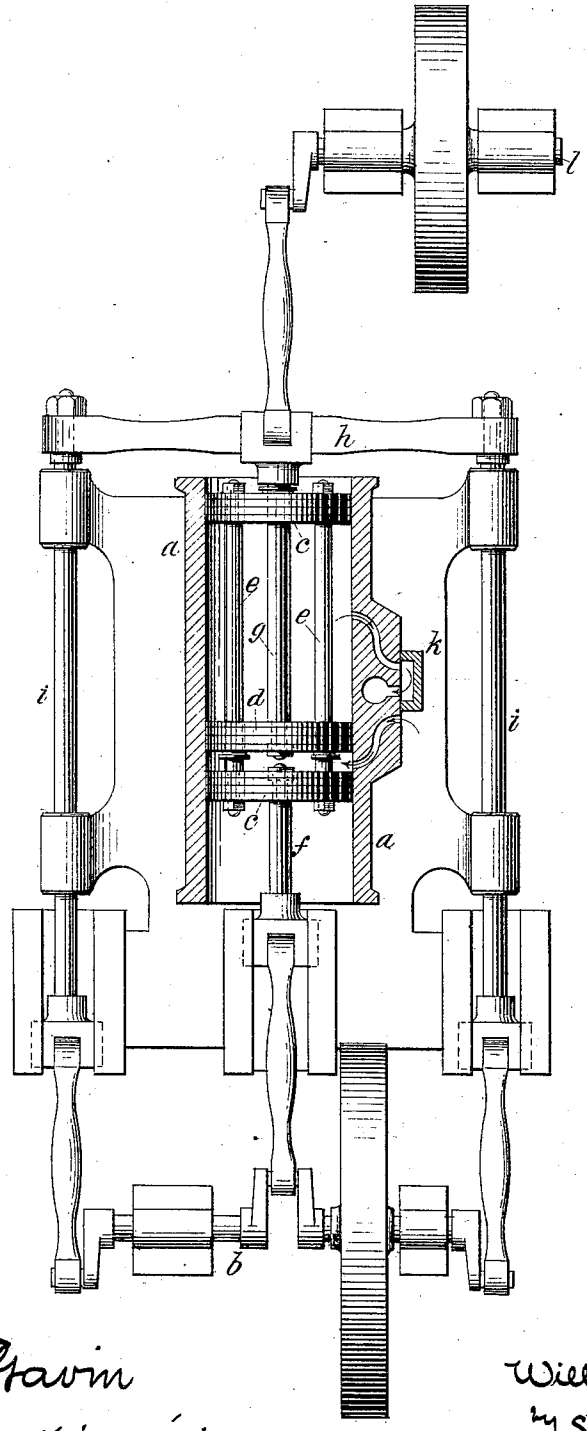
(Model.)

W. D. PEEBLES.

Balanced Piston Engine.

No. 237,694. **Patented Feb. 15, 1881.**



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UNITED STATES PATENT OFFICE.

WILLIAM D. PEEBLES, OF BRECKENRIDGE, TEXAS.

BALANCED-PISTON ENGINE.

SPECIFICATION forming part of Letters Patent No. 237,694, dated February 15, 1881.

Application filed January 18, 1881. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM D. PEEBLES, of Breckenridge, Stephens county, Texas, have invented certain new and useful Improvements in Balanced-Piston Engines, of which the following is a specification.

My invention relates to that class of steam or other engines which are constructed with two pistons receiving the pressure in opposite directions, each connected with cranks set at opposite positions, whereby the strain occurs simultaneously in opposite directions upon the crank-shaft and balances the same within its bearings, and thus obviates great friction on the journals and thereby economizes power, besides enabling high rates of piston-speed to be obtained, which is also conducive to economy.

My invention consists, mainly, in side bars and a cross connecting-yoke connected with one piston or set of pistons and with one crank or set of cranks, and a central rod connected to the other piston and the other crank, and in the combination therewith of a secondary shaft driven from said yoke, as hereinafter set forth.

The figure in the annexed drawing presents a plan view of my improved engine, with the cylinder shown in section.

My improved engine is more especially intended to operate by steam-pressure; but it may also be operated by the pressure of air, water, gas, or other fluid medium, as will be readily understood.

In the drawing, *a* indicates the cylinder of the engine, which, as usual in this class of engines, is more than twice or thrice the length of the stroke, as shown. This cylinder is open at each end, thus dispensing with heads, and hence rendering the construction lighter and simpler. The crank-shaft *b* is also provided, as usual, with two cranks or series of cranks set at diametrically-opposite positions, as shown. In lieu, however, of two pistons, as more commonly used, I prefer to employ three pistons, as may be observed. Thus the outer pistons, *c c*, are fixed together on the same rods at a wide distance, or more than twice the length of the stroke, and these pistons connect to and actuate one of the cranks, while a third central or internal piston, *d*, moving between the two outer ones, connects to the opposite crank or cranks. By this arrangement it will be observed that the outer pistons move in the ends of the cylinder, while the central piston moves between them in the middle of the cylinder, alternately approaching one of the outer pistons and then the other.

It will be observed that the points where the strokes terminate, or where the inner piston meets with either of the outer ones, occur at two fixed locations, near the middle of the cylinder, and on each side of the longitudinal center thereof, and therefore the steam-ports are arranged to open into the cylinder at these points, as shown. The steam is thus admitted between the central piston and either of the end pistons, according as the central piston meets first with one end piston and then with the other, these meetings occurring alternately at either port, so that the steam-pressure thus bearing simultaneously in opposite directions on the two separating pistons and being transmitted to the opposite cranks thus produce a balanced effect on the crank-shaft, as will be readily understood.

It will be seen that the end pistons serve as the heads of the cylinder, and form, in effect, a reciprocating cylinder, in which the central piston reciprocates reversely, and these two outer pistons, *c c*, are fixed together by two rods, *e e*, which move through stuffing-boxes on the central piston. One of the outer pistons is provided with a central rod, *f*, which is guided by a cross-head on guides and connected by a connecting-rod with the crank in the manner usual in steam-engines, as illustrated. The central piston has a central piston-rod, *g*, which passes through a stuffing-box in the center of the opposite outer piston, and connects to a yoke or wide cross-head, *h*, which connects to side bars, *i i*, on either side of the cylinder, which bars are guided by cross-heads and connected by connecting-rods to cranks on each side of the central crank, the central crank and outer cranks being set oppositely, as shown.

It will be seen from the drawing that the connecting-rods of the two pistons or sets of pistons are placed at a wide distance apart, and that the opposite cranks are separated correspondingly wide on the crank-shaft, leav-

ing a portion of shaft between the cranks, and these intervening portions of the shaft are supported in bearings arranged between the inner and outer cranks. By this arrangement no greater number of bearings and no greater frictional surface is used than heretofore, but each crank is supported close to a bearing, and hence the strain on one crank or crank-wrist cannot bear or be conveyed to the other, so that the cranks are hence independent of mutual strain and move in a smoother manner without undue friction or tendency to warping, which is liable to occur when not so supported.

By the arrangement of pistons shown it will be observed that not only are the cylinder-heads dispensed with, but only three stuffing-boxes are necessary, where four are required with other balanced-piston engines, which also have heads to their cylinders. It will also be observed that by this arrangement the valve-ports may be of the simple approved form, and the valve an ordinary slide-valve, as illustrated in the drawing, which constitutes one important advantage of this construction, whereas other engines of this kind require a special and more complicated form of ports and valve.

I do not, however, claim this arrangement of pistons, as the same has been heretofore employed; neither do I limit the novel features of my invention to this arrangement of pistons, as it may be employed with any equivalent double or balanced arrangement of pistons and cranks.

The valve *k* may be operated by one of the side-bars *i*, or by an eccentric in the usual manner.

I sometimes prefer to work two crank-shafts by the same engine—one at each end of the cylinder, as illustrated—so as to drive two trains of machinery. In this case a cross-head on the yoke *h* is connected by a connecting-rod to a crank on a secondary shaft, *l*, as shown in the drawing. This arrangement may be used where the engine is applied for street-car motors or similar purposes, in which case the cylinder may be placed beneath the floor and between the front and hind wheels, and connected with the two axles in the manner shown.

If desired, the cylinder may be inclosed in a jacket arranged to carry off any steam that may leak through the outer pistons.

What I claim as my invention is—

1. The combination, with a double or balanced piston engine, substantially such as described, of the side bars, *i i*, joined together by a yoke, *h*, and connected to one piston and also to one crank or set of cranks, in combination with the rod *g*, connected to the other piston or set of pistons, and also connected to the opposite crank, substantially as herein shown and described.

2. The combination, in a double balanced piston and crank engine, of the main balanced crank-shaft *b*, having a central crank connected with one of the pistons, and outer cranks connected to side bars, *i i*, with the yoke *h*, connecting said side bars with the other piston, together with the secondary shaft *l*, and its connecting-rod driven from said yoke, the whole arranged and operating substantially as herein shown and described.

WILLIAM D. PEEBLES.

Witnesses:
WILLIAM N. PORTER,
WILLIAM M. MCCONNELL.