P. CONRADY.

ENGINE WITH ROTATING PISTON.

APPLICATION FILED JULY 22, 1914.

1,136,409.

Patented Apr. 20, 1915.

3 SHEETS—SHEET 1.

Fig. 1

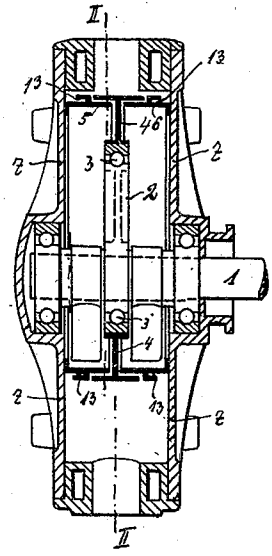


Fig. 2

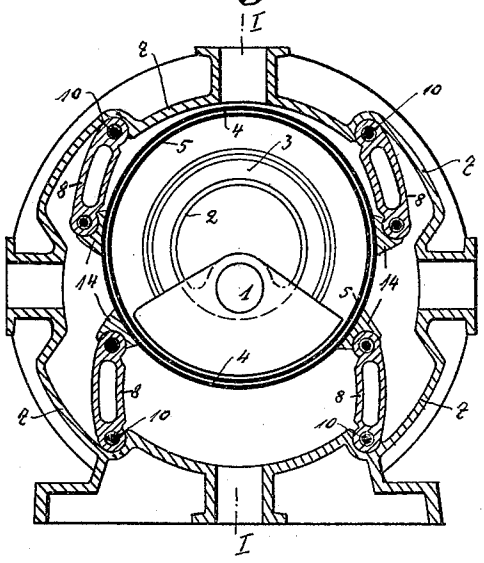


Fig. 3

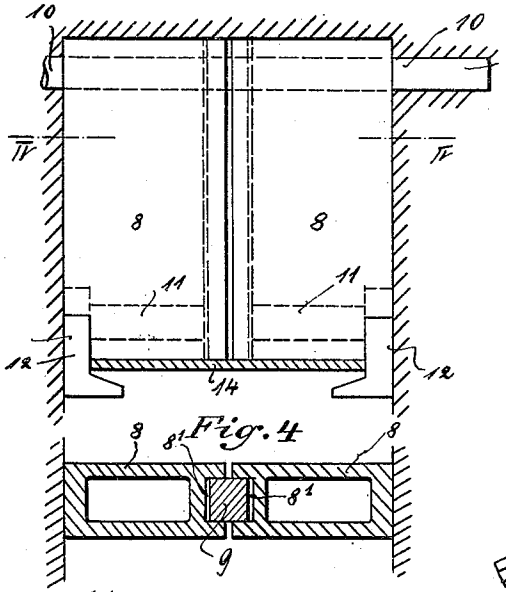


Fig. 4

Fig. 5

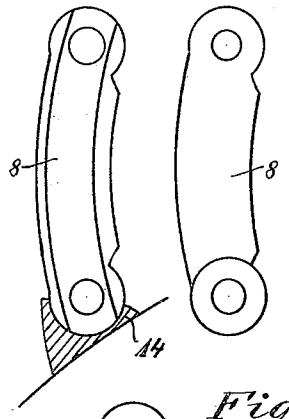
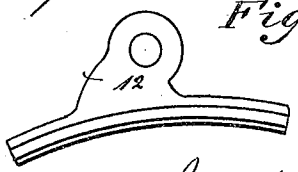


Fig. 6

Fig. 7



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3 SHEETS—SHEET 2.

Fig. 8

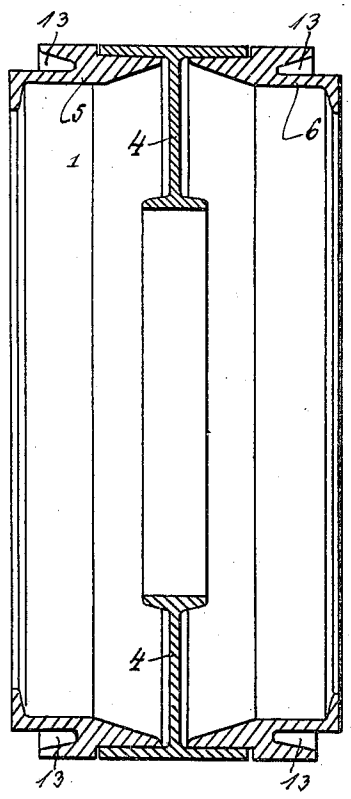
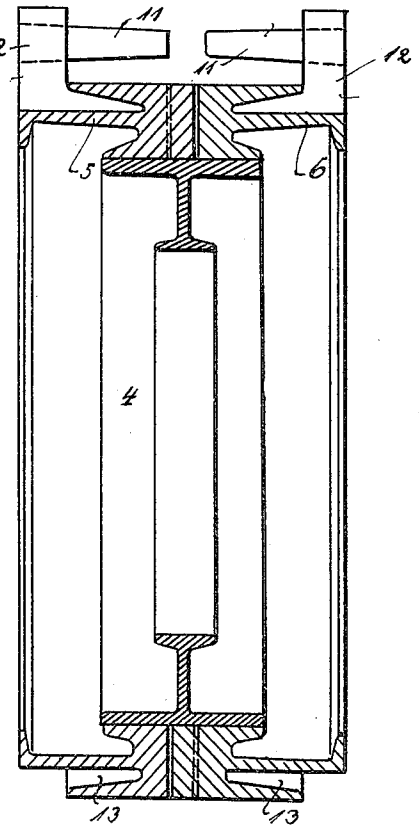


Fig. 10.



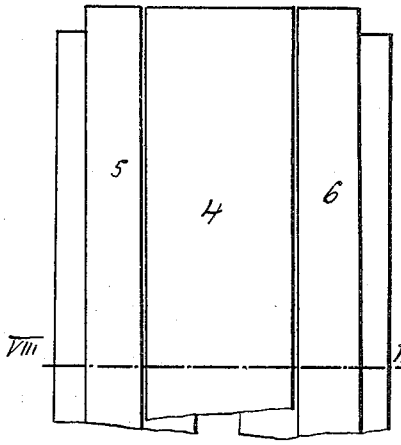


Fig. 9

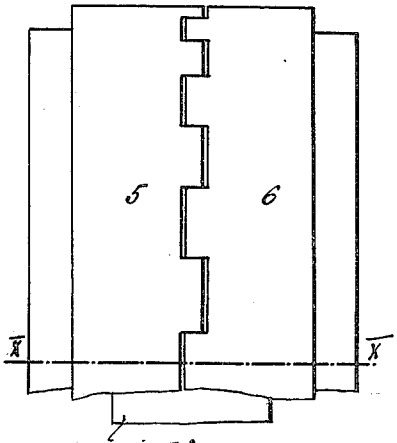


Fig. 11

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3 SHEETS—SHEET 3.

Fig. 12

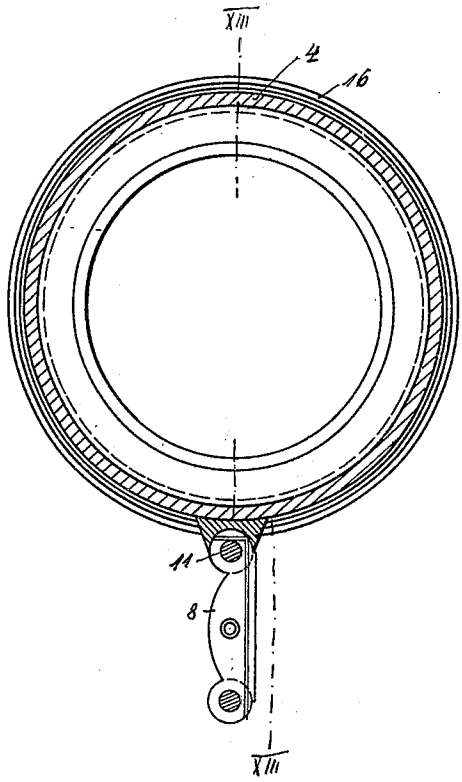
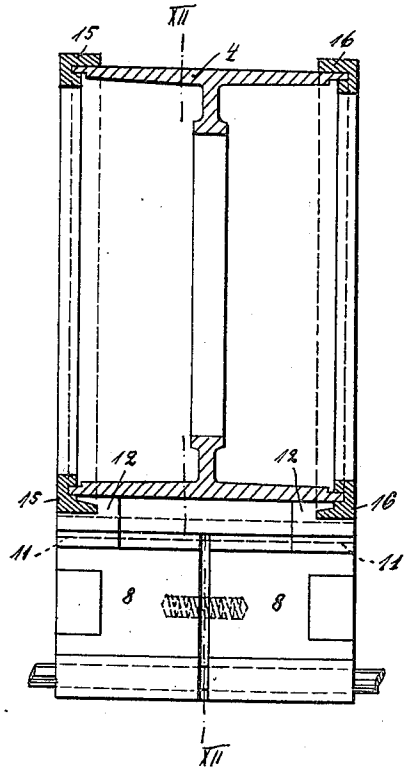


Fig. 13



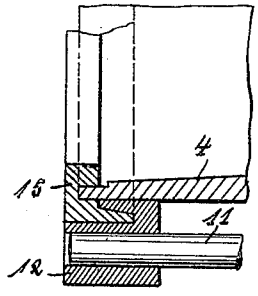


Fig. 14

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UNITED STATES PATENT OFFICE.

PHILIPP CONRADY, OF BOMMERSHEIM, NEAR OBERURSEL IM TAUNUS, GERMANY.

ENGINE WITH ROTATING PISTON.

1,136,409. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed July 22, 1914. Serial No. 852,523.

To all whom it may concern:

Be it known that I, PHILIPP CONRADY, a subject of the German Emperor, and a resident of Bommersheim, near Oberursel im Taunus, Germany, have invented certain new and useful Improvements in or Relating to Engines with Rotating Pistons, of which the following is a specification.

This invention relates to an engine with a piston which rotates eccentrically about the axis of rotation in a cylinder, does not come into contact with the wall of the cylinder and is positively guided by the abutments provided with flap valves, the said piston being divided transversely to obtain a tight joint with the lateral walls of the cylinder.

The invention comprises a construction of the engine, according to which each of the abutments which are also divided transversely, is provided at the end facing the piston, with a slide-block, so that the said slide blocks or shoes not only positively control the abutment valves on the piston drum, but also insure a tight joint at the lateral walls of the cylinder and at the joint between the slide block and the abutment valve, the pressure between the abutment valves forcing each of the latter against the corresponding slide block, and the slide block against the corresponding lateral wall of the cylinder. Owing to this construction, the engine works perfectly as regards its steam tight joint.

An engine according to this invention is illustrated by way of example in the accompanying drawing.

Figure 1 shows the complete engine in section on the line I—I of Fig. 2 and Fig. 2 shows the engine in section on the line II—II of Fig. 1. Fig. 3 shows one of the abutment valves with its slide blocks on an enlarged scale, in front elevation. Fig. 4 is a section on the line IV—IV of Fig. 3. Fig. 5 shows one half of the abutment valve in side elevation, looking from the left in Fig. 3. Fig. 6 shows the abutment valve without slide blocks in side elevation, looking from the left in Fig. 3. Fig. 7 shows one of the slide blocks, namely the right hand one, in side elevation looking from the left in Fig. 3. Fig. 8 shows one construction of a piston drum divided in its transverse direction into two halves, with its supporting part, in vertical section on the line VIII—VIII of Fig. 9 which is a plan. Fig. 10 is another construction of the divided drum and its supporting part in section on the line X—X of Fig. 11, which is a plan. Fig. 12 is a third construction of the piston drum with one of the abutment valves, in section on the line XII—XII of Fig. 13 which is a section on the line XIII—XIII of Fig. 12. Fig. 14 shows a portion of Fig. 13 in section, on an enlarged scale.

On the eccentric 2 secured to the shaft 1 is arranged on a ball bearing 3, the supporting part 4 for the piston drum 5, 6 divided in the known manner in its transverse direction. The single working chambers in the cylinder are formed in the known manner by abutment valves 8 (Fig. 2) rotatably mounted in the cylinder casing 7, and positively guided by the piston drum 5, 6. These abutment valves 8 are also divided in their transverse direction, as shown in Fig. 3. The two parts of the valve 8 are connected together in a steam tight and adjustable manner, by a ledge 9 which engages with corresponding grooves 8′ of the parts of the valve 8. They are rotatably mounted on pins 10 in the cylinder casing 7. Pins 11 of the slide blocks 12 engage with the lower end of the parts of the valve 8. The slide blocks 12 engage by means of their feet, as shown in Figs. 8 and 9, with a groove 13 of the piston drum 5, 6. A tight joint is formed between the drum 5, 6 and each of the valves 8, by a ledge 14 in which is inserted packing. From Fig. 2, in which the valves 8 are shown in section, it will be seen how they form a tight joint at both ends, that is, with the casing 7 and with the ledge 14.

If an excess of gas or liquid pressure which may be further assisted by spring pressure, acts in one of the cylinder chambers formed by the valves 8, the said pressure will act on the halves of the valves and on the ledge 9 contained between the latter. The said pressure is transmitted also into the joint 8′ of the ledge 9, whereby the halves of the valves 8 are forced apart and pressed against the lateral walls of the casing 7. Owing to the halves of the valves 8 being laterally exposed to pressure, the slide blocks 12 arranged laterally on the same, will also be pressed against the lateral walls of the casing 7. In that way, the joint contained between each half 8 of the valve and the corresponding slide block 12, will be closed by the pressure. The joint existing

between each slide block 12 and the corresponding piston-drum half 5 or 6, is also tightly closed, in case of any wear, owing to the halves of the drum 5, 6 being pushed apart by the gas or liquid pressure acting on the same from one side, so that these two halves 5, 6 are also pressed against the lateral walls of the casing 7, whereby at the same time the piston drum is caused to engage tightly with the lateral walls of the casing 7.

In order to avoid any leakage produced between the packing ledge 14, and the valve 8, and the drum 5, 6 owing to the wear which takes place during working between the packing ledge 14 and the corresponding valve 8, and between the packing ledge 14 and the drum 5, 6, the foot of the slide block and the corresponding groove 13 of the piston drum 5, 6 engage conically with each other. Owing to this arrangement, in the case of lateral wear of the drum 5, 6 the foot of the slide blocks 12 will penetrate deeper into the corresponding groove 13 of the drum 5, 6, and thus press more firmly the corresponding valve 8 against the corresponding packing ledge 14.

As shown in Fig. 10 the pins 11 of the slide blocks 12 can engage conically with the halves of the valves 8. The halves of the valve 8 which are exposed to wear on the lateral walls, do not then become loose on the pins 11, as they are pressed more and more on the cone of the pins 11 owing to the lateral movement.

Fig. 8 shows the construction of the drum for the case in which the excess of pressure forcing apart the drum halves 5, 6 acts in the drum, while Fig. 10 shows the construction of the drum for the case in which the excess of pressure acts in the chambers formed by the valves or abutments 8. In the construction of the drum 5, 6, shown in Figs. 10 and 11, the joint of the drum is toothed. These teeth prevent the steam or fluid pressure from escaping between the two halves 5, 6 of the drum and the packing ledge 14, from one chamber into another.

The construction in which the joint of the drum is toothed, that is to say, the two drum halves 5 6 are each provided with teeth, the teeth of one half engaging with those of the other, has the disadvantage that the drum halves 5, 6 must slide on a fairly wide supporting part 4, so that the drum halves 5, 6 owing to the friction, cannot be easily pushed to the side. To that must be added that the manufacture of teeth is complicated and difficult.

In order to avoid the disadvantages in question, it is advisable to make the arrangement shown in Figs. 12–14. In this arrangement, the supporting part 4 is itself formed into a drum, while the drum halves forming a lateral joint, are replaced by two rings 15, 16 supported by the supporting part 4 at its two edges. These rings are very easily moved to the side on the supporting part 4 by a pressure acting on them, and consequently press against the lateral walls of the cylinder casing so as to form a tight joint. The pressing of the rings 15, 16 against the cylinder casing is effected not direct by the pressure of the driving medium acting on the same, but by the slide blocks 12 mounted on the valves 8 by means of the pins 11. The valves 8 are divided. The pressure acting in the joint of the valves 8, presses the two halves of the valve 8 apart and against the corresponding slide blocks 12, whereby both the former and the latter are pressed against the lateral walls of the cylinder casing. The slide blocks 12, during their lateral movement, drive by means of the halves of the valve, the rings 15, 16, so that the latter are also pressed against the lateral walls of the cylinder casing and form a tight joint.

I claim:

1. In an engine of the class described, the combination of a cylinder, and a piston rotatably mounted in said cylinder out of contact with the circumferential walls and divided transversely whereby in operation the piston will have a fluid-tight joint with the lateral walls of said cylinder due to the separation of the cylinder sections by fluid pressure.

2. In an engine of the class described, the combination of a cylinder, a piston rotatably mounted in said cylinder and divided transversely whereby the sections of the piston are separable, and abutments coöperating with the piston, said abutments and sections of the piston having interfitting parts to form a fluid tight joint.

3. In an engine of the class described, the combination of a cylinder, a piston rotatably mounted in said cylinder and divided transversely whereby the sections are separable by fluid pressure, abutments coöperating with the piston, each of said abutments comprising a pair of slide blocks fitting the separable sections of the piston, said slide blocks being movable laterally with the separable sections of the piston.

4. In an engine of the class described, the combination of a cylinder, a piston mounted in the cylinder, abutments coöperating with the piston, each abutment comprising a pivoted part, laterally movable blocks carried by said pivoted part, said blocks fitting the piston at the edges thereof adjacent the lateral walls of the cylinder.

5. In an engine of the class described, the combination of a cylinder, a piston working therein, and an abutment in the cylinder cooperating with the piston, said abutment being divided transversely forming sections which are movable laterally and have parts

capable of engaging the lateral wall of the cylinder and parts interfitting parts of the piston at its edges adjacent the lateral wall of the cylinder, whereby a tight joint with the lateral walls of the cylinder is provided.

6. In an engine of the class described, the combination of a cylinder, a piston working therein, and abutments coöperating therewith, each of said abutments being divided transversely, a slide block on each of the sections of the abutment, the slide blocks fitting the piston adjacent the edges thereof and being capable of pressing against the lateral wall of the cylinder to effect a tight joint therewith.

7. In an engine of the class described, the combination of a cylinder, a piston divided transversely, a device rotatably supporting said piston within the cylinder and having a part bridging the sections of the piston, and abutments coöperating with the piston and having parts interengaging with the lateral edges of said piston and capable of engaging the lateral walls of the cylinder to effect a tight joint.

8. In an engine of the class described, the combination of a cylinder, a piston working within the cylinder and having tapering grooves therein adjacent the lateral walls of said cylinder, and an abutment coöperating with said piston, said abutment having a pair of slide blocks with tapering surfaces coöperating with the tapering groove so as to take up wear between the parts, the blocks being movable laterally into engagement with the lateral walls of the cylinder to effect a tight joint thereat.

9. In an engine of the class described, the combination of a cylinder, an eccentric piston rotatably mounted in said cylinder out of contact with the circumferential wall thereof and divided transversely, a member bridging the sections of said piston, the sections of the piston having tapering grooves therein adjacent the lateral walls of the cylinder, and abutments coöperating with the piston, each abutment comprising a pivotally supported device divided transversely, each of the sections of the abutment having a block pivoted thereon and provided with a tapering surface fitting the tapering groove in the adjacent piston section, a member overlapping the space between the divided abutment section, the pressure acting between the abutment sections and the piston sections serving to effect a tight joint between the lateral walls of the engine and the piston.

10. In an engine, the combination of a cylinder, a piston rotatable therein and moving out of contact with the peripheral cylinder wall, abutments pivoted in the cylinder and provided with devices slidable on the surface of the piston and interfitting with parts of the piston and movable laterally against the side walls of the cylinder to positively guide the piston and to insure a tight joint between the side walls of the cylinder and the piston.

11. In an engine, the combination of a cylinder, a piston rotatable in the cylinder, and an abutment coöperating with the piston and comprising means movable with the abutment and slidable on the piston, said piston and means having interfitting tapering parts to take up wear, to form a fluid tight joint, and to guide the piston in said cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

PHILIPP CONRADY.

Witnesses:
ERWIN DIPPEL,
JOSEPH CONRADI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."