

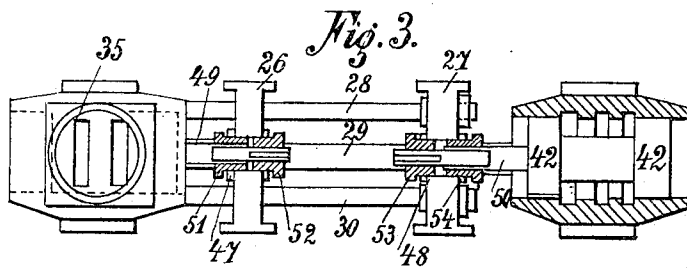
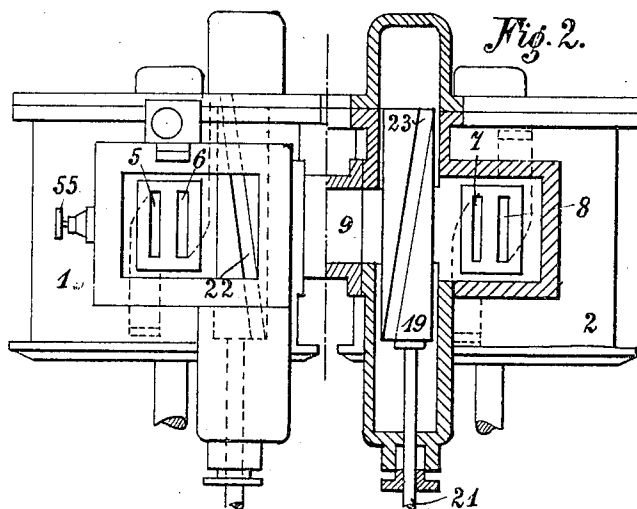
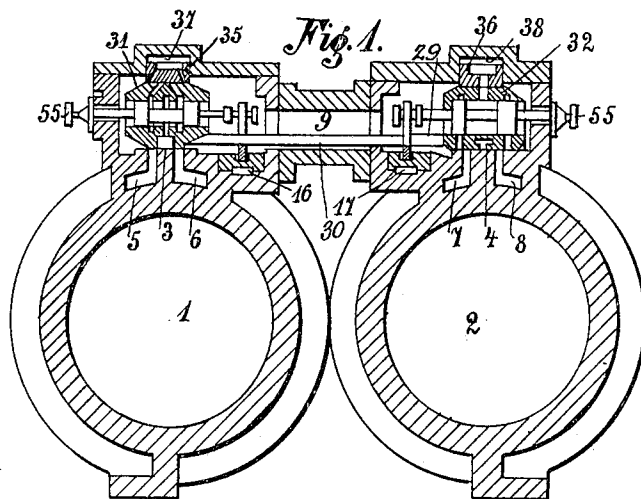
No. 818,907.

PATENTED APR. 24, 1906.

P. F. ODDIE.
 DUPLEX PUMP.

APPLICATION FILED AUG. 31, 1904.

4 SHEETS—SHEET 1.



Witnesses:-
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 W. Max. Duvall

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 P. F. Oddie
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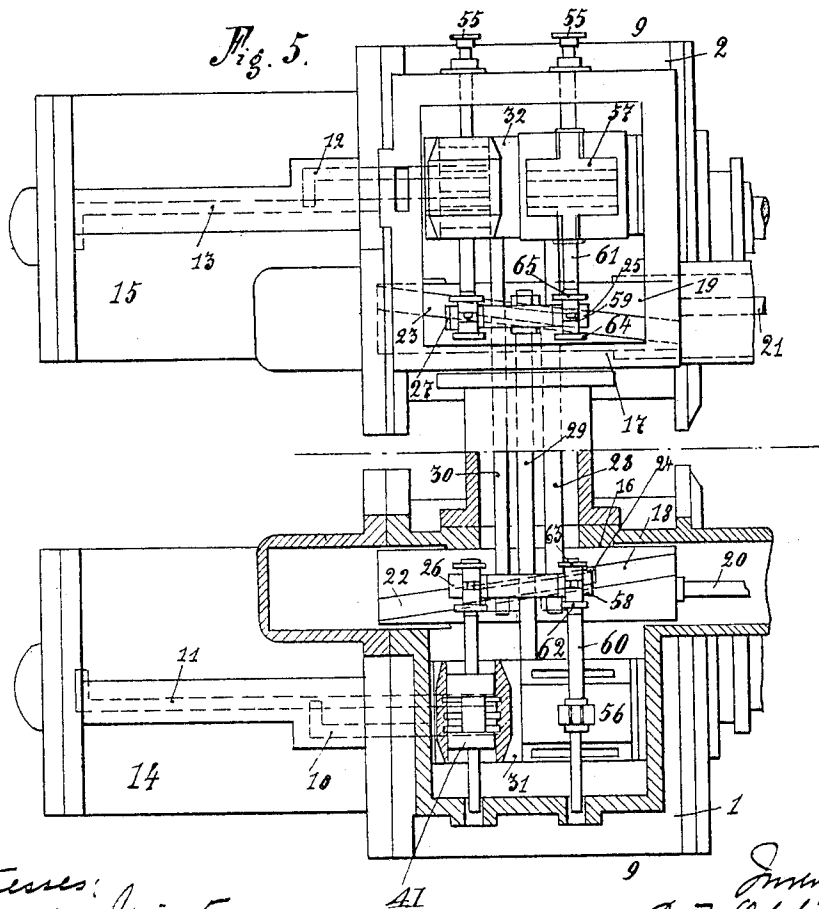
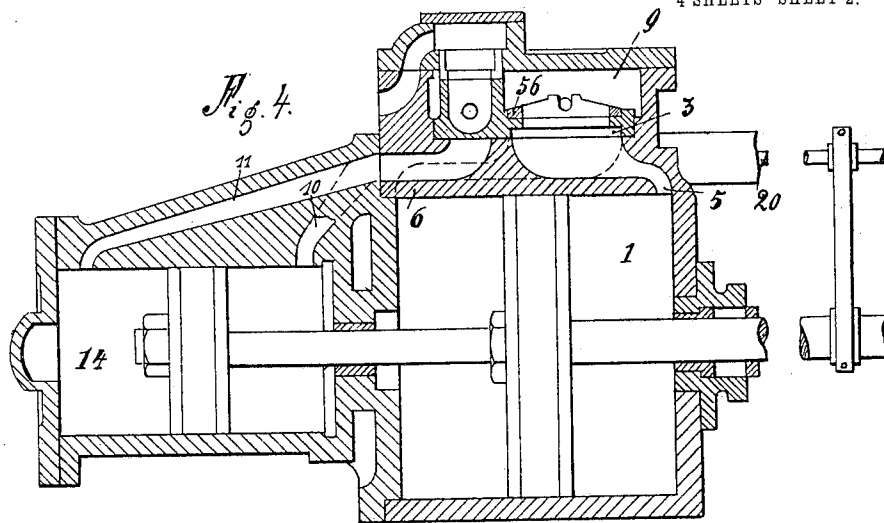
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 6.

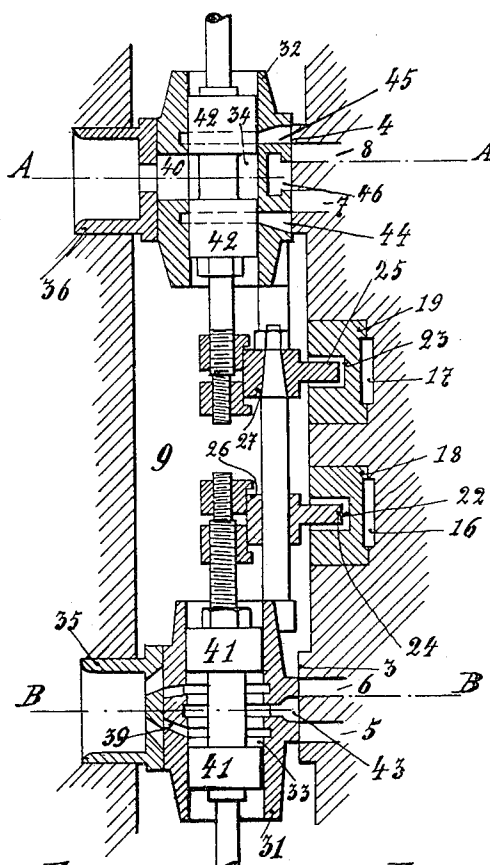


Fig. 7.

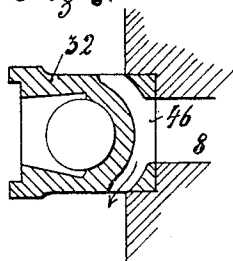
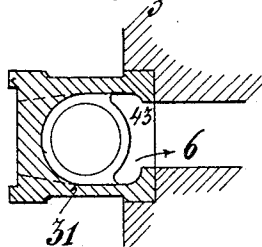


Fig. 8.



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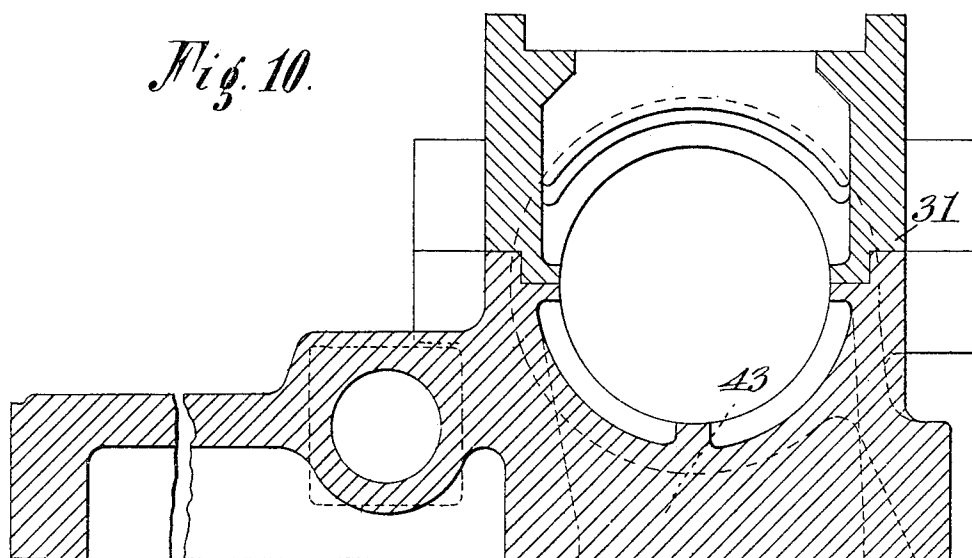
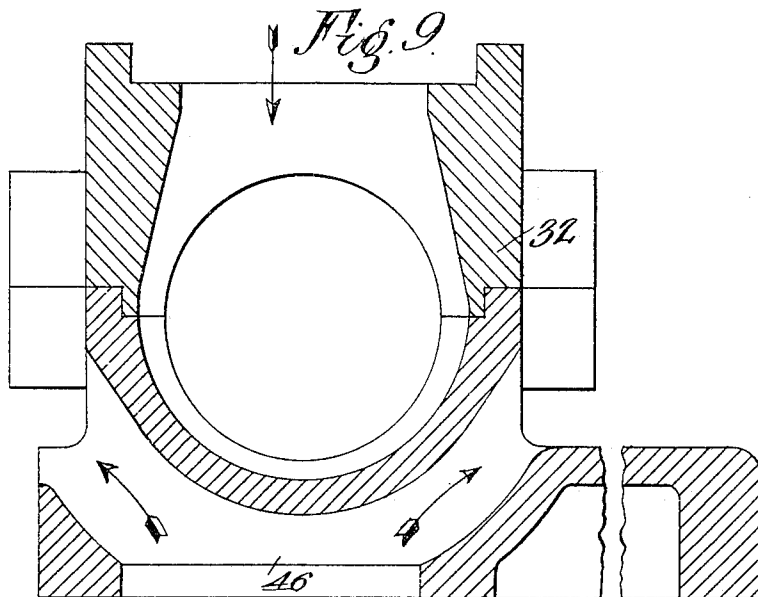
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

PHILIP FRANCIS ODDIE, OF LONDON, ENGLAND.

DUPLEX PUMP.

No. 818,907.

Specification of Letters Patent.

Patented April 24, 1906.

Application filed August 31, 1904. Serial No. 222,904.

To all whom it may concern:

Be it known that I, PHILIP FRANCIS ODDIE, civil engineer, a subject of the King of Great Britain and Ireland, residing at 85 Worple road, Wimbledon, London, England, have invented new and useful Improvements in Duplex Pumps, of which the following is a specification.

The present invention relates to duplex pumps, and in particular to slide-valve gear for the same, in which the main slide-valve of one cylinder and the expansion slide-valve of the other cylinder, and vice versa, are controlled by an obliquely-slotted block. These blocks are driven from the piston-rods of the cylinders. The invention is therefore adapted for such valve-gears as those in which the piston of the one cylinder drives the main slide-valve of the other cylinder and the expansion slide-valve of its own cylinder.

This invention has for its object the production of a simple form of a duplex slide-valve gear, which is especially suitable for use with high-pressure steam.

It is particularly designed for such pumps as are known by the name of "tandem compound duplex pumps."

With this object in view my invention consists in the construction and combinations of parts as hereinafter described and claimed.

Referring to the drawings, Figure 1 is a transverse section through the motor-cylinders and valve-gear of a duplex pumping-engine constructed according to my invention. Fig. 2 is a plan of the same with the valve-chest cover and valves removed, the better to show the valve-face and ports and channels. Fig. 3 is a detail, to an enlarged scale, of the valve-gear itself. Fig. 4 is a longitudinal section through a compound tandem duplex pumping-engine, while Fig. 5 is a plan of the same, showing the valve-gear for the high and low pressure cylinders in position. Fig. 6 is a longitudinal section through both main valves in a larger scale. Fig. 7 is a section through the one main valve in line A A of Fig. 6. Fig. 8 is a section through the second main valve in line B B of Fig. 6. Figs. 9 and 10 are cross-sections, on an enlarged scale, of the valves for my compound engine.

The main cylinders 1 and 2 of the engine are provided with valve-faces 3 and 4, having ports and passages 5, 6, 7, and 8, communicating with the opposite ends of each cylinder, these valve-faces being situated in the chamber 9. Recesses 16 and 17 are formed

in each cylinder adjacent to the valve-face, in which recesses blocks 18 and 19 are located, these blocks being driven by arms on the piston-rods, which piston-rods are connected with the rods 20 and 21, attached to the blocks 18 and 19. Cross-heads 26 and 27, having inclined projections 24 and 25, engage in inclined slots 22 and 23, formed in the blocks 18 and 19. These cross-heads are connected by suitable rods or connecting-pieces 28, 29, and 30 to the main distributing-valves 31 and 32 of the opposite cylinder. These main valves are formed with recesses 33 34, into which the steam or working fluid is admitted, and from thence it is distributed by the channels 5 6 7 8 to the respective ends of the cylinders.

In order to prevent leakage of high-pressure steam directly into the chamber 9 and in order to keep the main valve sufficiently, but without undue pressure, pressed onto its valve-face, I provide plungers or pistons 35 36, accurately fitted, but capable of free up-and-down movement, into a suitably-formed recess 37 38. Steam is admitted into the plungers 35 36 and passes, by means of the channels 39 40, into the recess in each main valve, and from thence is distributed to the respective cylinder ends.

In the case of the main valve 32 the steam passes alternately to the channels 7 8, communicating with the ends of the one cylinder by means of two channels 44 45, while in the case of the main valve 31 the steam is distributed alternately to the channels 5 6 by means of one channel 43, formed approximately in the middle of the main valve. Likewise the exhaust, passing alternately from the end of the one cylinder through the channels 7 8, is led into the common receiver 9, in the case of the main valve 32, by means of a channel 46, formed approximately in the middle of this main valve, while in the case of the main valve 31 the exhaust, passing alternately from the ends of the cylinder through the channels 5 6, exhausts directly into the common receiver 9, the said channels being alternately uncovered by the main valve for this purpose.

On the cross-heads 26 27 are formed jaws 47 48. Spindles 49 50, with nuts or collars 51 52 53 54, engage one in each jaw. To the other ends of these spindles are attached the expansion-valves 41 42, the arrangement being such that each cross-head actuates the main valve of the opposite cylinder and the

expansion-valves of its own, and vice versa. I mount these expansion-valves on the spindle that drives them, so that their relative positions one to another remain constant 5 and regulate the expansion by giving more or less lost motion between the nuts or rings and the jaw on the driving-piece in which they engage. By this arrangement the expansion-valves remain stationary for a certain part of the stroke of the piston, leaving 10 the port or passage for inlet steam fully open, and then after the lost motion is taken up move quickly and cut off the steam, so that any excessive throttling is avoided.

15 A convenient method of regulating the lost motion is shown in the drawings, where the nuts and washers are fitted with right and left hand screws, respectively, corresponding with right and left hand screws formed on the 20 spindles, which latter are prolonged so that they can be regulated from outside by means of hand-wheels 55. When the spindles are turned by means of the hand-wheels 55, the nuts or washers being prevented from turning, these latter will be brought nearer or farther apart, thus increasing or decreasing the 25 lost motion. The expansion-valves therefore commence their travel earlier or later in the stroke, cutting off the supply of steam correspondingly earlier or later, as may be 30 required.

In case of a compound engine the valve-faces 3 and 4 are provided with additional ports and channels 10, 11, 12, and 13, communicating with the ends of the high-pressure cylinders 14 and 15, from which high-pressure cylinders the steam is delivered into 35 the low-pressure cylinders 1 and 2.

The operation is as follows: Steam is admitted directly into the cylindrical recesses 40 in the main valves between the expansion piston-valve heads, passing thence into the high-pressure cylinders 14 and 15. After having actuated the pistons in these cylinders it is led into the low-pressure cylinders 1 45 and 2 and thence allowed to escape into the exhaust. Expansion-valves 56 57 may be fitted to control the admission of steam into the low-pressure cylinder, driven from extra 50 jaws 58 59 and rods 60 61 on the cross-heads and capable of being regulated with nuts or washers 62 63 64 65 in a similar manner to that described for the expansion-valves of

the high - pressure cylinder. In this case, however, they take the form of flat valves 55 working on the back of the main valves, as owing to the comparatively low pressure in the receiver the friction of their movement is inconsiderable.

Having thus described my invention, what 60 I claim as new, and desire to secure by Letters Patent, is—

1. In a duplex pumping-engine, the combination of cylinders, a piston and piston-rod 65 for each cylinder, a main valve for each cylinder, connections between said main valves and the opposite piston-rods respectively, said main valves being formed with recesses or cavities, and expansion or cut-off valves 70 located in said cavities, said main valves being located and operated in an exhaust-chamber common to both of the cylinders, substantially as described.

2. In a duplex pumping-engine, the combination of cylinders, a piston and piston-rod 75 for each cylinder, a main valve for each cylinder, mechanism connecting said main valves with the opposite piston-rods respectively, said main valves being formed with recesses or cavities, and expansion or cut-off valves 80 located in said cavities, said main valves being also provided with one or more exhaust-channels formed at or near the middle of the valve for one side of the engine, and with openings at the end of the valve for the other 85 side of the engine, said openings communicating with the common exhaust-chamber containing said valves, substantially as described.

3. In a duplex pumping-engine, the combination of a casing, main valves located in 90 said casing and having recesses or cavities therein, and expansion-valves located in said cavities, said cavities being closed at both ends by the heads of said expansion-valves, 95 live steam entering between said heads, and the cut-off edges of said expansion-valves being located between the closing-valve heads, substantially as described.

In testimony whereof I have signed my 100 name to this specification in the presence of two subscribing witnesses.

PHILIP FRANCIS ODDIE.

Witnesses:

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R. F. WILLIAMS.