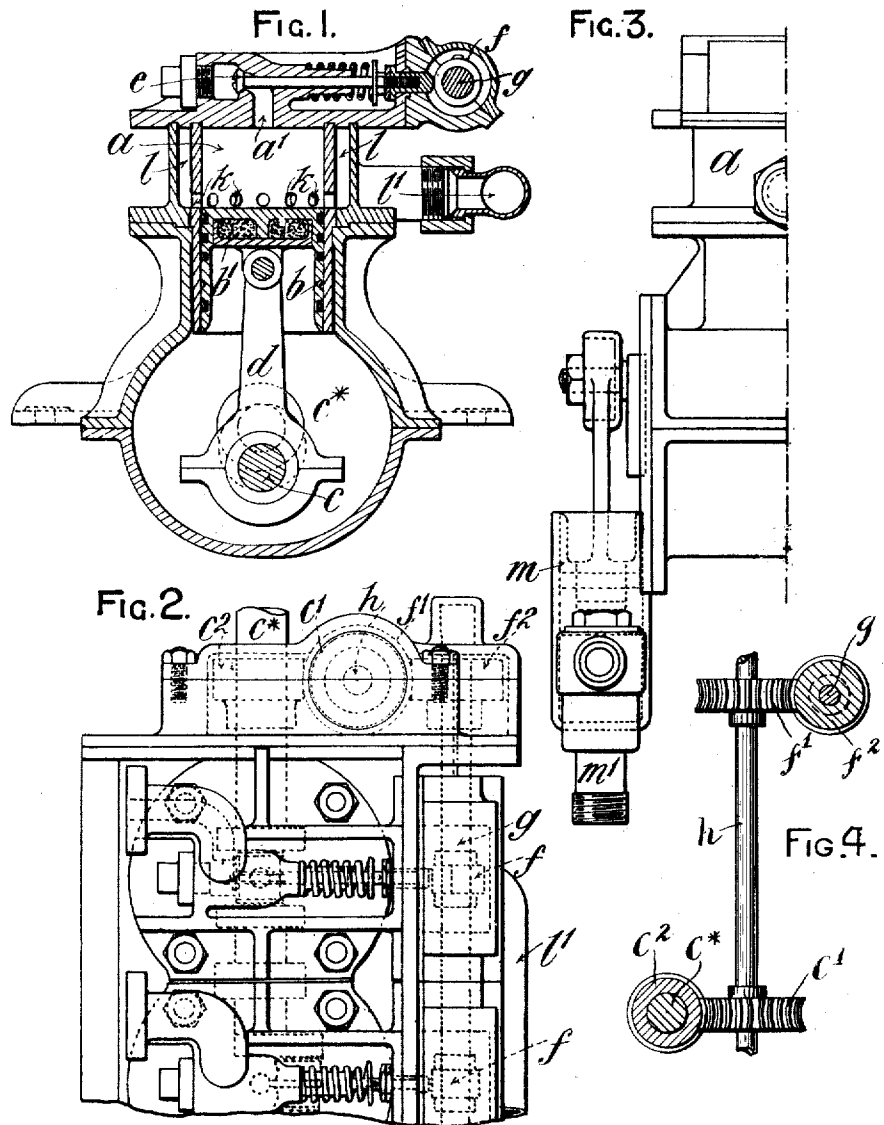


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STEAM ENGINE.
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1,023,648.

Patented Apr. 16, 1912.



WITNESSES:
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UNITED STATES PATENT OFFICE.

ALEXANDER ALBERT HOLLE, OF OLST, NETHERLANDS.

STEAM-ENGINE.

1,023,648.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALEXANDER ALBERT HOLLE, a subject of the Queen of the Netherlands, residing at Haere House, Olst, in the Kingdom of the Netherlands, have invented a new and useful Steam-Engine, of which the following is a full and complete specification.

This invention relates to steam engines of the single-acting type, and it has for its object utilizing the kinetic energy of the steam, *i. e.* the impact of the steam on the piston and not the pressure or expansion thereof, whereby the efficiency of the engine is materially increased without increasing the consumption of steam. I attain this end by so constructing the admission valve mechanism that said valve does not open until the crank is at its angle of maximum leverage and is then only kept open for an infinitesimal space of time. To obtain the maximum kinetic energy the admission port is arranged axially in the cylinder head so that the steam issues therefrom in a direct line with the path of motion of the piston, and to reduce the consumption of steam to a minimum the exhaust port is opened as soon after the inlet valve is closed as possible.

In the accompanying drawing which illustrates this invention:—Figure 1 is a view in sectional elevation through one of the cylinders. Fig. 2 is a broken view in plan. Fig. 3 is a view in side elevation showing the opposite end of the engine to that shown in Fig. 2, and Fig. 4 is a view of the gearing by which the cam shaft is driven from the crank-shaft.

Throughout the views similar parts are marked with like letters of reference.

The cylinders *a*—of which there are a plurality—are of the single-acting type and the trunk pistons *b* of said cylinders are coupled directly with the crank-pins *c* of the crank-shaft *c** by means of connecting rods *d* in the usual manner. In the head of each cylinder is an admission port *a'* which is axially arranged with respect to the cylinder, and in the back end of said port is an admission valve *e* of the spring-controlled puppet type. This valve is operated to open it by a cam *f* mounted on a cam shaft *g* which is preferably located at the top of the cylinder and is driven from the crank-shaft *C** by a vertical shaft *h* and two sets of skew gearing *C¹ C²* and *f¹ f²*. The cam *f* is so shaped and located on its shaft that the admission valve

e is not opened until the crank pin *c* of the crank-shaft is at its angle of maximum leverage, *i. e.* when the piston has moved about half-way through its working stroke, and that said valve is only kept open for an infinitesimally short space of time, *i. e.* momentarily.

In the wall of the cylinder are exhaust ports *k* which are so located that they are uncovered or opened by the piston *b* as it moves toward the end of its outward stroke and after the admission valve *e* has closed and are covered or closed by said piston on its return stroke. To insure that the cylinder is clear of exhaust steam when the exhaust ports *k* are closed by the piston *b* on its return stroke a vacuum is maintained at said ports. A convenient method of effecting this is to form annular chambers *l* around each of the cylinders and to couple said chambers to the suction inlet *m'* of an air pump *m* driven from the crank-shaft of the engine by means of a common pipe *n* junctioning with outlets *l'* of the chambers *l*.

It will be seen that in an engine constructed in the manner herein specified the pistons are actuated solely by the kinetic energy of the steam on the pistons and not by either pressure or expansion, and that as the steam is only admitted to the cylinders for an infinitesimally short space of time when the crank—through which the power is imparted—is at its angle of maximum leverage, the highest possible efficiency is obtained with a minimum consumption of steam.

I claim:

1. In a steam engine the combination of a plurality of single-acting cylinders, axially arranged admission ports in the heads of the cylinders, admission valves in said ports, exhaust ports in the walls of the cylinders so located as to be opened by the pistons as they move toward the ends of their outward strokes and after the admission valves have closed, and mechanism for operating the admission valves so that they are opened only when the cranks have reached their angle of maximum leverage and are kept open for only an infinitesimal space of time, as set forth.

2. The combination in a steam engine of a plurality of single-acting cylinders, trunk pistons in said cylinders, a crank-shaft mounted in suitable bearings, connecting rods coupling the pistons with the crank-pins of the crank-shaft, admission ports cen-

trally and axially arranged in the cylinder heads, valves in said admission ports, mechanical means for opening said valves momentarily when the crank-pins of the crank-shaft are at their angle of maximum leverage, exhaust ports in the walls of the cylinders so located that they are opened by the pistons as they move on their outward strokes and after the admission valves have

closed, and means for maintaining a vacuum 10 at said exhaust ports, as set forth.

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

ALEXANDER ALBERT HOLLE.

Witnesses:

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W. F. AKEN.
