(No Model.)

D. E. CROSBY.

STEAM ENGINE.

No. 434,143. Patented Aug. 12, 1890.

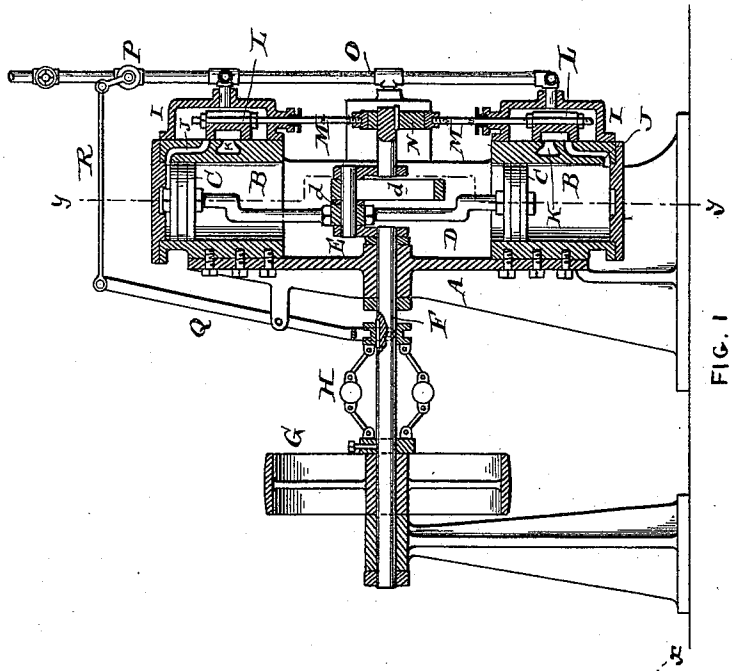

FIG. 1

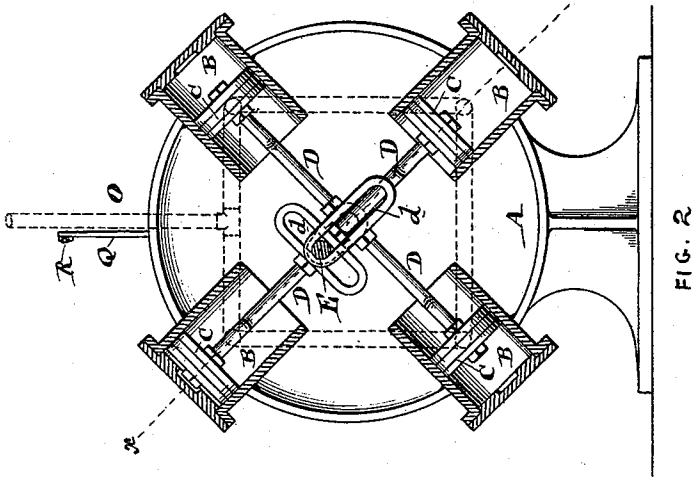

FIG. 2

Witnesses:
Henry Drury
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By his Atty
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UNITED STATES PATENT OFFICE.

DARWIN E. CROSBY, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 434,143, dated August 12, 1890.

Application filed April 15, 1890. Serial No. 347,967. (No model.)

To all whom it may concern:

Be it known that I, DARWIN E. CROSBY, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Steam-Engines, of which the following is a specification.

My invention has reference to steam-engines; and it consists of certain improvements, which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to construct an engine employing a number of cylinders arranged about a crank-shaft and to which the pistons of the respective cylinders are connected.

In carrying out my invention I arrange about a crank-shaft a number of cylinders, preferably four in number, and connect them in pairs, so that the pistons of the diametrically-opposite cylinders are positively coupled together and provided with a connection with a crank of the shaft. The connection is preferably formed by a slotted cross-head in which the crank-pin works. The friction and wear may be reduced and taken out by any of the usual means employed in connection with cranks of steam-engines. I prefer to arrange the pairs of cylinders at right angles to each other, so as to obtain as uniform an action as possible. In my construction the cylinders are secured to a single frame, which supports one end of the shaft and holds the cylinders in a vertical plane. This casting may be box-shaped, if desired. The cylinders are preferably single-acting, being open at the inner ends, and are each provided with a slide-valve, the slide-valves of all of the cylinders being operated by an eccentric or cam common to them all and rotated by the crank-shaft, so as to allow the steam to enter one cylinder simultaneously with the exhaust from the cylinder diametrically opposite, and also so as to allow the steam to enter the successive cylinders in rotation. A common steam-supply pipe is arranged to feed all of the valve-chests of the several cylinders and is provided with a valve, such as a throttle-valve, which is operated by a suitable governor, to control the supply of steam in accordance with the demand to obtain a uniform speed.

In the drawings, Figure 1 is a sectional elevation on line $x\,x$ of Fig. 2. Fig. 2 is a sectional elevation on line $y\,y$ of Fig. 1.

A is the main frame of the engine, and is preferably made box-shaped, and to it is bolted or otherwise secured the four cylinders B, arranged in pairs diametrically opposite.

Journaled in the frame A, between the four cylinders, is the crank-shaft F, having the crank E arranged within the space bounded by the inner or open ends of the cylinders B.

C are the pistons of the several cylinders, and are exposed on the faces adjacent to the crank E, and said pistons are coupled in pairs by the piston-rods D, each of which is provided with a slotted cross-head *d*. As the piston-rods D of the two pairs of cylinders are arranged at right angles to each other, the cross-heads *d* are also arranged at right angles to each other. The crank E extends through both of said cross-heads, as clearly shown in Figs. 1 and 2. When the crank is on the dead-center with respect to one pair of cylinders, it is at its point of greatest leverage with respect to the other pair, and vice versa.

Each of the cylinders is provided with a valve-chest I, a steam-port J leading to the outer end of the cylinder, and an exhaust-port K. L are valves in said valve-chest, and may be of the usual slide-valve type and adapted to supply steam to or from the cylinders. The several valves L are connected by valve-rods M with an eccentric strap or frame about the eccentric N, which is secured to the crank F, whereby all of the valves are operated from the same eccentric and shaft to control the supply of steam to and from the cylinders in rotative succession.

O is the steam-supply pipe and leads to all of the valve-chests, and is provided with a throttle-valve P, which may be controlled by a governor H on the crank-shaft F acting through a lever Q and rod R.

G is the power-wheel for transmitting power from the engine.

I do not limit myself to the exact details herein set out, as they may be modified without departing from the spirit of my invention.

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

In a steam-engine, the combination, with the crank-shaft, of a series of cylinders ar-

ranged about said crank-shaft, pistons for said cylinders, piston-rods connecting the pistons of said cylinders in pairs, a main steam-supply pipe O for supplying steam to all of said cylinders, valves to control the supply of steam from said pipe O to each of the cylinders, an eccentric common to all of said cylinders for controlling the valves therefor, a valve P in said main supply-pipe O for shutting off the supply of steam to all of the cylinders simultaneously, a lever Q, pivoted to the main frame of the engine, a governor H, for operating the lever Q, and a connection R between the lever Q and valve P, substantially as shown and described.

In testimony of which invention I hereunto set my hand.

DARWIN E. CROSBY.

Witnesses:
ERNEST HOWARD HUNTER,
MAURICE H. HOLMES.