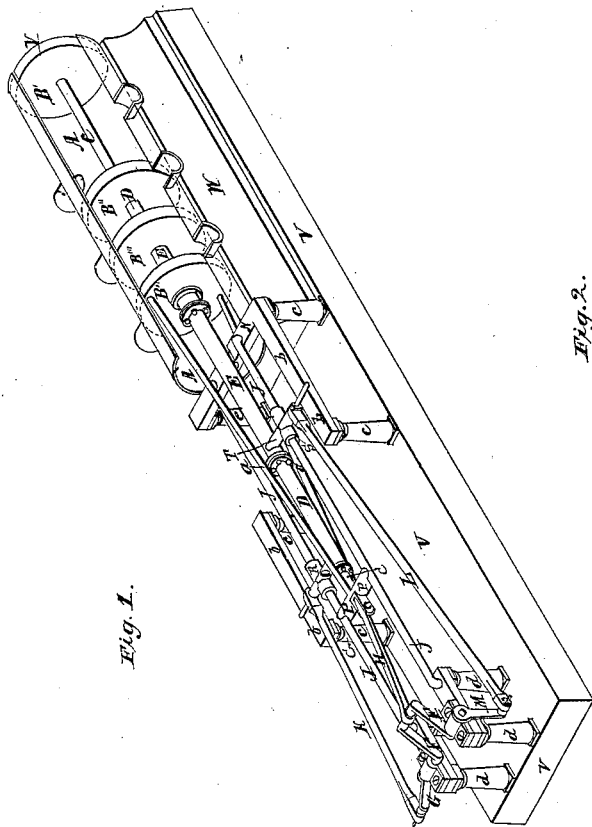
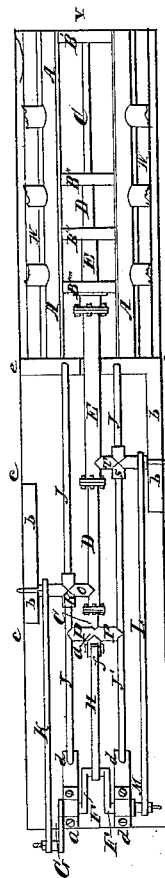


*R. Pomeroy,*  
*Reciprocating Steam Engine,*  
*No. 2,437,* *Patented Jan. 24, 1842.*



*Fig. 1.*

*Fig. 2.*



# UNITED STATES PATENT OFFICE.

RALPH POMEROY, OF BELLEVILLE, NEW JERSEY.

## IMPROVEMENT IN THE CONSTRUCTION OF THE STEAM-ENGINE.

Specification forming part of Letters Patent No. 2,437, dated January 24, 1842.

### *To all whom it may concern:*

Be it known that I, RALPH POMEROY, of Belleville, county of Essex, and State of New Jersey, have made certain Improvements in the Manner of Constructing a Steam-Engine, of which improvement the following is a description.

My improvement in the steam-engine consists in a peculiar mode of employing several pistons in a single cylinder and connecting them to a series of cranks upon the main shaft in such a manner as nearly to equalize the motion of the engine, prevent the occurrence of a dead-point, and effect a more economical use of the steam.

Figures 1 and 2 of the accompanying drawings represent my invention, in which—

A A is the cylinder, constructed without any heads, they being unnecessary in my plan, a portion of which is removed in Fig. 1, so as to show the arrangement of the four pistons within it. These pistons are marked B', B'', B''', and B'''. The piston B' has a solid piston-rod, C, and cross-head P P moves in between the guides J J, in the usual manner, and connected by a rod, H, to the main crank F, which construction, there being nothing novel in it, does not require to be described. Piston B'' is placed above B' and has a tubular piston-rod, D, through which the rod C of piston B' passes. This tubular piston rod D has at its end opposite the piston a horizontal bar, O, passing from its right side at a right angle extending over and outside of the guide-rod J of the same side, and where it crosses the guide-rod J has a socket or tubular slide, R, formed upon it, which embraces the guide rod J, and by so doing keeps the bar O in place. This bar O is further supported on the outside of the guide-rod J by its end resting and sliding on a bar or guide, b b, supported on pedestals or otherwise, and placed parallel and in the same horizontal plane with the guide J, and is connected by a rod, K, between these guides J and b to a second crank set at an angle of one hundred and twenty degrees distant from the main crank, to which the rod of piston B' is attached. The piston B''' also has a tubular rod, E, and, being placed above both the last-described pistons, its tubular rod embracing, necessarily, the rods of these pistons, and has at its upper end a bar, T, projecting from its left side, extending over the guide J' of the same side, and having

a tubular slide, S, to embrace said guide resting with its end upon a guide, b, and connected by a rod, L, with a third crank distant one hundred and twenty degrees from both of the former ones, in all of which particulars the construction and arrangement of the bar T and its appendages resemble the bar O of piston B'', already described. Piston B'''' is placed above the others. It has no tubular rod like them, but has merely an opening at its center to allow their piston-rods passing through it, which opening on the outer side of the piston is provided with a stuffing-box to prevent the escape of steam from its inner side. It has, in lieu of the tubular rods which two of the other pistons have, two rods rising from points on its surface immediately opposite each other which run to the cross head P P, to which the rod C of the piston B' is attached. From this connection it will be seen that piston B' and B'''' must always move together, as they are connected by the rod H to the same crank.

It will be seen that when the shaft carrying the cranks is made to revolve the piston B' and B'', the pistons B'' and B''', and the pistons B''' and B'''' will alternately operate toward and recede from each other. During the period that either of these pairs are receding from each other the steam is to be admitted between them, or it is to act upon them by its expansion, and at the termination of this motion the steam is to be let off by the eduction-pipe and is to be admitted between the two pistons which have approached each other, and so alternately.

Owing to the manner in which I arrange the cranks upon the shaft—viz., at about an angle of one hundred and twenty degrees from each other—one of the two pistons between which I admit the steam at the moment they begin to separate in working the engine will be nearly stationary for a short time and operate somewhat as a fixed head for the steam to act against, as the crank to which it is attached will at this time be about the dead-point. This I will explain. In commencing to work the engine we will suppose that pistons B'' and B''' are nearly together, the crank of piston B''' being about the dead-point. The steam is now admitted under full head between them, the effect of which at first is to drive piston B'' toward the opposite end, Y, of the cylinder, the piston B''' remaining during this time nearly stationary,

allowing of the effective force of the steam being exerted on piston B". As soon as the crank of piston B''' has been carried beyond the dead-point, the steam operates effectively on both and causes them to recede from each other. This will bring pistons B' and B'' together, piston B' being carried by its crank while the steam is between piston B'' and B''' toward piston B'. Pistons B' and B'' will then move together for a short distance (owing to the relative position of their respective cranks) toward the end Y of the cylinder, while the piston B''' is moving toward the opposite end, until the crank of B'' comes to the dead-point, when piston B'' remains stationary, while piston B' moves on. At the time they begin to separate I again admit the steam, permitting the steam already admitted between pistons B'' and B''' to act expansively upon piston B'', which it will be enabled to do, as at this time piston B'' will be nearly stationary and operate as a head for the steam to act against. As soon as the crank of piston B'' has passed the dead-point, however, and pistons B'' begins to recede from piston B', the eduction-pipe between pistons B'' and B''' is opened to let off the steam between them. Pistons B' and B'' in receding cause pistons B''' and B'''' to approach each other, piston B''' moving with piston B' on account of their connection, and piston B'' being carried toward piston B'''' by its crank. When they have met, they move together for a short distance in the same manner that I described

pistons B' and B'' as moving, after which, when they begin to separate, I apply the steam between them, permitting that last admitted between pistons B' and B'' to operate expansively, pistons B' and B''' serving as fixed points, while the crank which carries them is at the dead-point, or as fixed heads for the steam in the spaces between pistons B' and B'' and pistons B''' and B'''' to act against; but as soon as crank F has passed its dead-center the pistons B' and B''' begin to move again, piston B''' and B'''' receding from each other, which has the effect of bringing piston B'' and B''' into the position they occupied in the beginning of this explanation, when the same operation may be repeated.

I am aware that two pistons have been employed, the rod of one being hollow and the rod of the other working through it, only one crank being employed. This I do not claim.

What I claim as my invention, and desire to secure by Letters Patent, is--

Combining four pistons constructed and arranged substantially in the manner set forth in one cylinder, said pistons being connected with three cranks placed at about an angle of one hundred and twenty degrees from each other, all as herein described.

RALPH POMEROY.

Witnesses:

S. S. WEBSTER,  
JAMES SUMMERS.