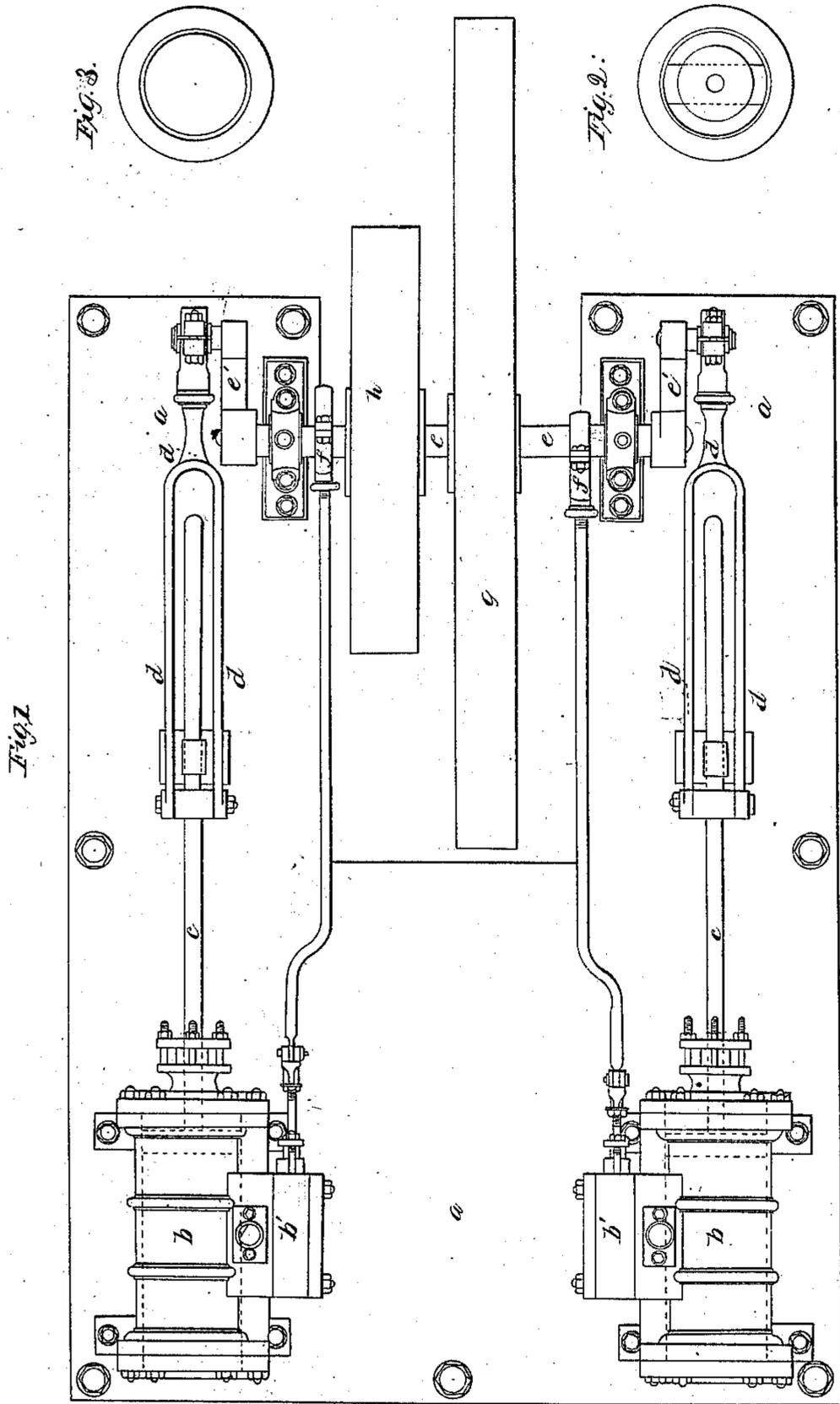


*A. C. F. Franklin,*

*Reciprocating Steam Engine,*

*No. 81,766,*

*Patented Sep. 1, 1868.*



*Witnesses:*  
*Geo. Pett.*  
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# United States Patent Office.

ALEXANDER CÆSAR FREDERICK FRANKLIN, OF NO. 4 PRINCES SQUARE,  
BAYSWATER, ENGLAND.

*Letters Patent No. 81,766, dated September 1, 1868.*

## IMPROVEMENT IN RECIPROCATING STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL TO WHOM IT MAY CONCERN:

Be it known that I, ALEXANDER CÆSAR FREDERICK FRANKLIN, of 4 Princes Square, Bayswater, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in "Steam-Engines;" and I, the said ALEXANDER CÆSAR FREDERICK FRANKLIN, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof; that is to say—

This invention has for its object improvements in steam-engines, and is applicable where two cylinders are employed, the pistons of which are connected to one crank-shaft. The number of the cylinders may, however, be more than two.

The invention consists in so arranging the engine that the steam only acts on each piston, to move it in one direction, so that if two cylinders be employed, the pressure of the steam will be acting on the piston of one cylinder, and thus turning the crank-shaft, whilst the piston of the other cylinder is being moved back without being acted on by the pressure of the steam. It should be observed that when the cylinders open in opposite directions, the two cranks should project from their shaft in one direction, but when the two cylinders open in the same direction, the two cranks should project in opposite directions from their shaft. And in order that my said invention may be most fully understood, and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

### *Description of the Drawings.*

Figure 1 is a plan of a steam-engine, arranged according to my invention, and having two stationary steam-cylinders. *a a* is a base-plate, on which are bolted the two steam-cylinders *b b*, each of which is open at one end to the air. One of the cylinders is open in front the stuffing-box, for the piston-rod being carried by means of a bar passing from side to side of a ring-cover, such as is shown in plan in Figure 2. The other steam-cylinder, which is open at the back, may be fitted with a ring-cover, such as is shown at Figure 3. The steam-passages are to be arranged in the usual way, except that the passage leading to the open end of each cylinder should be stopped up or dispensed with. *b' b'* are valve-boxes on the sides of the cylinders. They may contain slide-valves, of ordinary construction, and they are to be supplied with steam in the usual way. The piston-rods *c c* are jointed at their outer ends to the connecting-rods *d d*, which at their other extremities are coupled with cranks *e' e'*, on the driving-shaft *e*, as is shown. *f f* are eccentrics on the shaft *e*, for giving motion to the valves in the usual way. *g* is a fly-wheel, and *h* a belt-pulley, to receive an endless strap, for driving machinery. Both of them are fixed upon the driving-shaft *e*.

If preferred, the valves of the steam-chests may be so arranged and provided with actuating-mechanism that the steam shall be exhausted from the cylinder at about half stroke, and I sometimes place valves in the exhaust-passages, such valves being arranged so that when the pressure in the cylinder falls to the atmospheric pressure, the valve in the exhaust-passage closes, and from the continued motion of the piston a partial vacuum results, which is utilized in the return-stroke.

I would remark that the form of the engines may be varied. Thus, the pistons may have trunks upon them to admit of the connecting-rods being coupled at once with the piston, or the cylinders may be arranged to oscillate on trunnions, as is well understood, and other similar variations may be made.

In the practical working of the above-described arrangement of open cylinders, with pistons and cranks, the steam, while driving one piston, operates, through the driving-shaft and cranks, to effect the return movement of the other. If the two cylinders be arranged with their ends open in the same direction, and the cranks are made to project in the same direction, the engine will not operate so as to effect a full revolution of the shaft. So, should the cranks be arranged to stand in opposite directions, and the cylinders be made to open in opposite directions, the engine will not turn the shaft an entire revolution. The arrangement involved by my invention, therefore, contemplates that either the two cranks should be arranged in opposite directions

with respect to each other, and both the cylinders be open in one direction, or both the latter shall open in opposite directions, and the cranks be arranged to project in the same direction.

I therefore claim my improved engine, constructed substantially as described, that is, with each cylinder open at one end only to the atmosphere, and with the cranks of the driving-shaft and the connecting-rods of the pistons of such engines arranged to project from the shaft in the manner herein described.

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