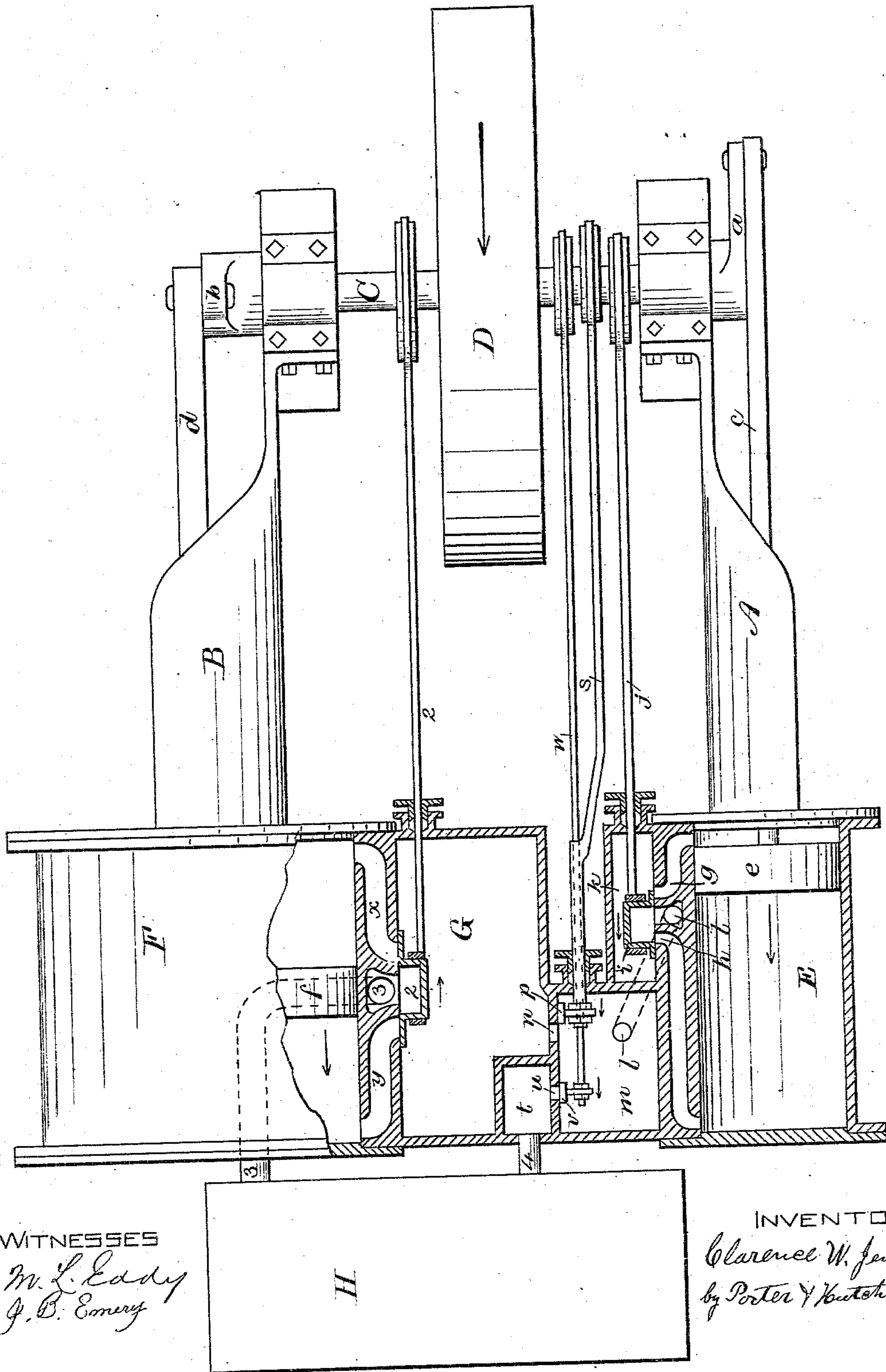


(No Model.)

C. W. JENKINS.
COMPOUND STEAM ENGINE.

No. 295,403.

Patented Mar. 18, 1884.



UNITED STATES PATENT OFFICE.

CLARENCE W. JENKINS, OF SALISBURY, MASSACHUSETTS.

COMPOUND STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 295,403, dated March 18, 1884.

Application filed October 29, 1883. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE W. JENKINS, of Salisbury, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Compound Steam-Engines, which will, in connection with the accompanying drawing, be hereinafter fully described, and specifically defined in the appended claims.

This invention relates to an improvement in that class of steam-engines in which are employed both a high and a low pressure cylinder, and in which the steam first exerts its force in the high-pressure cylinder, after which it passes into and acts expansively in the low-pressure cylinder, from whence it passes into the condenser; and it consists in so connecting the exhaust-ports of the high-pressure cylinder, by suitable conduits and valvular devices, with the low-pressure cylinder and the condenser that as soon as the steam, escaping at each stroke from the high-pressure cylinder, shall have produced an equilibrium of pressure in the two cylinders it will then, during the rest of the stroke, be exhausted into the condenser without passing into the low-pressure cylinder, thereby relieving the high-pressure cylinder of back-pressure, and also giving it the benefit of the vacuum in the condenser.

The accompanying drawing is a top or plan view of an engine embodying my invention, certain of the parts being shown in section or in part broken away, the more clearly to show interior parts and their connections.

In said view, A represents the bed of the high-pressure side or engine, and B the bed of the low-pressure engine. C is the crank-shaft, and D a driving-pulley mounted thereon, and which is, for purpose of illustration, assumed to be rotating in the direction of the arrow shown upon it; and, for convenience of explanation, the movement of the pistons in the direction indicated by said arrow will be termed the "forward stroke," and their movement in the opposite direction will be termed the "return-stroke." Further referring to said figure, E represents the high-pressure cylinder, and *e* its piston, which is connected with the crank-shaft by rod *c* and crank *a* in the usual manner. F is the low-pressure cylinder, whose piston *f* is connected with crank-shaft C by rod *d* and crank *b* in the well-known

manner. H represents the condenser, and G a receiver, into which the steam passes on its way from cylinder E to cylinder F, and which performs the function of a steam-chest to cylinder F. An auxiliary receiver, *m*, is shown as arranged between cylinder E and the main receiver G, the passage *n* between which is closed and opened by valve *p*, which is actuated through rod *s*, connected with an eccentric on shaft C, as shown. Said receiver *m* also communicates with condenser H through port *u*, which is closed and opened by valve *v*, actuated by rod *w*, connected with an eccentric on the rock-shaft, as shown, said rod *w*, for convenience, moving in a hollow portion of rod *s*. The steam as it passes through port *u* enters the small chamber *t*, when it passes into condenser H through passage 4.

The practical operation of an engine embodying my invention is as follows: The piston *e* of the high-pressure cylinder being supposed to be at or nearly to the extreme point of the return-stroke, where steam will be admitted through port *g*, the valve *i* is then moved by its rod *j* to open said port *g*, and closes port *h*, and allowing the exhaust-steam to pass by way of the cavity in the valve, in the usual manner, into the exhaust-pipe *l*, whence it flows into the auxiliary receiver *m*, and thence through port *n* into the main receiver G and the low-pressure cylinder F, as admitted by its valvular devices. After lapse of sufficient time for the flow of steam from cylinder E to produce an equilibrium of pressure therein and in the receiver G, valve *p* is closed and valve *v* opened by the means stated, whereby the flow of steam into the receiver ceases, and it is exhausted directly into the condenser, thereby relieving the high-pressure piston from the back-pressure, which would equal that existing in the receiver and the low-pressure cylinder, and also giving it the benefit of the vacuum in the condenser. The steam thus admitted into the receiver from cylinder E before valve *p* closes enters the larger cylinder alternately through ports *x y*, as controlled by valve *z*, and, after acting on piston *f*, passes through exhaust-pipe 3 into condenser H, all in the usual manner.

Instead of the auxiliary receiver *m*, the steam from exhaust *l* may pass directly into receiver G; but when arranged as shown valve

p is more conveniently arranged to be held to its seat by steam-pressure; and the same is true with reference to the small chamber *t*, through which the steam passes to the condenser; and, if desired, the receivers may be altogether dispensed with in a well-known manner, the steam from cylinder E passing directly into cylinder F.

It will be obvious that instead of exhausting from each cylinder into the same condenser a separate condenser may be employed for each; and the valvular devices, air-pump, and other devices usually employed in connection with a steam-condenser may be of the ordinary construction and operation. All the parts and devices shown or described may be of any known kind or construction, and may be changed or varied as desired results may require, as, with the exception hereinabove referred to, and to be hereinafter claimed, all the parts are old and of well-known construction and operation; and hence I do not claim the same, broadly, either singly or in combination, save with said exception; and hence

I claim as my invention—

1. In a compound or double-cylinder engine wherein the same steam acts first in the high and then in the low pressure cylinder, the combination, with said cylinders and the condenser, of suitable conduits and valvular devices, whereby the steam passing from the high to the low pressure cylinder will, without passing through said low-pressure cylinder, be diverted into the condenser at or near the point or time when the pressure of such exhaust-steam has produced an equilibrium of pressure in the two cylinders, substantially as specified.

2. In a compound or double-cylinder engine, the combination, with the high and low pressure cylinders and a condenser with suitable conduits and valvular devices, by which the steam as it is exhausted from the high-pressure cylinder enters and operates in the low-pressure cylinder, of a conduit and automatically-actuated valvular device, whereby when the piston in the high-pressure cylinder is at or near the dead-centers, and after the exhaust therefrom has produced an equal pressure in the two cylinders, the remaining exhaust-steam in said high-pressure cylinder will be conducted to the condenser without passing through the low-pressure cylinder, substantially as specified.

3. In a compound engine, the combination of high-pressure cylinder E, low-pressure cylinder F, condenser H, exhaust-pipe *l*, connected with cylinder E, steam-port *n*, and its valve *p*, arranged to admit to and exclude from cylinder F the steam issuing from said pipe, steam-port *u*, with its valve *v*, arranged to admit to and exclude from the condenser the steam issuing from said pipe, and actuating devices connected with and arranged to so actuate said valves that as the exhaust-steam intermittently escapes from pipe *l* it will, as soon as an equal pressure thereof is established in said cylinders, be shut off from cylinder F and conducted to said condenser, substantially as specified.

CLARENCE W. JENKINS.

Witnesses:

T. W. PORTER,
SIDNEY WETMORE.