F. KLEINEICK.

STEAM ENGINE.

APPLICATION FILED MAR. 10, 1909.

1,067,037.

Patented July 8, 1913.

3 SHEETS—SHEET 1.

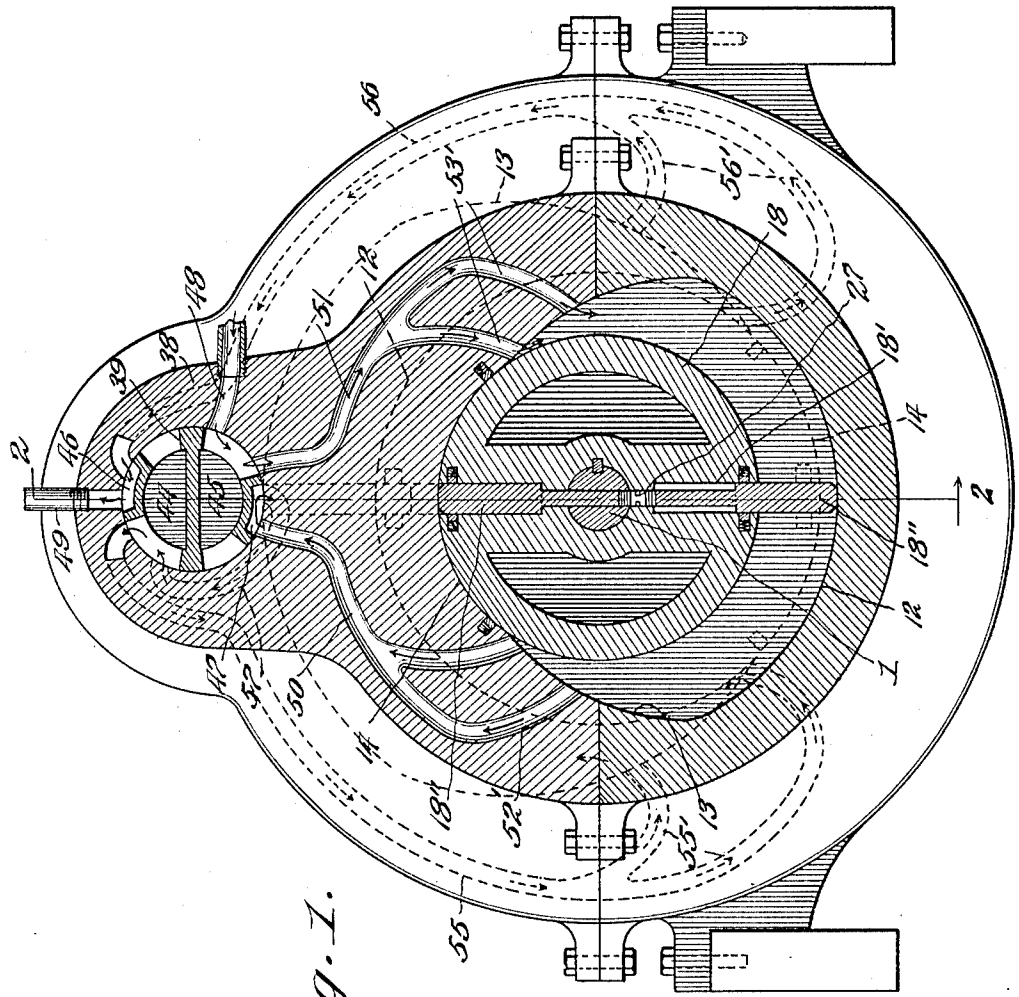


Fig. 1.

Witnesses

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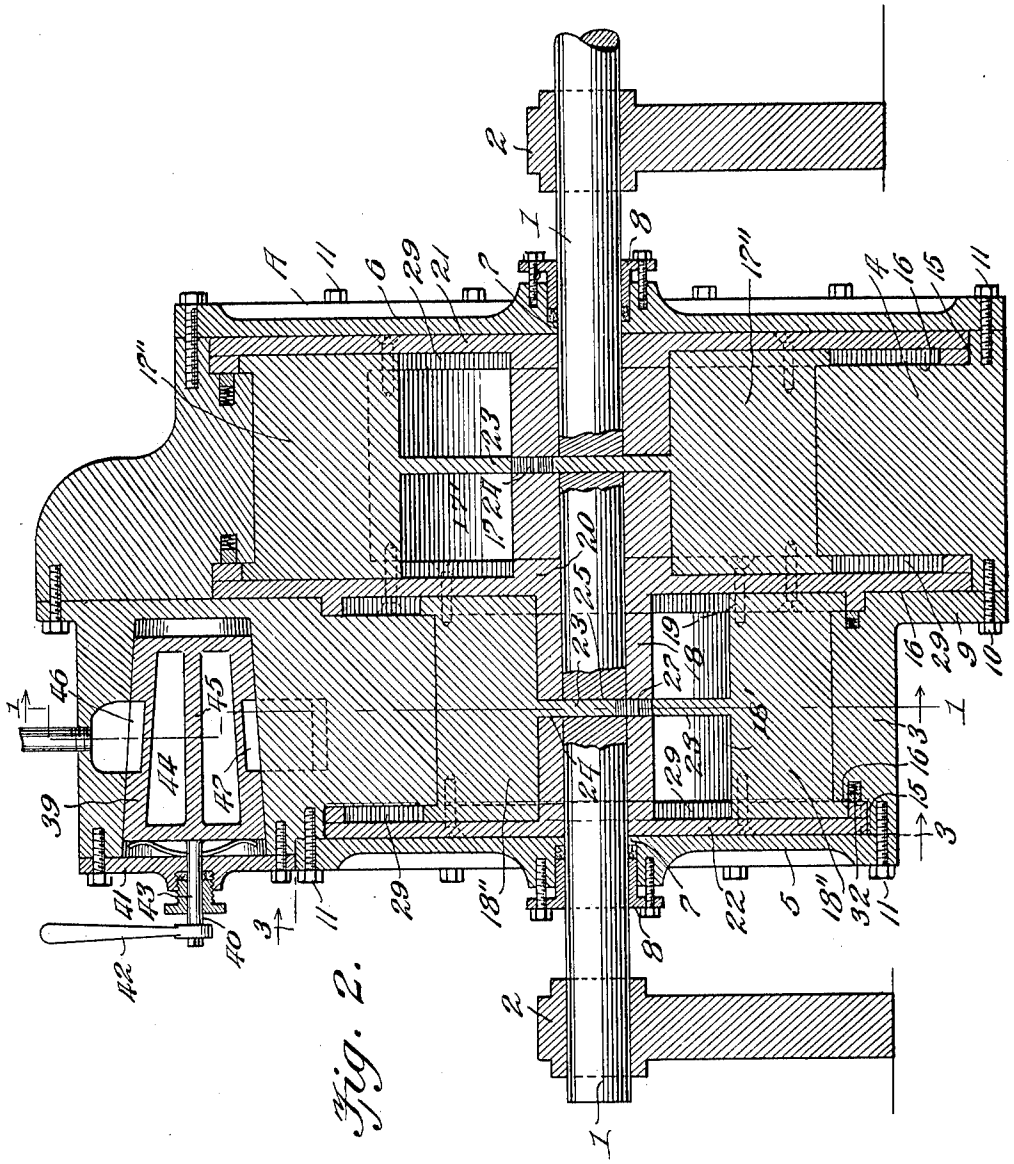


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 4.

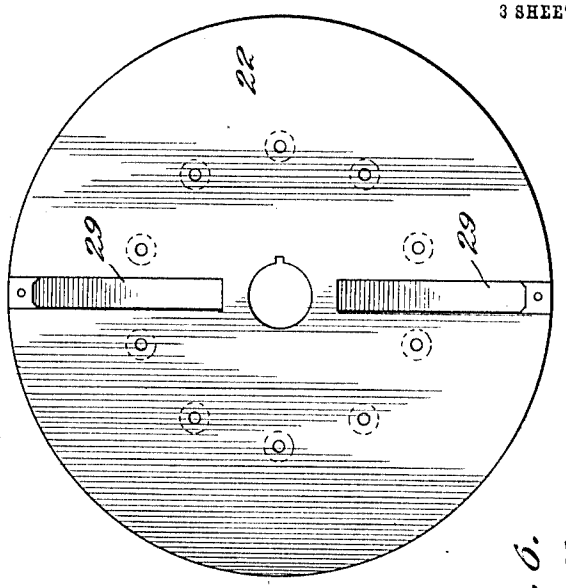


Fig. 5.

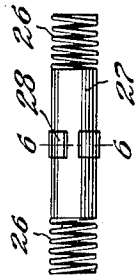
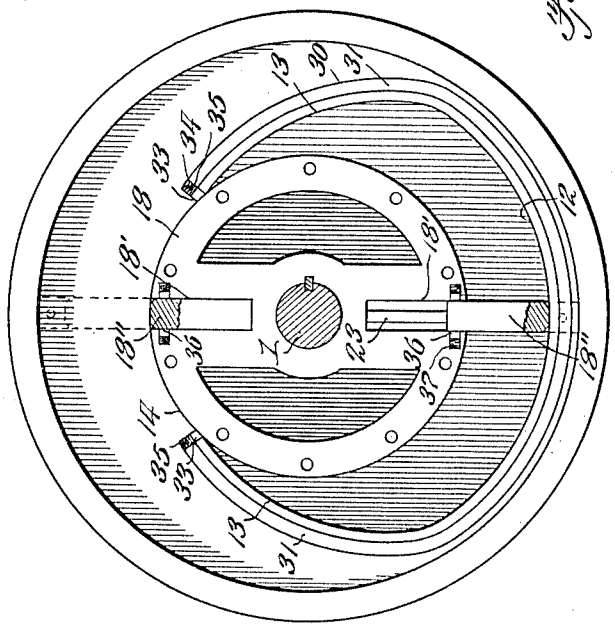


Fig. 6.



Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

FRITZ KLEINEICK, OF COEBURN, VIRGINIA.

STEAM-ENGINE.

1,067,037. Specification of Letters Patent. Patented July 8, 1913.

Application filed March 10, 1909. Serial No. 482,421.

To all whom it may concern:

Be it known that I, FRITZ KLEINEICK, a citizen of the United States, residing at Coeburn, in the county of Wise and State of Virginia, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

This invention relates to a steam or other elastic fluid engine of the rotary type, and relates more particularly to a compound engine wherein substantially the entire energy of the motive fluid can be abstracted before passing from the engine.

The invention has for one of its objects to improve and simplify the construction and operation of engines of this character so as to be comparatively easy and inexpensive to manufacture, reliable and efficient in use, and readily reversible.

Another object of the invention is the provision of a compound engine in which the rotor or piston is composed of drums of different diameters to which are secured disks which coöperate with the casing to form high and low pressure stages, the said drums being provided with vanes or blades on which the motive fluid acts expansively to rotate the piston.

A further object is the employment, in connection with an engine of this character, of a simple arrangement of ports and valve for controlling the same whereby the engine can be readily reversed.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one of the embodiments of the invention, Figure 1 is a vertical, transverse section of the engine taken through the high pressure stage thereof on the line 1—1, Fig. 2. Fig. 2 is a vertical longitudinal section of the engine on the line 2—2 of Fig. 1. Fig. 3 is a section on line 3—3, Fig. 2. Fig. 4 is a side view of the inner face of the end disk on the high pressure end of the rotor. Fig. 5 is an enlarged detail view of one of the devices for maintaining the blades of the piston in contact with the walls of the casing. Fig. 6 is a transverse section on line 6—6, Fig. 5.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawings, 1 designates the shaft of the engine mounted in suitable bearings 2 and passing out of the ends of the casing of the engine. The casing in the present instance, is composed of two cylindrical sections 3 and 4, and heads 5 and 6. The heads are provided with shaft openings 7 through which the shaft 1 extends and at these openings are arranged suitable packings 8 for preventing leakage of fluid from the casing. The section 3 is of smaller diameter than the section 4 and is provided with a peripheral flange 9 to which the section 4 is secured by bolts 10, and the heads 5 and 6 are secured respectively to the sections 3 and 4 by bolts 11 or other suitable fastenings. The smaller section 3 of the casing constitutes the first or high pressure stage of the engine, while the section 4 constitutes the second or low pressure stage. The internal surface of each section of the casing is not a regular cylinder and, as shown in Fig. 1, consists of a cylindrical wall 12 arranged concentrically with respect to the axis of the shaft and the cylindrical wall 13, the center of which is located at some point between and on a radius extending from the axis of the shaft to the center of the concentric wall 12 of the casing. The eccentric portion 13 of the internal surface of the casing is cut away at 14 on an arc of a circle concentric with the engine shaft and at a radial distance considerably less than the radius between the shaft and the portion 12 of the said internal surface. The sections 3 and 4 are counterbored in their end faces as indicated at 15, so that when the parts of the casing are fastened together, annular pockets or grooves 16 are formed for receiving the disks of the piston.

The piston is composed of a relatively large drum 17 and a small drum 18 keyed to the shaft 1, and disposed between the drums and rigidly secured thereto, as by fastenings 19, is a disk 20 that has its peripheral portion disposed in the annular pocket or chamber 16 formed between the two sections 3 and 4 of the casing. Secured to the outer ends of the drums 17 and 18 are disks 21 and 22 that have their peripheries disposed in the other pockets or chambers 16. The disk 21, which is of the same diameter as the disk 20, has, like the disk 22, a perfectly flat outer face so as to snugly fit

the flat inner face of the adjacent head of the casing so that leakage of fluid between the parts will be effectively prevented. The drums 17 and 18 are provided respectively with longitudinally extending pockets 17′ and 18′ arranged at diametrically opposite points in each, and in the pockets are arranged vertically-movable blades or vanes 17″ and 18″. The bottoms of the blades are formed with stems 23 that pass through openings 24 in the bottoms of the pockets and through an opening 25 in the shaft 1. Interposed between adjacent stems are helical springs 26 which are separated by a movable member or plug 27 that has a split spring packing ring 28 as shown in Fig. 5, the said springs 26 serving to urge the blades outwardly into contact with the internal walls of the casing and the packing 28 between the blades serving to prevent leakage of fluid from one side of the piston to the other as the blades are moved back and forth. In the opposed faces of the disks of the piston are radially-extending slots 29 in which the ends of the blades work. The sections 3 and 4 are provided with grooves 30 which, as shown in Fig. 3, follow the general contour of the internal walls of the casing, and in these grooves are packing strips 31 that rest on springs 32, as shown in Fig. 2, so as to urge the said packing strips into contact with the disks of the piston. The grooves 30 terminate, as shown in Fig. 3, at the ends of the concentric portions 14 of the internal wall of each section of the casing, for the reason that the drums are arranged to snugly fit such concentric portions so that no packings are needed at these points, and at the ends of the packing strips 31 are longitudinally-extending packing strips 33 set in grooves 34 and pressed outwardly into contact with the drum portions of the piston by springs 35. The blades of the piston are packed by strips 36 arranged in grooves in the pockets of the drums of the pistons and these strips are urged into contact with the blades by springs 37. By packing the moving parts in this manner, the leakage of the working fluid is reduced to a minimum and greater economy may be obtained.

On the section 3 of the casing is formed a valve chest 38 in which is fitted a frusto-conical valve 39 that is provided with a stem 40 that passes through the cover plate 41 of the chest and is equipped with an operating lever 42, there being a packing 43 around the stem to prevent leakage of fluid. The valve 39 is provided with ports 44 and 45 extending transversely therethrough and with ports 46 and 47 in the outer surface thereof. Motive fluid is supplied to the valve chest through the inlet 48 connected with any suitable source and the exhaust fluid passes from the engine through the exhaust port 49. In the section 3 of the casing are formed passages 50 and 51 that communicate with the valve chest at their upper ends and that are provided with branches 52′ and 53′ respectively, that communicate with the high pressure chamber of the engine, the extremities of the said branches terminating in ports in the wall 13 at points adjacent the ends of the wall 14. The section 4 of the casing is formed with fluid-conducting passages 55 and 56 that are provided with branches 55′ and 56′ that communicate with the lower pressure chamber and also with the valve chest. Formed in the wall of the steam chest is a by-pass 57 for connecting the high and low pressure chambers together by the various ports of the valve so that the steam acting in the high pressure chamber can be conducted to the low pressure chamber, during either forward or reverse movement of the engine.

When the valve is in the position shown in Fig. 1, the ports are so related to the various steam-conducting passages that the piston will be rotated in a clockwise direction. Steam is admitted to the engine through the inlet 48 and flows to the high pressure chamber through the port 45, passage 51, and branches 53, and acts on the extended blade or vane 18″ projecting from the piston drum 18. While the live steam is acting on the forward side of the said blade, the steam on the rear side thereof is exhausted through the branches 52′, passage 50, to the port 47 of the valve. The port 47 is registering with the by-pass 57 and this by-pass is connected by the port 44 with the passage 55 leading to the low pressure chamber of the engine so that the steam exhausted from the high pressure chamber will be conducted to the low pressure chamber to act on the blades 17″ of the piston, the steam operating expansively in said low pressure chamber to contribute in rotating the piston. The exhaust steam passes from the low pressure cylinder through the branches 56′, passage 56, port 46 of the valve, and exhaust pipe 49. When it is desired to reverse the engine, the valve 39 is turned sufficiently to bring the left hand end of the port 45 of the valve into communication with the passage 50, the right hand end of the port 44 into communication with the passage 56, and the ports 46 and 47 into communication respectively, with the passages 55 and 51 so that steam will be conducted through the engine by a path opposite from that indicated by the arrows shown in Fig. 1.

With an engine of the construction set forth, the steam acts by means of its full pressure in the high pressure chamber and by means of its expansion in the low pressure chamber, so that substantially the entire energy of the motor fluid can be abstracted. Furthermore, the engine can be readily reversed, and as the working parts

are thoroughly packed, leakage of the fluid is reduced to a minimum.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims.

Having thus described the invention, what I claim is:—

1. In combination, a bi-sectional casing, a shaft disposed in said casing, two cylindrical pistons fixed on said shaft, diametrically opposite vanes mounted on each piston, said casing being formed with two steam chambers in which said pistons and vanes work, a cylindrical valve rotatable in said casing adjacent said pistons, an exhaust pipe mounted in said casing, a steam-admitting passage disposed at right angles with respect to said exhaust pipe, said casing formed with oppositely-arranged channels being curved in one direction and opening into one of said steam chambers, said valve formed with two transversely-extending ports and with a segmental cavity disposed intermediate the ends of said ports, one of said channels being arranged to communicate with one of said ports and the other channel communicating with one of said cavities, said steam passage emptying into said last named port, oppositely arranged channels being formed in said casing curving in a direction opposite to said first-named channels and opening into the other steam chamber, said second-named channels communicating respectively with the other port and cavity of said valve, said exhaust pipe communicating with said last-named cavity, said casing being formed with a passage connecting said last named port and said first-named cavity.

2. In combination, a casing, a shaft disposed in said casing, two cylindrical pistons fixed on said shafts, diametrically opposite vanes being mounted on each piston, said casing being formed with two irregularly-shaped steam chambers having eccentric portions diametrically-oppositely disposed, in which said vanes work, an exhaust pipe terminating short of the eccentric portion of one of said steam chambers, a rotatable valve interposed between said last-named chamber and said exhaust pipe, each of said pistons snugly engaging the concentric portions of said steam chambers, said valve being formed with diametrically-opposite peripheral cavities and with two transversely extending channels, oppositely-curved passages communicating at one end respectively with one of said valve cavities and one of said channels, branches formed upon each of said passages pointing toward and emptying into the concentric end of the other steam chamber, a passage connecting said last-named cavity and the other channel, said exhaust pipe opening into said other cavity, oppositely-curved passages opening into said second-named cavity and channel respectively, a steam channel communicating with said first-named valve channel, and branches formed upon said-named passages pointing toward said first-named branches and emptying into the concentric end of said other steam chamber.

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

FRITZ KLEINEICK.

Witnesses:
W. W. Colvin,
J. E. Quinley.

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