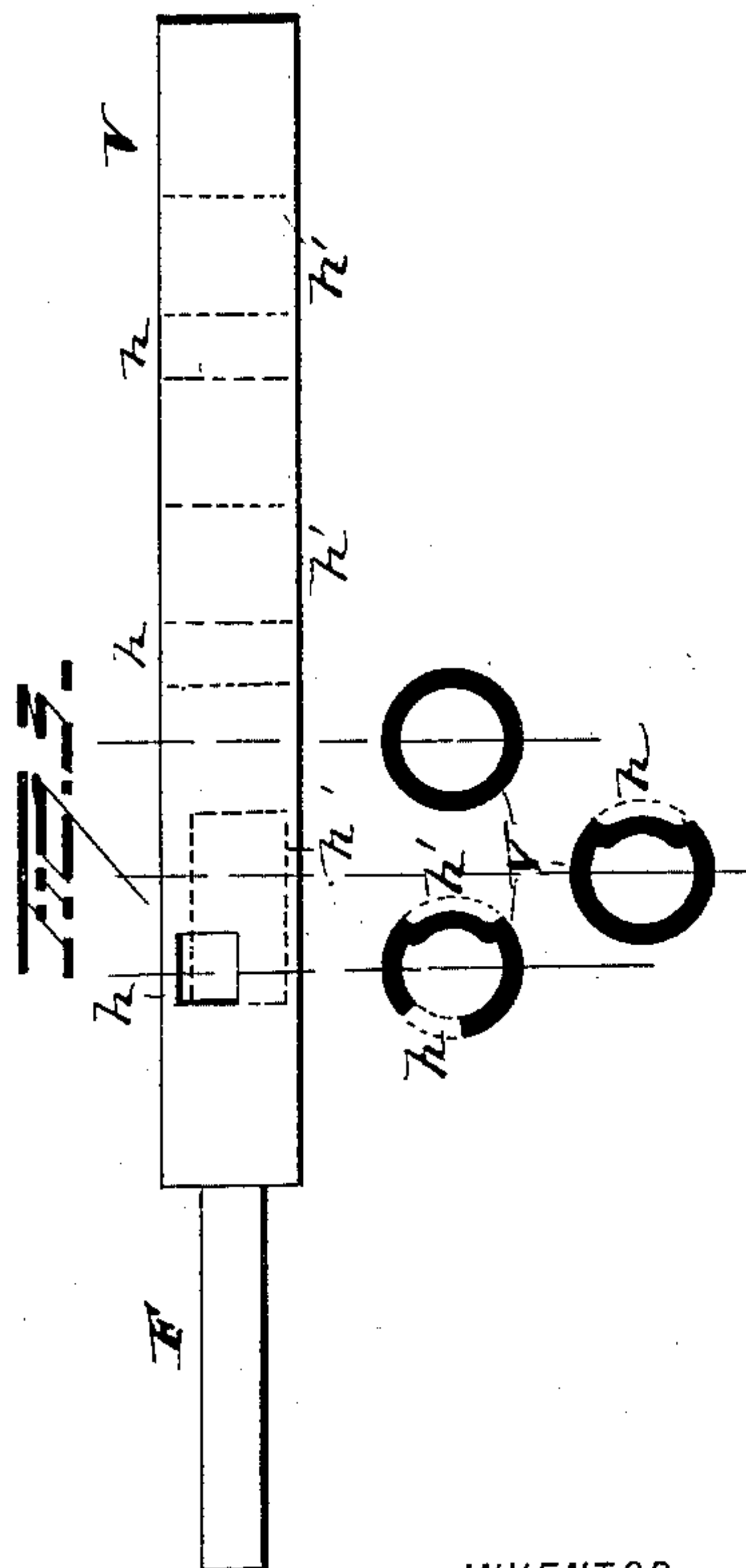
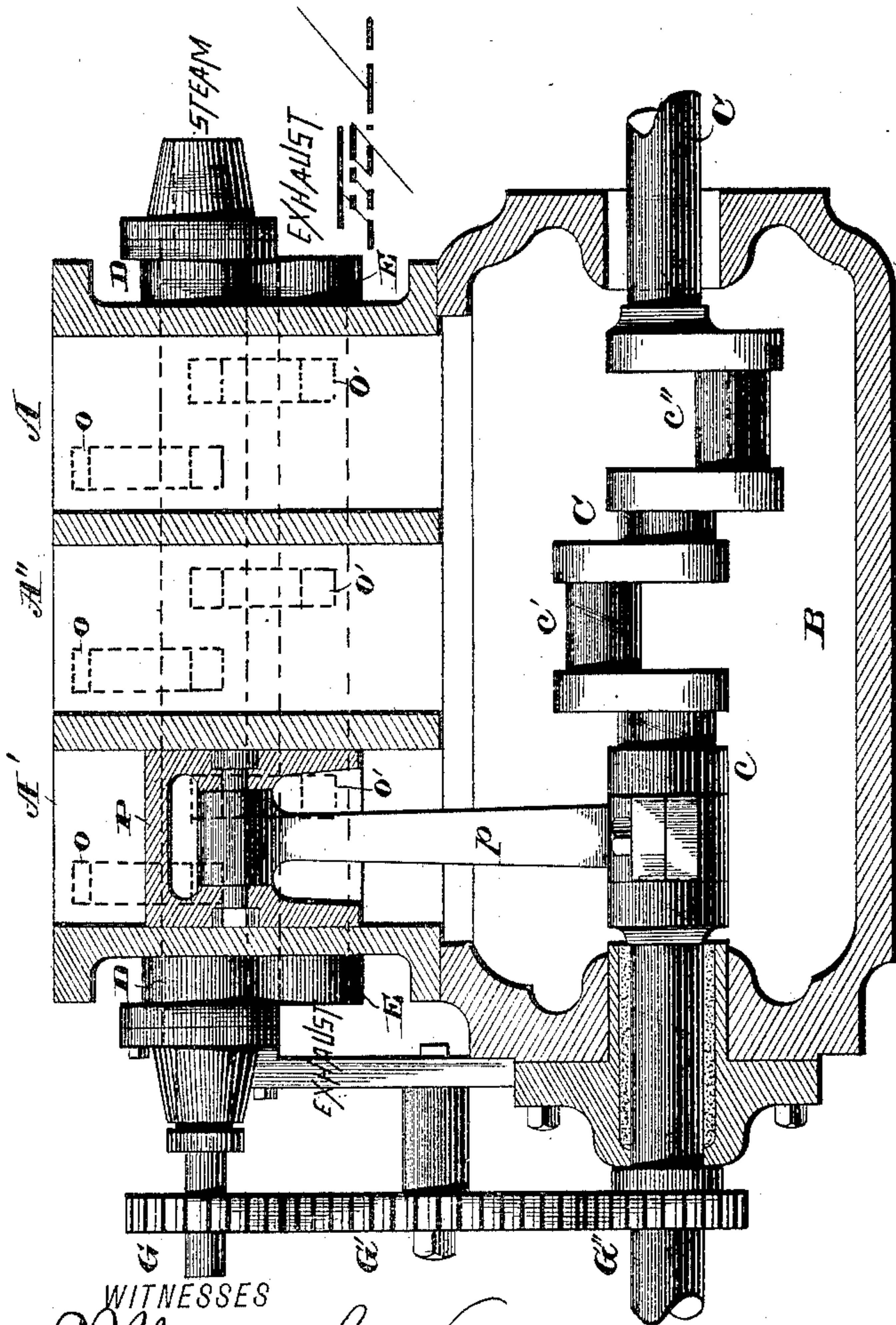
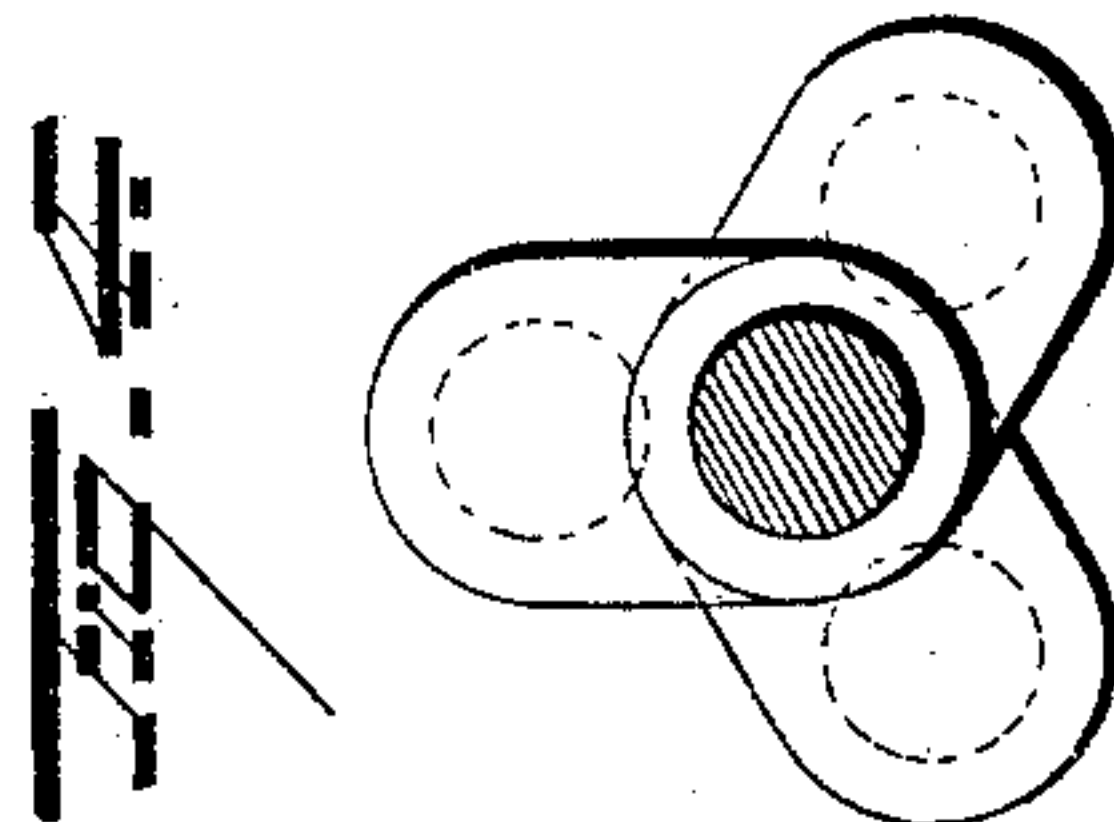
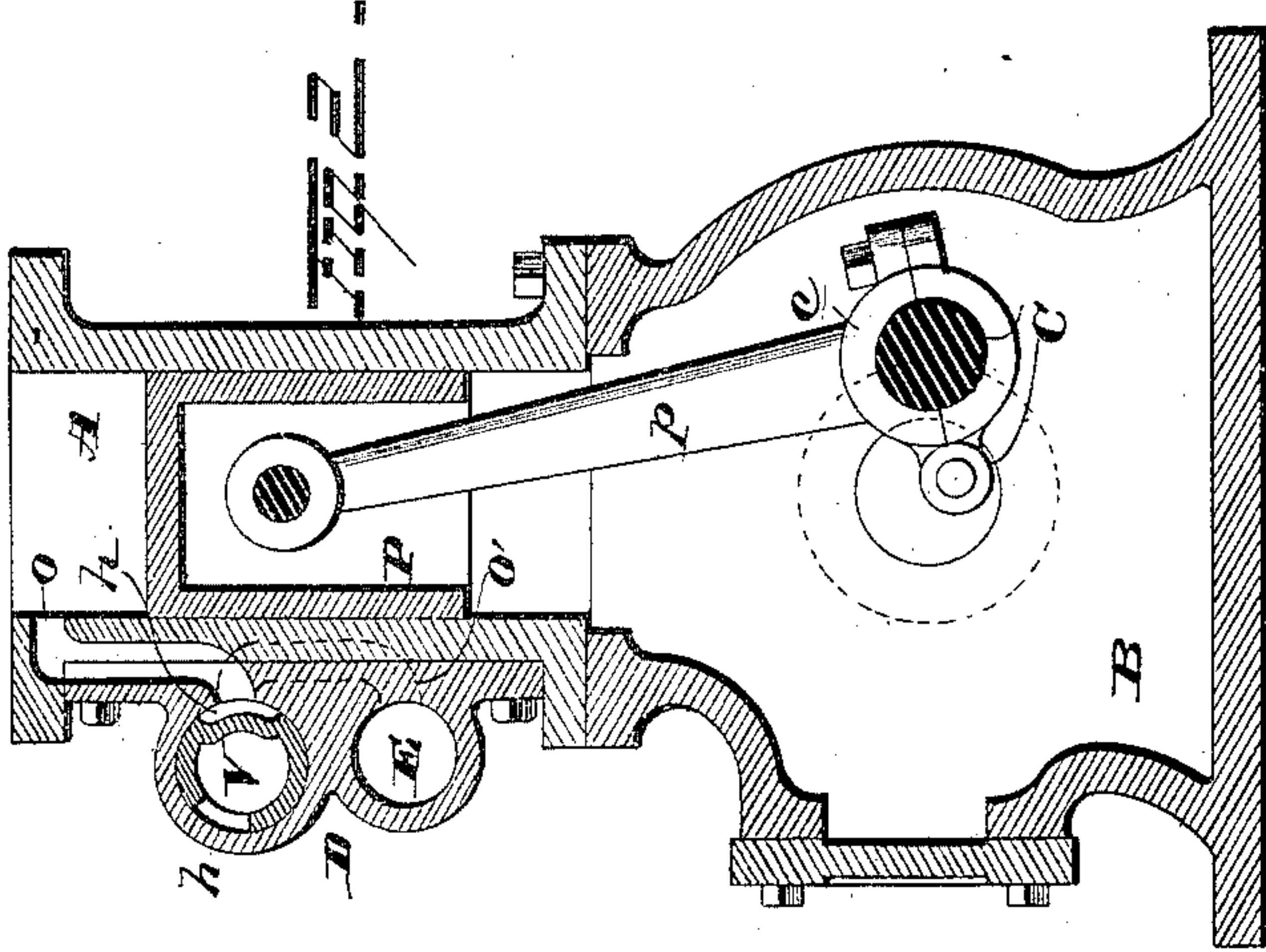


(No Model.)

A. BOWN.  
STEAM ENGINE.

No. 339,135.

Patented Apr. 6, 1886.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

ALBERT BOWN, OF STREATOR, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
FAWCETT PLUMB, OF SAME PLACE.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 339,135, dated April 6, 1886.

Application filed November 14, 1885. Serial No. 182,853. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT BOWN, of Streator, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in engines.

The object is to provide a multiple-cylinder engine in which the steam may be made to work expansively in a greater or lesser degree, and in which the amount of compression for steam-cushioning may be as great as desired.

A further object is to provide a perfectly-balanced rotary valve which will waste no steam in the course of its action, and which may be put to practical use in an economical and effective manner.

With these ends in view, my invention consists in certain features of construction and combination of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view of the engine in vertical longitudinal section. Fig. 2 is a vertical transverse section through one of the cylinders. Fig. 3 is a detached view of the valve, showing transverse section of the same at intervals, (indicated by dotted lines;) and Fig. 4 is an end view of the cranked engine-shaft.

A A', &c., represent two or more cylinders, in the present instance three, supported upon a hollow base, B, containing oil and water. The engine-shaft C extends through the base B, and has suitable bearings in each end. The shaft C is cranked at points in a line with the axes of the cylinders. The three cranks c c' c'' diverge from the axis of the shaft in radial planes, forming equal angles with each other, and their wrist-pins are connected with the pistons P by the piston-rods p.

D represents a valve-chamber, which acts also as a steam-chest, and is bored out truly to form a seat for the hollow valve V.

A chamber, E, located beneath the valve-chamber D, serves as a common exhaust-chamber for all the cylinders. The live steam enters the valve-chamber and valve at m, and

is exhausted at n, either end of the engine being used for this latter purpose, as may be most convenient. o o o show ports or connections between the top of each cylinder and the valve-chamber, and o' o' o' show similar ports connecting the valve-chamber and the common eduction-port, E. It will be noticed that the openings into the valve-chamber of all these ports are in the same horizontal line. The valve V is hollow, and has a spindle or shaft, F, fixed in the end opposite the steam-ingress, by which it may be driven. The other end is open, and the steam is then admitted to its interior. Through its walls or side are pierced three holes or ports, h, at a horizontal distance from either end corresponding to the ports e of the cylinders, and at an angular distance from each other of one hundred and twenty degrees. The valve has also three depressions or exhaust-ports, h', corresponding in length and distance from the ends of valve with the openings o o' o o', &c.—that is, they are each of a length equal to the distance between the outside edges of any pair of cylinder or exhaust ports o o', and in a proper position on the valve to exhaust the steam admitted by its corresponding steam-port after the steam has performed its duty. The valve is driven by gears G G' G'' from the engine-shaft, the gears on the valve-spindle and that on the crank-shaft having an equal number of teeth. The gear on the valve-spindle is so set that when the piston of any cylinder is at its utmost height the corresponding valve-port h opening to that cylinder shall have just commenced to open into and admit steam to the steam-port o of same cylinder. Suppose that the piston P, Fig. 2, is at the top of its cylinder. Then the forward edges of the valve-port h (the valve moving in the same direction as the crank-shaft) will have overlapped the nearest edge of the steam-port o, and steam will be admitted from the interior of the valve to the top of the cylinder, and continue to be admitted until the hindmost edge of the valve-port h shall have overlapped the port o, which will occur at about one-half the downward stroke of the piston sooner or later, according as the circumferential length of the steam-ports shall be shorter or longer. The piston continuing its downward stroke and the valve



its rotation, the former arrives at the end of said downstroke, and at the same time the leading edge of the exhaust-port or depression  $h'$  will arrive at the nearest edge of both steam and exhaust ports  $o$  and  $o'$ , and, embracing both these ports and connecting them, will allow the steam to exhaust into  $E$  until it has wholly passed  $o$  and  $o'$ , at which time the piston will be nearly at the end of its upward stroke.

Compression then ensues by reason of all the ports being closed by the body of the valve until the piston is at the end of its upward stroke, when the leading edge of  $h$  will again overlap steam-port  $o$  and the action will be repeated. The action of the other piston is precisely the same. It will be observed that the duration of the admission of steam depends upon the length of the ports, and may be as short as desired, to get the full benefit of expansion. It, however, cannot be made full stroke, and this condition, allowing no expansion, is seldom or never desirable in a steam-engine. The amount of compression may be as much or little as desired, and depends upon the length of the exhaust-ports. The valve is perfectly "balanced," rotates continuously onward, and consumes none of the useful effect of the steam in its working. If an ordinary lubricator is placed on the steam-pipe, it is self-lubricating. The pistons lubricate themselves from the oil in the base, and this will likewise lubricate the valve in case there should be no lubricator on the steam-pipe.

Although gears are herein shown and described for transmitting motion from the engine-shaft to the valve-spindle, it is evident that other means might be employed, and it

is also evident that slight changes might be resorted to in the form and arrangement of the several parts described without departing from the spirit and scope of my invention; hence I do not wish to limit myself strictly to the construction herein set forth; but,

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

1. The combination, with a set of cylinders, a valve-chamber and steam-chest common to said cylinders, steam-ports leading from the chamber to the cylinders, and exhaust-ports leading from the chamber to a common exhaust-chamber, of a hollow valve located within the valve-chamber, and provided with a set of steam-ports arranged to successively open into the steam-ports in the cylinders, and with a set of exhaust-ports, each adapted to connect one steam with one exhaust port, and control the passage of exhaust-steam into the exhaust-chamber, substantially as set forth.

2. The combination, with a cylindrical valve-seat, a hollow continuously-rotating valve adapted to receive steam at one end thereof, and an exhaust-chamber distinct from the valve-chamber and located outside of the casing, of two or more cylinders adapted to be opened and closed to the steam and exhaust at the proper interval, substantially as set forth.

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

ALBERT BOWN.

Witnesses:

JAY BAKER,  
JOHN E. WILLIAMS.