L. J. WENTZEL.

STEAM ENGINE.

APPLICATION FILED MAY 9, 1910.

1,009,874.

Patented Nov. 28, 1911.

2 SHEETS-SHEET 1.

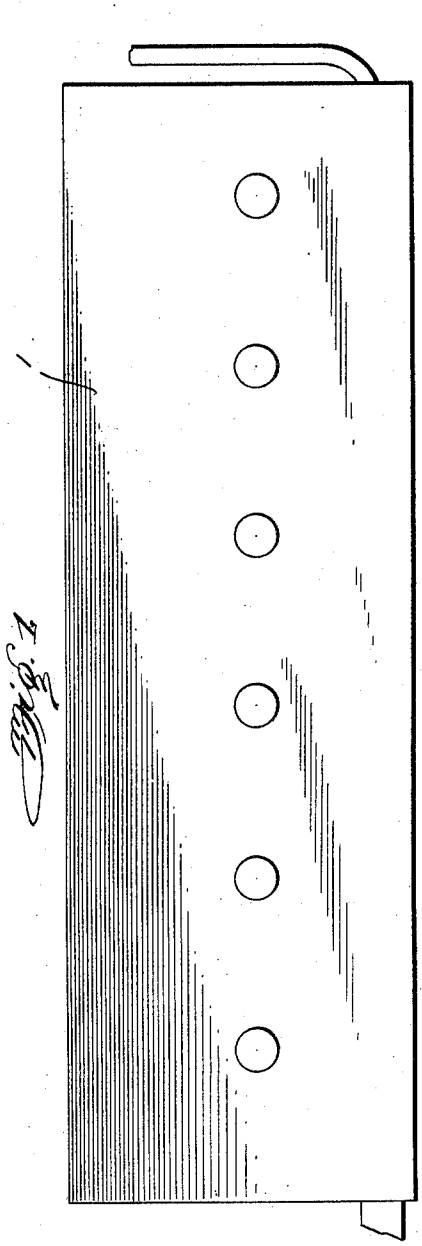

Fig. 1.

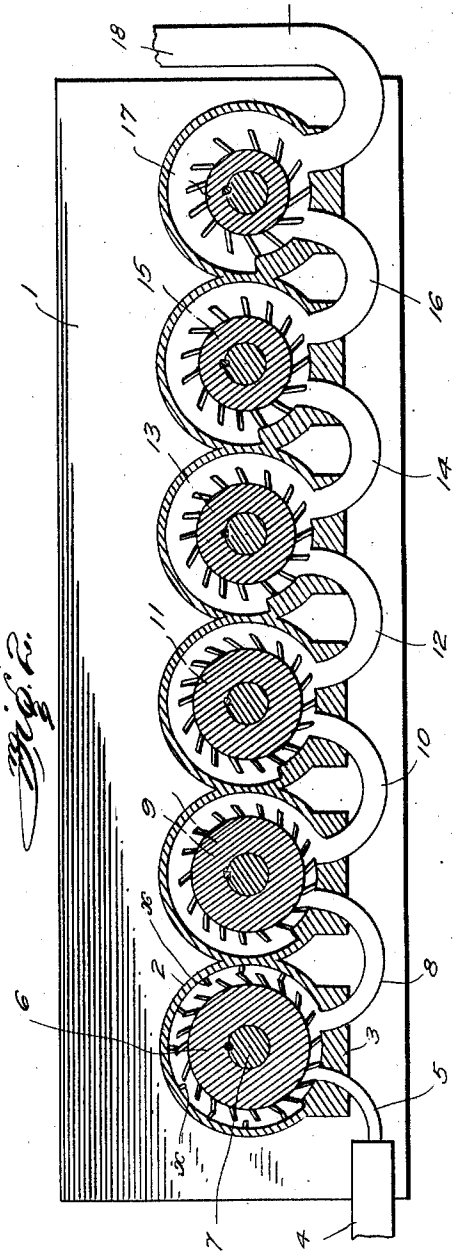

Fig. 2.

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Witnesses

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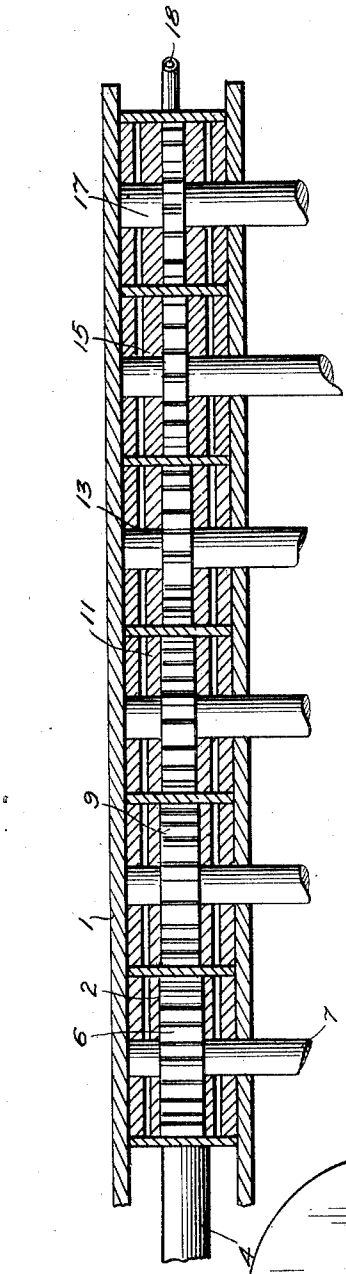

Fig. 1.

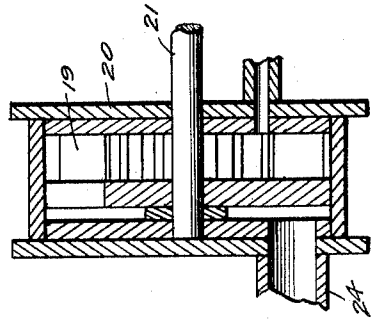

Fig. 6.

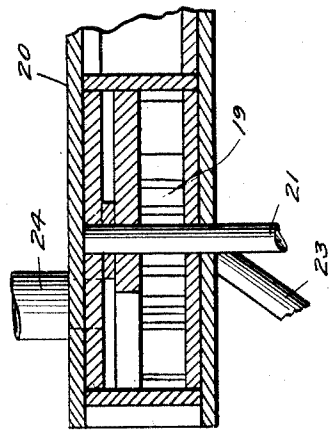

Fig. 5.

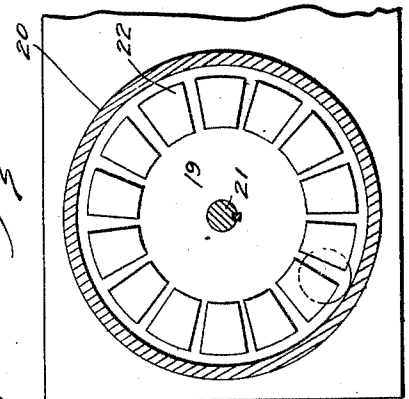

Fig. 4.

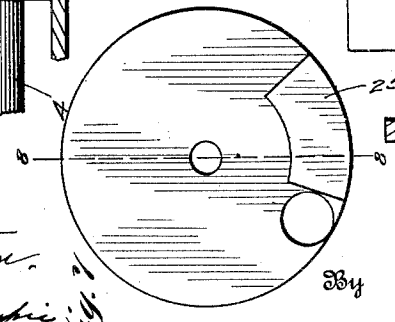

Fig. 8.

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Fig. 7.

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UNITED STATES PATENT OFFICE.

LOUIS JOHAN WENTZEL, OF BROOKLYN, NEW YORK.

STEAM-ENGINE.

1,009,874. Specification of Letters Patent. **Patented Nov. 28, 1911.**

Application filed May 9, 1910. Serial No. 560,195.

To all whom it may concern:

Be it known that I, LOUIS J. WENTZEL, a subject of the King of England, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Steam-Engine Constructions, of which the following is a specification.

This invention relates to improvements in steam engine constructions and the leading object in view is the production of a steam engine wherein the steam is conducted from one cylinder, having a plural bladed piston working therein, to a series of cylinders, having plural bladed pistons working therein.

One of the other objects of the invention is the construction of an improved steam engine having a plurality of pistons mounted for operation in communicating cylinders, through which the steam or pressure fluid is arranged to flow in a continuous unbroken stream, driving the different pistons in the different cylinders.

Another object of the invention is the construction of an improved steam engine comprising a plurality of pistons working in communicating cylinders, the cylinders being connected by pipes of increasing diameter and the pistons having blades of decreasing number.

With the above and other objects in view the invention comprises certain combinations, constructions and arrangements of parts, clearly described in the following specification and clearly illustrated in the accompanying drawings, in which,

Figure 1 is a side elevation of the engine casing, Fig. 2 is a vertical longitudinal sectional view through the casing and the pistons, Fig. 3 is a horizontal sectional view through the casing and pistons, Fig. 4 is a detail sectional view of a modified form of the piston construction, Fig. 5 is a horizontal sectional view thereof, and Fig. 6 is a vertical sectional view thereof. Fig. 7 is a plan view of one wall of the cylinder. Fig. 8 is a cross section on line 8—8 of Fig. 7.

Referring to the accompanying drawings illustrating the preferred form of the invention, 1 denotes the engine casing, which consists of side plates, end plates, and top and bottom plates, the shape of the casing shown being rectangular.

Between the walls of the casing 1 a series of cylinders 2 are mounted, the cylinders being preferably cast in a single unit structure. The bottom parts of the cylinders 2 are thickened at 3 and are formed with inlet openings and exhaust openings through which the steam may enter and exhaust, passing from one cylinder to the other. The first cylinder, which is shown to the left in Figs. 2 and 3, is fed with steam or other pressure fluid, by the supply pipe 4, which is inserted in an opening in one of the end walls of the casing 1. The supply pipe 4 communicates with a curved passage 5, which may consist of a pipe or in an opening formed in the casing. The passage 5 extends through the bottom of the first cylinder and terminates in a vertically disposed outlet opening into the cylinder. Within the first cylinder a piston 6 is mounted on the shaft 7, which is journaled to the casing in any suitable manner. This piston 6 is provided with a series of tangentially disposed blades 8, mounted on the circumferential edge of the piston. The piston 6 is so mounted within the cylinder that the tips of the blades will closely contact with the upper curved surface of the bottom 3, which prevents the steam from passing directly from the inlet or feed opening to the outlet of exhaust opening. After the steam or other pressure fluid has entered the first cylinder and passed around the piston, thereby driving the same, the steam or other pressure fluid escapes through the passage 8 in the bottom, 3, which is slightly larger in diameter than the inlet of feed passage 5. The exhaust passage 8 is curved like the inlet passage 5 and communicates with the second cylinder, said exhaust passage 8 forming a feed passage for the second cylinder, and the upper end of said passage being disposed vertically in the bottom of the second cylinder.

Within the second cylinder a piston 9 is operatively disposed. This piston is provided with a series of blades on its circumferential edge, which are arranged in like manner to the blades of the first piston, with the exception that the blades of the second piston are fewer than the blades of the first piston. The steam from the second cylinder discharges by the curved passage 10 into the third cylinder, and said passage is arranged in like manner to the passage 8, the difference being that the passage 10 is of

larger diameter than the passage 8. The third cylinder is provided with a piston 11, on which the blades are arranged in like manner to the first and second pistons, the number of the blades of this piston being still less in number than the number of the blades of the first and second pistons. The third cylinder communicates with the fourth cylinder through the passage 12 which is of larger diameter than the passages 8 and 10, and is arranged in like manner to said passages 8 and 10. Within the fourth cylinder a piston 13 is operatively disposed, in like manner to the other pistons, and is provided on its circumferential edge with a lesser number of blades than the pistons mentioned. The fourth cylinder communicates with the fifth cylinder by means of the curved passage 14, which is arranged in like manner to the passages mentioned, but which is of greater diameter than said passages. Within the fifth cylinder the piston 15 works, this piston having a series of blades thereon, of a lesser number than the pistons mentioned. The cylinder last mentioned communicates with the sixth cylinder by the passage 16, which is arranged like the other passages mentioned, but is of larger diameter than said passages. Within the last cylinder the piston 17 works, being arranged in like manner to the other pistons, but is provided with a series of blades of less number than the fifth piston 15. The last cylinder exhausts through a curved passage or pipe 18, which is of larger diameter than the other passages mentioned, and which may, if desired, be connected with a seventh cylinder.

When steam or other pressure fluid is supplied to the first cylinder it will drive the piston therein around, escape through the discharge passage 8, which forms the feed passage for the second cylinder, and after passing around the second cylinder and driving the piston therein, will escape through the passage 10 into the third cylinder, drive the piston therein, escape through the passage 12 into the fourth cylinder, drive the piston therein, escape through the passage 14 into the fifth cylinder, drive the piston therein, escape through the passage 16 into the last cylinder, drive the piston therein, and then escape through the last passage 18, either into the atmosphere or into a seventh cylinder.

In Figs. 4, 5 and 6 a modification of the invention is shown, consisting of the construction of a piston 19, which is mounted within a cylinder 20, upon the shaft 21. The piston 19 is provided with a series of blades 22, so arranged with relation to the body of the piston that steam or other pressure fluid can flow from one side of the cylinder to the other side, through the piston. Steam or other pressure fluid is fed to the cylinder by means of a supply pipe 23, which is disposed diagonally of the faces of the piston. An exhaust pipe 24 extends from the side of the cylinder 20 opposite to the side to which the inlet or supply pipe is connected. A check 25 controls the flow, or interrupts the flow of steam from the inlet to the outlet pipe.

The pistons 6, 9, 11, 13, 15 and 17 are of different thicknesses, decreasing in diameter from the piston 6 to the last piston, so that the blades thereof will be of decreasing width. The radius of the pistons also varies, decreasing from the first piston to the last piston, while the cylinders in which the pistons operate are of like area. The cylinders are internally enlarged on their upper parts and near the bottom portions 3, so that steam can expand between the ends of the blades on the pistons and the inner walls of the cylinders. The area of each inlet equals the area of the adjacent space between the bottom portion 3 and the piston adjoining the same, and the area of each exhaust equals the area of the space between the enlarged wall of the cylinder and the periphery of the piston. The first piston cylinder, in Fig. 2, is shown provided with internal projections or wings x, forming stops for dividing the cylinder into sections, whereby the steam can expand in the cylinder in steps, and thereby press against the wings or blades of the pistons.

Having described my invention I claim:—

1. An engine construction consisting of a series of cylinders, pistons located in said cylinders, blades on said cylinders, said blades not contacting the walls of said cylinders, a pair of ribs integral with the walls of said cylinders and inlet and exhaust passages connecting the said cylinders.

2. An engine construction consisting of a series of cylinders, pistons located thereon, a pair of ribs integral with said cylinders located adjacent the inlet points of said cylinders, and inlet and exhaust passages connecting said cylinders.

3. An engine construction consisting of a series of cylinders, pistons in said cylinders, ribs integral with the walls of said cylinders, inlet ports located between said ribs, said inlet ports being of a length equal to the length of said cylinders and exhaust passages.

4. An engine construction consisting of a series of cylinders, a pair of ribs integral with the walls of each of said cylinders, inlet and exhaust passages connecting said cylinders, one of said ribs being located between said inlet and exhaust passages.

5. An engine construction consisting of a cylinder, a piston therein, blades on said piston, ribs integral with the wall of said cylinder, an inlet passage located between

said ribs, an exhaust passage beyond said ribs, blades on said pistons, said blades being of a width equal to the distance between said ribs and the periphery of said piston, a plurality of projections located on the wall of said cylinder, said projections adapted to co-act with said blades in forming pockets in said cylinder, said exhaust passage being of greater dimensions than said inlet passage.

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

LOUIS JOHAN WENTZEL.

Witnesses:

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M. J. COLLINS.