

W. ANTHONY.
DIRECT ACTING FLUID ENGINE.
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1,063,904.

Patented June 3, 1913.

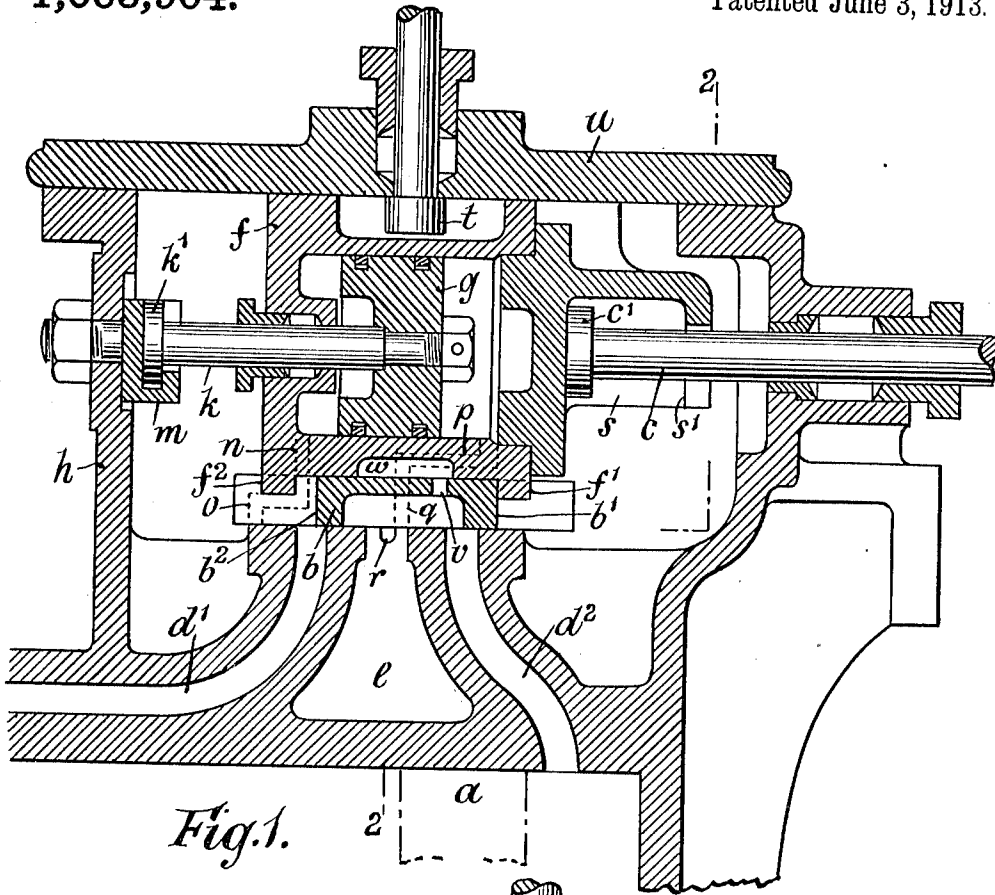


Fig. 1.

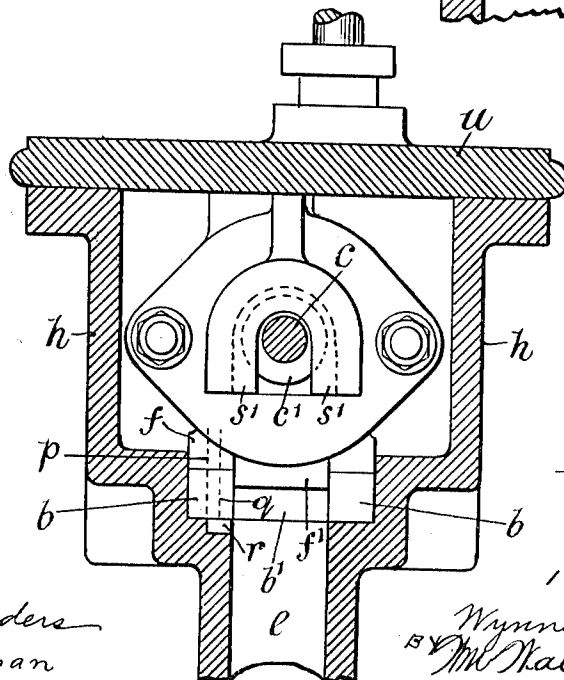


Fig. 2.

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WYNNARD ANTHONY, OF COLCHESTER, ENGLAND.

DIRECT-ACTING FLUID-ENGINE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WYNNARD ANTHONY, subject of the King of Great Britain, residing at Capel House, Colchester, in the county of Essex, England, have invented new and useful Improvements in Direct-Acting Fluid-Engines of the Positive-Action Type, of which the following is a specification.

This invention relates to improvements in means for effecting the distribution of the pressure-fluid in a reciprocating engine of the type in which the displacement of the slide-valve is initiated by a force mechanically transmitted from the moving parts of the engine and completed by the pressure of the operating fluid on its admission to an auxiliary cylinder which contains a fixed piston. Now according to the present invention, the said auxiliary cylinder is so constructed, mounted and operated that it is required to undergo a longitudinal displacement relatively to the valve and subsequently cause the initial displacement of the valve, the effect of the combined displacements being the admission to, and evacuation from, the said auxiliary cylinder of the pressure-fluid resulting in the completion of the travel of the valve.

The invention includes other improvements which will be described by reference to the accompanying drawing.

In this drawing: Figure 1 is a central longitudinal section, and Fig. 2 is a transverse section taken along the line 2—2 of Fig. 1.

In these figures the several parts of the mechanism of the engine which are relevant to the present invention are shown in the relative positions which they will occupy when the displacement of the valve by the mechanically transmitted force is about to cease and its travel completed by the operation of the pressure-fluid.

The piston *a* of the main engine is supposed to be traveling from left to right and approaching the end of its stroke, the valve *b* being mechanically urged from right to left by the thrust of the rod *c*. In the position shown, the port leading to the passage *d*¹, which has been and is still admitting high pressure fluid to the left-hand side of the piston *a*, is closing and the port which is permitting the evacuation of the spent fluid from the right-hand side of the piston through the passage *d*² to the exhaust pas-

sage *e* is also closing. When the valve *b* has been mechanically urged by the rod *c* a short distance farther, the auxiliary valve-motor comes into operation and immediately conveys the valve into its extreme position to the left admitting the pressure-fluid through the passage *d*² to the right-hand side of the piston *a* and causing its direction of motion to be reversed.

The valve-motor consists of a cylinder *f* which is slidably mounted on the back of the slide-valve *b* and within the cylinder *f* is fitted a piston *g* which is prevented from longitudinal motion relatively to the valve-casing *h*. As shown in the drawing, the piston *g* is secured to a rod *k* the enlarged head *k*¹ of which is inserted within a socket *m* secured to the valve-casing *h*. The cylinder *f* on being displaced by the rod *c* causes the slide-valve *b* to travel therewith by the engagement of a projection *f*¹ on the cylinder with one end *b*¹ of the slide-valve, the movement of the slide-valve in the contrary direction being derived by the engagement of a corresponding projection *f*² on the cylinder *f* with the other end *b*² of the slide-valve. In transferring the engagement from *f*¹ to *f*² a small amount of relative motion between *f* and *b* will take place. By virtue of this displacement of *f* relatively to *b*, passages formed partly in *f* and partly in *b* are alternately brought into and taken out of register with each other. In the position shown it will be seen that a passage *n* formed in *f*, and shown in dotted lines, is in register with a passage *o* formed in *b*. Through the combined passage *n o* pressure-fluid will be able to enter the left-hand end of the cylinder *f* when the extremity of the passage *o* becomes uncovered by the further displacement of the valve *b* to the left. There is also another passage *p* formed in *f* leading from the right end thereof which, in the position shown is in register with another passage *q* formed in *b* and through this combined passage *p q* spent fluid contained in the right-hand end of *f* will be able to escape to the exhaust passage *e* when, by the further movement of the valve *b* to the left, the extremity of *q* comes into register with a recess *r* formed in the face of the cylinder. The combined passages *n o* and *p q* are opened simultaneously and permit pressure-fluid to enter the left end of the cylinder *f* and be evacuated from the right

end thereof. This will have the effect of rapidly displacing the cylinder *f* to its extreme position to the left and require it to carry therewith the slide-valve *b*. The passage *d*² will in this manner become immediately wide open for the admission of the high-pressure fluid to the right-hand side of the main piston *a* and so reverse its direction of motion.

10 The reversal of the motion of the piston *a* will cause a reversal of the motion of the rod *c*, the head *c*¹ of which, when it has moved sufficiently to make contact with the notched extremity *s*¹ of the socket *s*, will convey the cylinder *f* with it. The first effect of the return movement of *f* will be to cause the projection *f*² to approach the left end *b*² of the slide-valve and close the passages *n o* and *p q* by placing the portions thereof out of register with one another. When *f*² engages with *b*² a pair of passages corresponding to *n o* but adapted to admit pressure-fluid to the right-hand end of the cylinder *f* will come into register and so also will a pair of passages corresponding to *p q* for the evacuation of fluid from the left end of *f*. The passages alternative to *n o* and *p q* are omitted from the drawing.

30 A starting lever *t* passing in a fluid-tight manner through the cover *u* of the valve-casing *h* is provided. On the removal of the cover *u* the piston and cylinder elements of the valve-motor and also the slide-valve *b* can be removed for examination and refitting and as these elements contain the passages *n o*, *p q* and also the corresponding alternative passages, they can be readily cleared if choked. By the provision of an aperture *v* in the back of the slide-valve the pressure in the space *v* between *f* and *b* will be maintained at the exhaust-pressure and the higher fluid-pressure will keep both *f*

and *b* well seated on one another and on the cylinder-face.

I claim:—

1. In a reciprocating engine, a cylinder, a valve casing having inlet and exhaust ports for passage of motive fluid to and from the cylinder, a main slide valve in said valve casing movable across said ports, and having passages therein, a movable cylinder in said valve casing in contact with said valve and having a limited amount of movement in relation to said valve, said movable cylinder having passages adapted to coöperate with the passages in the slide valve, means having a lost motion connection with the cylinder for imparting initial movement thereto, and a stationary piston in said cylinder.

2. In a reciprocating engine, a cylinder, a valve casing having inlet and exhaust ports for passage of motive fluid to and from the cylinder, a main slide valve in said valve casing movable across said ports and having passages therein whose communication with the valve casing is controlled by the movement of the valve, a movable cylinder in the valve casing in contact with the valve and having a lost motion connection therewith, a fluid passage to said chamber, said movable cylinder having passages coöperating with the passages in the main valve, means operated from a moving part of the engine having a lost motion connection with said cylinder for moving the same, and manually controllable means for operating said movable cylinder.

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

WYNNARD ANTHONY.

Witnesses:

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