

B-B

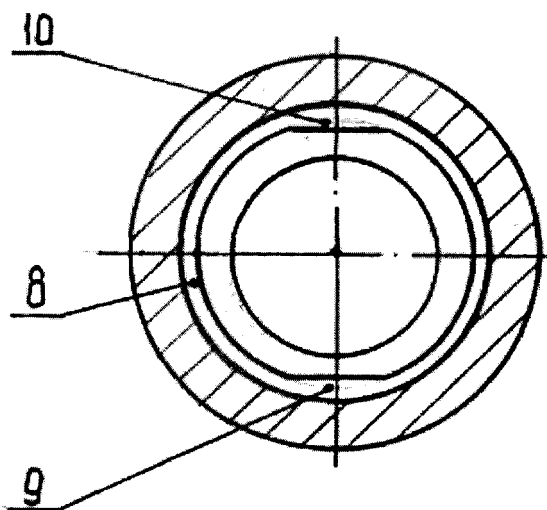


Figure 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2017/000755

A. CLASSIFICATION OF SUBJECT MATTER
B25D 17/00 (2006.01)

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)

B25D 9/00-9/26, 17/00, 17/26

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)

PatSearch (RUPTO internal), Esp@cenet, PAJ, USPTO, Information Retrieval System of FIPS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	RU 2580112 C1 (OBSHESTVO S OGRANICHENNOI OTVETSTVENNOSTJU "UKRAINSKAYA IMPULSNAYA INDUSTRIYA") 10.04.2016, p. 5, line 17 - p. 7, line 48	1-4
A	RU 2241592 C2 (OBSHESTVO S OGRANICHENNOI OTVETSTVENNOSTJU "GORNYY INSTRUMENT") 10.12.2004	1-4
A	US 4062411 A (GARDNER-DENVER COMPANY) 13.12.1977	1-4
D, A	US 2017/0080554 A1 (CATERPILLAR INC.) 23.03.2017	1-4

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

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"E" earlier application or patent but published on or after the international filing date

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"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

29 May 2018 (29.05.2018)

Date of mailing of the international search report

31 May 2018 (31.05.2018)

Name and mailing address of the ISA/

RU

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Facsimile No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2017080554 A [0002]