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

(11) **EP 3 421 619 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.01.2019 Bulletin 2019/01

(51) Int Cl.:
C21C 5/40 *(2006.01)* ***F27D 17/00*** *(2006.01)*

(21) Application number: **18179501.4**

(22) Date of filing: **25.06.2018**

(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:
KH MA MD TN

(30) Priority: **28.06.2017 RU 2017122725**

(71) Applicant: **Obschestvo S. Ogranichennoi Otvetstvennostyu "Mednogorsky Medno-Serny Kombinat"**
462270 Mednogorsk (RU)

(72) Inventors:
- **Bulatov, Konstantin Valerievich**
  620026 Ekaterinburg, Sverdlovskaya obl. (RU)
- **Ibragimov, Andrey Faritovich**
  462274 Mednogorsk, Orenburgskaya obl. (RU)
- **Iskhakov, Ilfat Ildusovich**
  624330 Krasnouralsk, Sverdlovskaya obl. (RU)
- **Lepin, Sergei Aleksandrovich**
  462274 Mednogorsk, Orenburgskaya obl. (RU)

(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

(54) ASPIRATION COVER OF CONVERTER DUST CAP

(57) The invention relates to metallurgy and more particularly to fume and dust extraction devices. The object is to maximize collection of uncontrolled emissions of dusty aspiration fumes from under the converter dust cap. Aspiration cover of converter dust cap is adapted to be mounted on frame of the converter dust cap and comprises a body, a rotating shutter and movable doors. The body is provided with a gas flue. The rotating shutter has a rotating shutter drive and is rotatable at an angle of up to 25°. The movable doors comprise a vertical part and an inclined part pivotally connected at an angle of 120-130° to each other and having a movable doors drive.

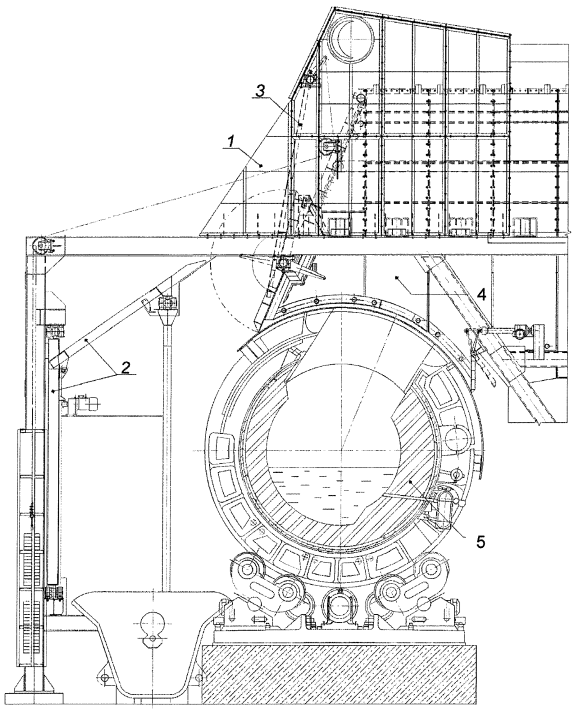

FIG. 1

EP 3 421 619 A1

Description

[0001] The invention relates to metallurgy and more particularly to fume and dust extraction devices.

[0002] The prior art most closely related to the present invention is a converter cover and a dust cap disclosed in Inventor's Certificate SU 466290. The cover comprises a movable shutter formed by two (right and left) front walls, an inclined rotating shutter with brakes for retaining the same and rotation mechanisms, two stationary sidewalls and two side flues. The dust cap is separated from the shelter by a sectional plate. The rotation mechanism of the inclined shutter comprises two double-armed levers, one arm of each lever being connected to a drive, and the other to a counterweight.

[0003] However, the cover does not provide a sufficient efficiency of fume and dust extraction because in blowing position of the converter fumes are trapped from a large space covered by two front moving walls, and a great amount of aspiration fumes is captured.

[0004] The technical problem to be solved by the present invention is the low efficiency of collecting uncontrolled emissions of dusty aspiration fumes from under the converter dust cap.

[0005] The object of the invention is to maximize the collection of uncontrolled emissions of dusty aspiration fumes from under the converter dust cap.

[0006] The object is achieved owing to the fact that an aspiration cover of a converter dust cap is adapted to be mounted on a frame of the converter dust cap and comprises a body, a rotating shutter and movable doors, the body being provided with a gas flue, wherein the rotating shutter has a rotating shutter drive and is rotatable at an angle of up to 25°, and the movable doors comprise a vertical part and an inclined part pivotally connected at an angle of 120-130° to each other and having a movable doors drive.

[0007] The body can be made up of vertical, horizontal and inclined panels.

[0008] The panels can be made of steel.

[0009] The panel can comprise a rectangular angle-framed sheet,

[0010] The joints between the panels can be sealed with an asbestos cord.

[0011] The rotating shutter can comprise a ribbed fire sheet.

[0012] The cover can comprise a first shaft and a counterweight, said rotating shutter being connected to the first shaft that is connected to the rotating shutter drive on one side and to the counterweight on the other side.

[0013] The rotating shutter can be welded to the first shaft.

[0014] The first shaft can be connected to the counterweight through a block and tackle system.

[0015] The first shaft can be connected to the rotating shutter drive via a lever.

[0016] The first shaft can be mounted in bearing housings.

[0017] The housings of bearings can be adapted to be secured to a dust cap frame.

[0018] The gas flue can be disposed in the upper part of the body.

[0019] The movable doors can be supported by rollers.

[0020] The movable doors drive can comprise a second shaft with sprockets mounted thereon, the sprockets being engaged with a chain that is secured on the vertical part of the movable doors.

[0021] The inventive arrangement of the movable doors at an angle of 120-130° to each other and the rotation ability of the shutter at an angle of up to 25° are chosen in view of supposed uncontrolled emission and enable collection and evacuation of aspiration fumes during both tapping operation and blowing operation of the converter, thereby maximizing the collection of uncontrolled emissions of dusty aspiration fumes from under the convertor dust cap.

[0022] During the process steps the rotating shutter of the aspiration cover operates in conjunction with a rotary lid of the dust cap and the movable doors, forming together a general aspiration system.

[0023] Owing to its structure, in particular the attachment and drive mechanisms, and steel plates in the shape of a rectangular angle-framed sheet, sealing the joints between the panels with an asbestos cord, and making the rotating shutter as a ribbed fire sheet, the inventive device ensures the compliance with all safety requirements to the convertor operation.

[0024] The present invention is disclosed with reference to Figs. 1 to 5, where:

Fig. 1 shows an aspiration cover mounted on a converter dust cap in blowing position of the converter.
Fig. 2 is a side view of the aspiration cover;
Fig. 3 is a front view of the aspiration cover;
Fig. 4 is a front view of the aspiration doors:

Fig. 5 is a side view of the aspiration doors.

Reference numerals 1-16 in Figs 1 to 5 stand for:

[0025]

1 - body of aspiration cover;
2 - movable doors;
3 - rotating shutter;
4 - dust cap;
5 - converter;
6 - dust cap frame;
7 - gas flue;
8 - rotating shutter drive;
9 - bearing housing;
10 - first shaft;
11 - counterweight;
12 - vertical part of movable doors;
13 - inclined part of movable doors;
14 - bearing metal structures of movable doors;

15 - roller;
16 - movable doors drive.

[0026] Aspiration cover of a dust cap 4 of a converter 5 is adapted to be mounted on a dust cap frame 6 and comprises a body 1, a rotating shutter 1 and movable doors 2.

[0027] Upper part of the body 1 is provided with a gas flue 7.

[0028] The movable doors 2 comprise a vertical part 12 and an inclined 13 part, which are pivotally connected at an angle of 120-130° to each other, supported by rollers 15 and have a movable doors drive 16, in this case a motor reducer. Sprockets are mounted on a second shaft of the movable doors drive 2 in engagement with a chain that is secured on the vertical part 12 of the movable doors 2.

[0029] In assembled state, the aspiration cover is mounted on a dust cap frame 6 of the converter 5 directly above it.

[0030] The rotating shutter 3 is disposed over the mouth of the converter 5 on the service passage side.

[0031] The aspiration cover body 1 is made up of steel panels arranged vertically, horizontally and obliquely.

[0032] A panel comprises a preferably rectangular angle-framed sheet that serves as a flange to attach to the other panels forming the body 1 by means of metal items.

[0033] Joints between the panels and other stationary parts forming the aspiration cover body 1 are sealed with an asbestos cord.

[0034] Flues 7 are cut in the upper part of the aspiration cover body 1 on both sides for withdrawal of aspiration fumes, which are then conveyed to a gas cleaning section.

[0035] Design of the flues 7 takes into account the aggressive atmosphere of fumes, their abrasive nature, amounts and the compliance with all safety requirements.

[0036] The rotating shutter 3 comprises a fire sheet reinforced with ribs and welded to a first shaft 10. The first shaft 10 is connected, via a lever, to a rotating shutter drive 8 on one side and, via a block and tackle system, to a counterweight 11 on the other side.

[0037] The first shaft 10 of the rotating shutter 3 is mounted in bearing housings 9, which are secured to the dust cap frame 6 by means of racks.

[0038] The dust cap frame 6 is a welded metal structure consisting of T-beams fastened together by ties. The beams are mounted on columns that are secured to foundation.

[0039] The rotating shutter drive 8 is designed to rotate the rotating shutter 3 in the process and repair operations at an angle of up to 25°. The rotating shutter drive 8 can be also based on a motor reducer. End switches turn off the rotating shutter drive 8 at extreme positions of the rotating shutter 3.

[0040] To avoid damage to the rotating shutter 3 during process steps such as ladling, deskulling of the mouth, etc., a restraint element is mounted on the dust cap frame 6 on the service passage side.

[0041] The movable aspiration doors 2 comprise a composite structure including bearing metal structures 14 such as supports and beams, on which movable steel panels of the vertical 12 and inclined 13 parts of the movable doors 2 are mounted on the front of the converter 5.

[0042] In a particular embodiment, a fume cleaning area is disposed eastwards of a copper smelting shop. The area comprises bag filters, smoke exhausters, compressors disposed in a separate building, and a flue extending from the point of cutting into a fume collector at the exit of the copper smelting shop to the existing chimney shaft.

[0043] The device works in the following manner.

[0044] The vertical 12 and inclined 13 parts of the movable doors 2 are pivotally connected at an angle and supported by rollers 15, on which they are moving when the movable doors drive 16 is turned on. A chain is secured on the vertical panels 2, and movable doors drives 16 with sprockets mounted on drive shafts are installed on rigidly fixed beams. As the sprockets rotate, the chain is advanced and, accordingly, the chain moves the panel in the direction of closing and opening. A limit switch issues end-of-motion command.

[0045] The area, where a ladle for tapping slag and molten metal is disposed, is closed by the movable doors 2 and the rotating shutter 3 for the time of tapping and rotating the converter 5.

[0046] In blowing operation of the converter 5 the rotating shutter 3 of the aspiration cover is elevated to upper position at angle of 25°, and the movable doors 2 and the lid of the dust cap 4 are closed.

[0047] As the converter 5 runs out from blowing operation, the lid of the dust cap 4 is elevated at angle 120° towards the restraint element, the movable doors 2 are opened and the rotating shutter 3 of the aspiration cover is lowered to its lowest position.

Exemplary Embodiment

[0048] A cover is a body having a rectangular section of 4300x5300x4100. The aspiration cover body comprises 31 steel panels arranged vertically, horizontally and obliquely. A flue has a diameter of 800 mm. A fire sheet measures 4050x4325 mm, and a first shaft has a diameter of 150 mm. Vertical part of the movable doors has a size of 4600x5400 mm, and inclined part has a size of 3350x3450 mm.

[0049] The above examples are particular embodiments and do not cover all possible embodiments of the invention.

[0050] Those skilled in the art will appreciate that other variations of the present method do not alter the essence of the invention, but only define specific embodiments thereof.

Claims

1. An aspiration cover of a converter dust cap, ***characterized in that*** the cover is adapted to be mounted on a frame of the converter dust cap and comprises a body, a rotating shutter and movable doors, the body being provided with a gas flue, wherein the rotating shutter has a rotating shutter drive and is rotatable at an angle of up to 25°, and the movable doors comprise a vertical part and an inclined part pivotally connected at an angle of 120-130° to each other and having a movable doors drive.

2. The cover according to claim 1, ***characterized in that*** the body comprises vertical, horizontal and inclined panels.

3. The cover according to claim 2, ***characterized in that*** the panels are made of steel.

4. The cover according to claim 2, ***characterized in that*** the panel comprises a rectangular angle-framed sheet.

5. The cover according to claim 2, ***characterized in that*** joints between the panels are sealed with an asbestos cord.

6. The cover according to claim 1, ***characterized in that*** the rotating shutter comprises a ribbed fire sheet.

7. The cover according to claim 1, ***characterized in that*** the cover comprises a first shaft and a counterweight, wherein said rotating shutter is connected to the first shaft, which is connected to the rotating shutter drive on one side and to the counterweight on the other side.

8. The cover according to claim 7, ***characterized in that*** the rotating shutter is welded to the first shaft.

9. The cover according to claim 7, ***characterized in that*** first shaft is connected to the counterweight via a block and tackle system.

10. The cover according to claim 7, ***characterized in that*** the first shaft is connected to the rotating shutter drive via a lever.

11. The cover according to claim 7, ***characterized in that*** the first shaft is mounted in bearing housings.

12. The cover according to claim 11, ***characterized in that*** the bearing housings are adapted to be secured to a dust cap frame.

13. The cover according to claim 1, ***characterized in that*** the gas flue is disposed in the upper part of the body.

14. The cover according to claim 1, ***characterized in that*** the movable doors are supported by rollers.

15. The cover according to claim 1, ***characterized in that*** the movable doors drive comprises a second shaft with sprockets mounted thereon, the sprockets being engaged with a chain that is secured on the vertical part of the movable doors.

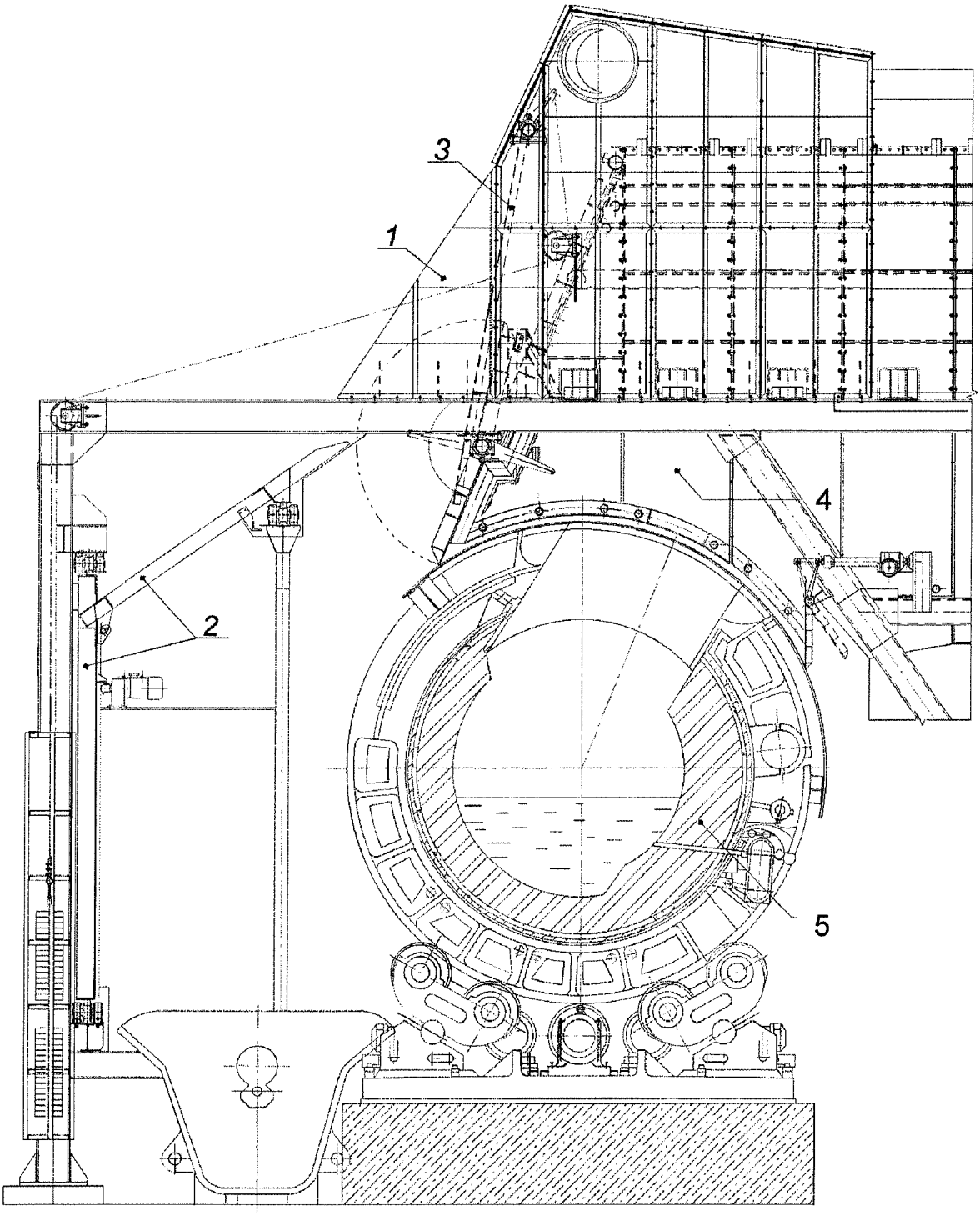

FIG. 1

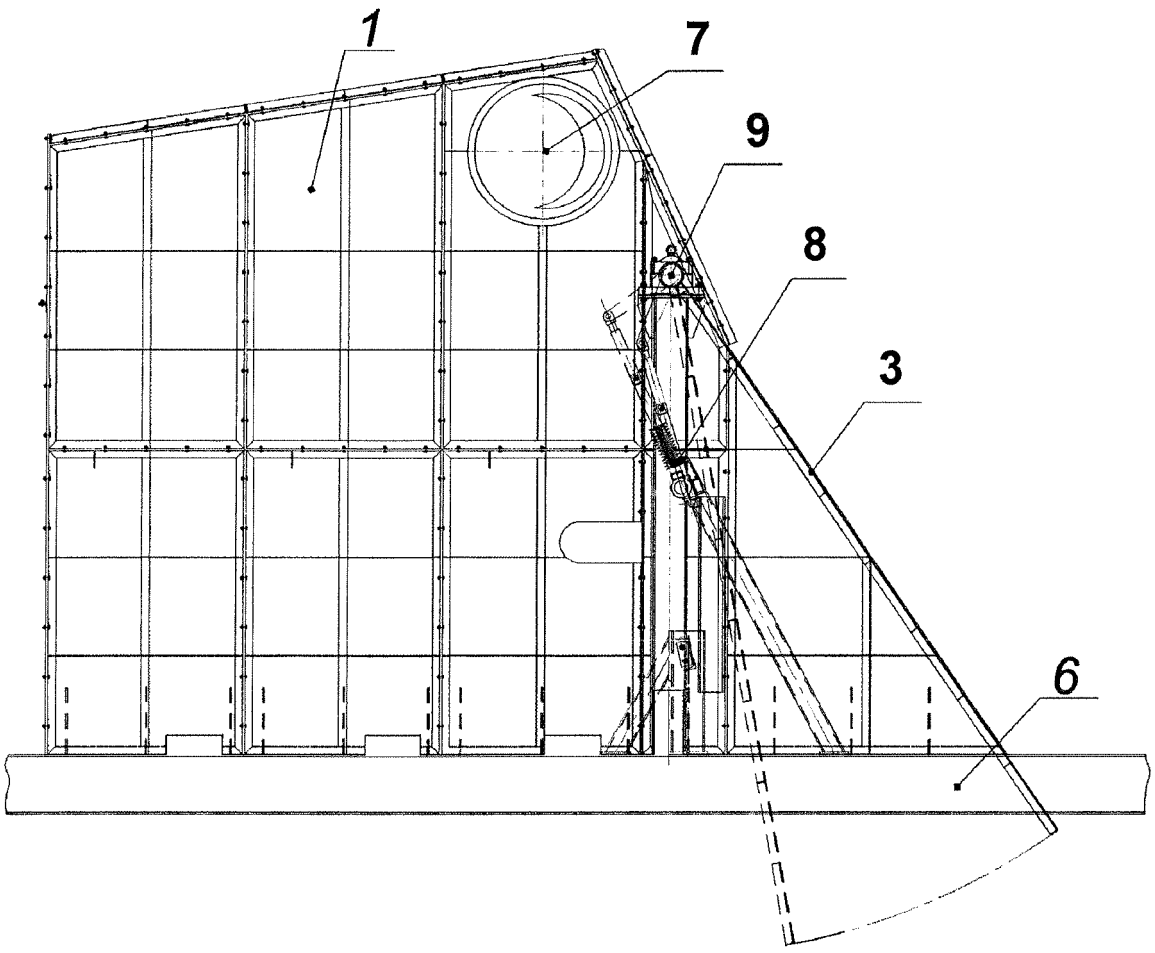

FIG. 2

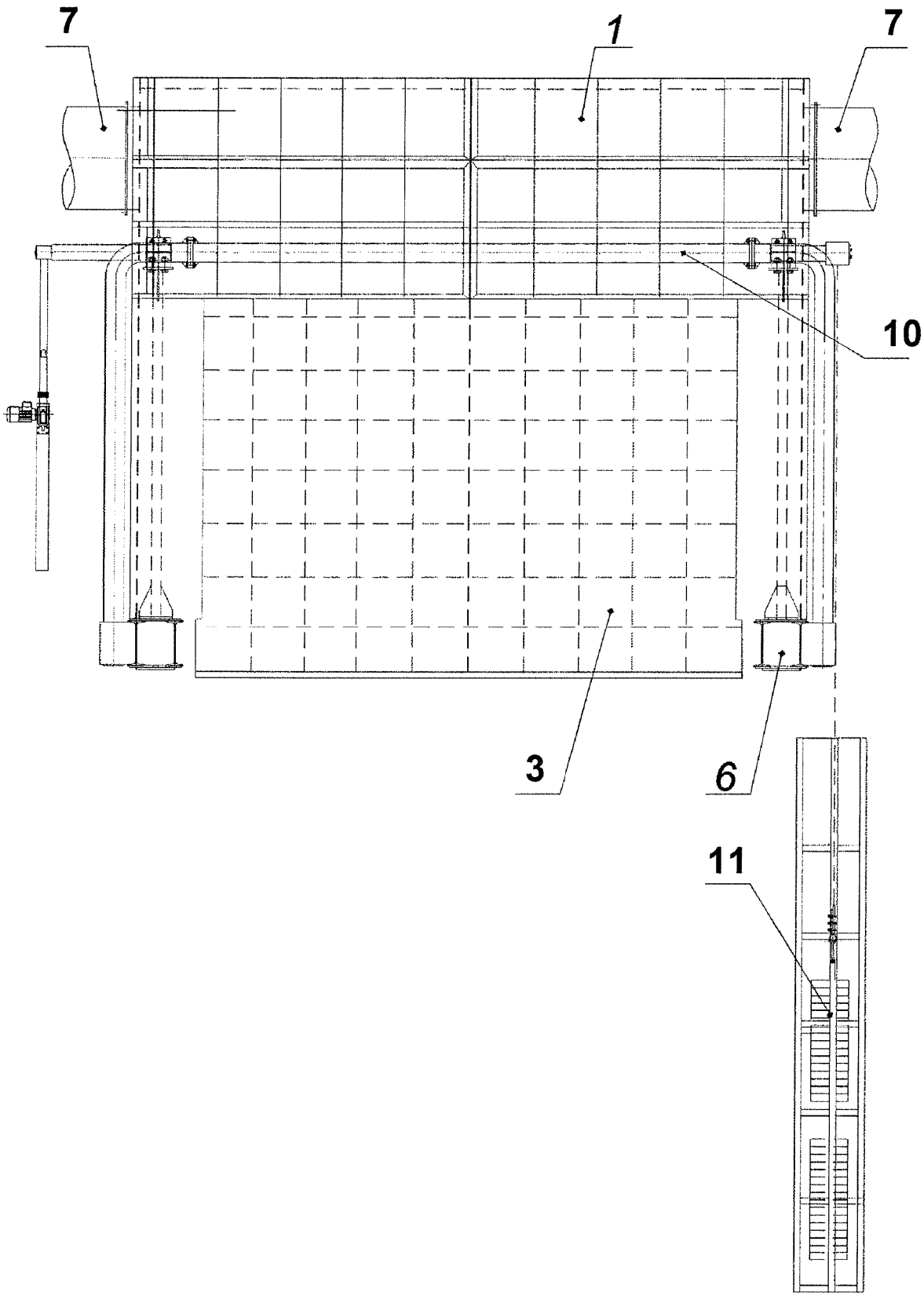

FIG. 3

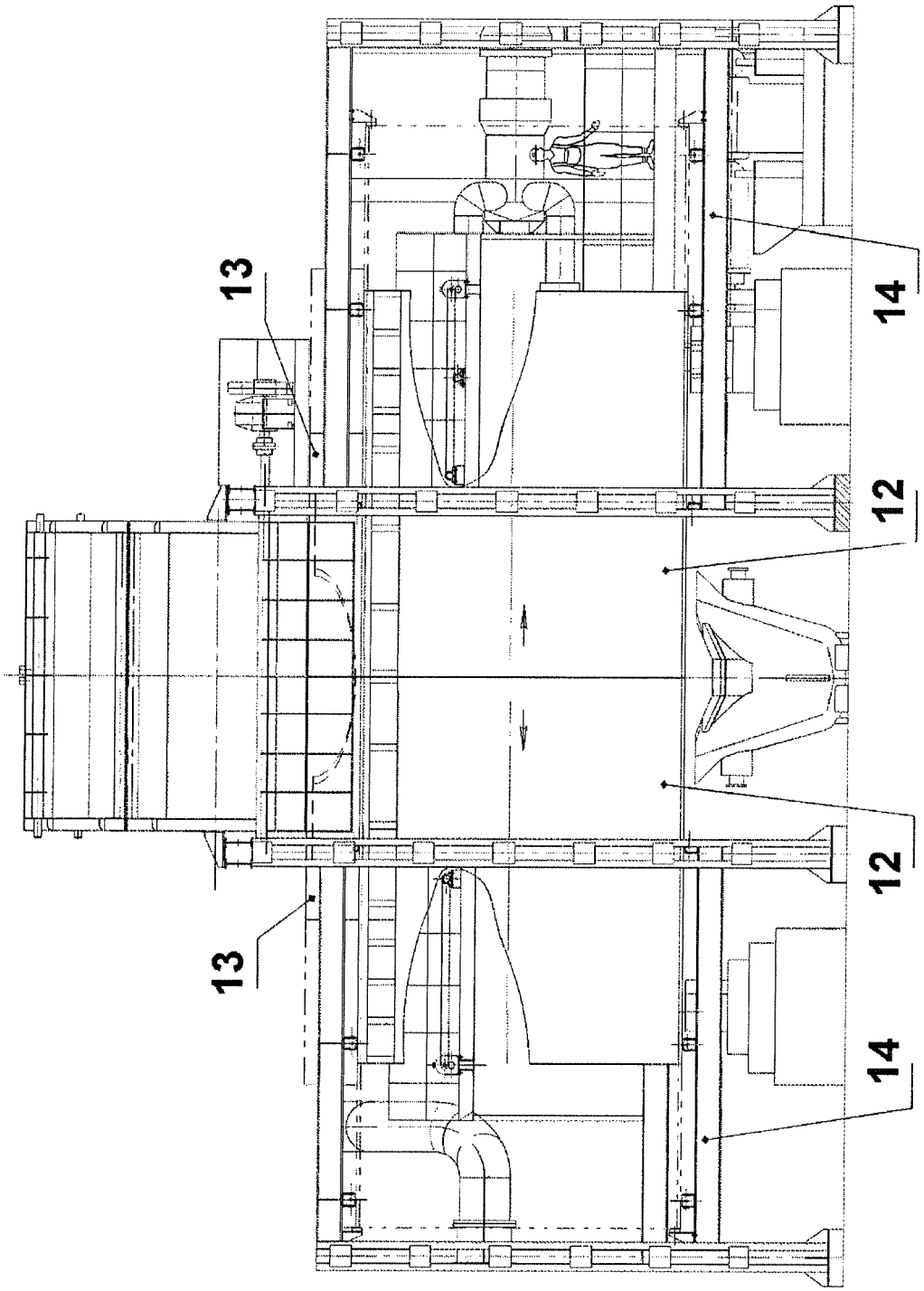

FIG. 4

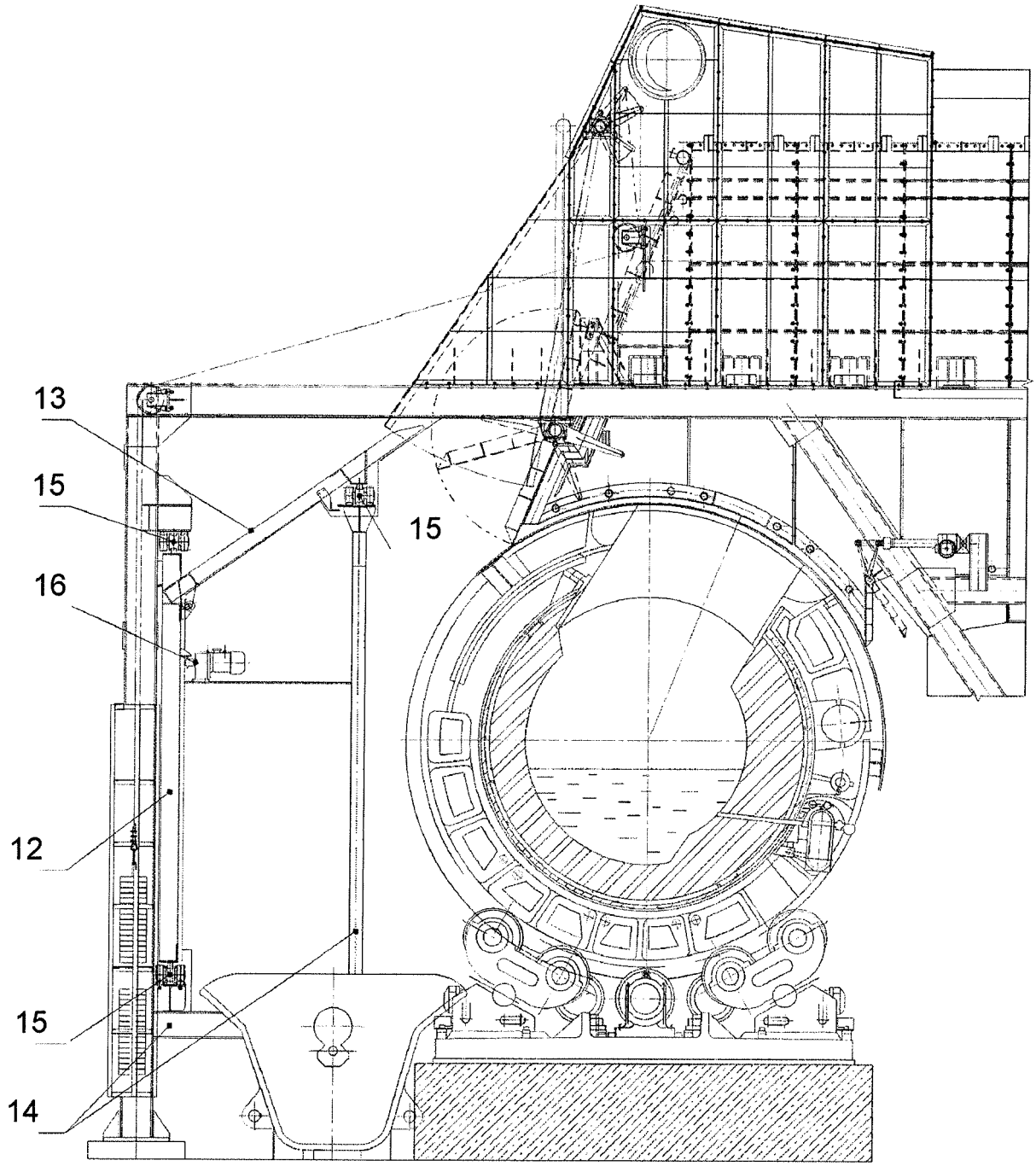

FIG. 5

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 18 17 9501

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 1 417 588 A (AMBURGH CHARLES VAN) 30 May 1922 (1922-05-30) * figure 1 * * page 2, line 21 - line 120 * * page 1, line 15 - line 20 *	1-15	INV. C21C5/40 F27D17/00
A	CN 205 035 423 U (YUNNAN COPPER CO LTD) 17 February 2016 (2016-02-17) * figure 1 *	1-15	
A,D	SU 466 290 A1 (INVENTOR CERTIFICATE MATERIAL RESEARCH INSTITUTE) 5 April 1975 (1975-04-05) * figure 1 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)
C21C F27D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 August 2018	Gimeno-Fabra, Lluis

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 17 9501

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-08-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 1417588 A	30-05-1922	NONE	
CN 205035423 U	17-02-2016	NONE	
SU 466290 A1	05-04-1975	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82