

(No Model.)

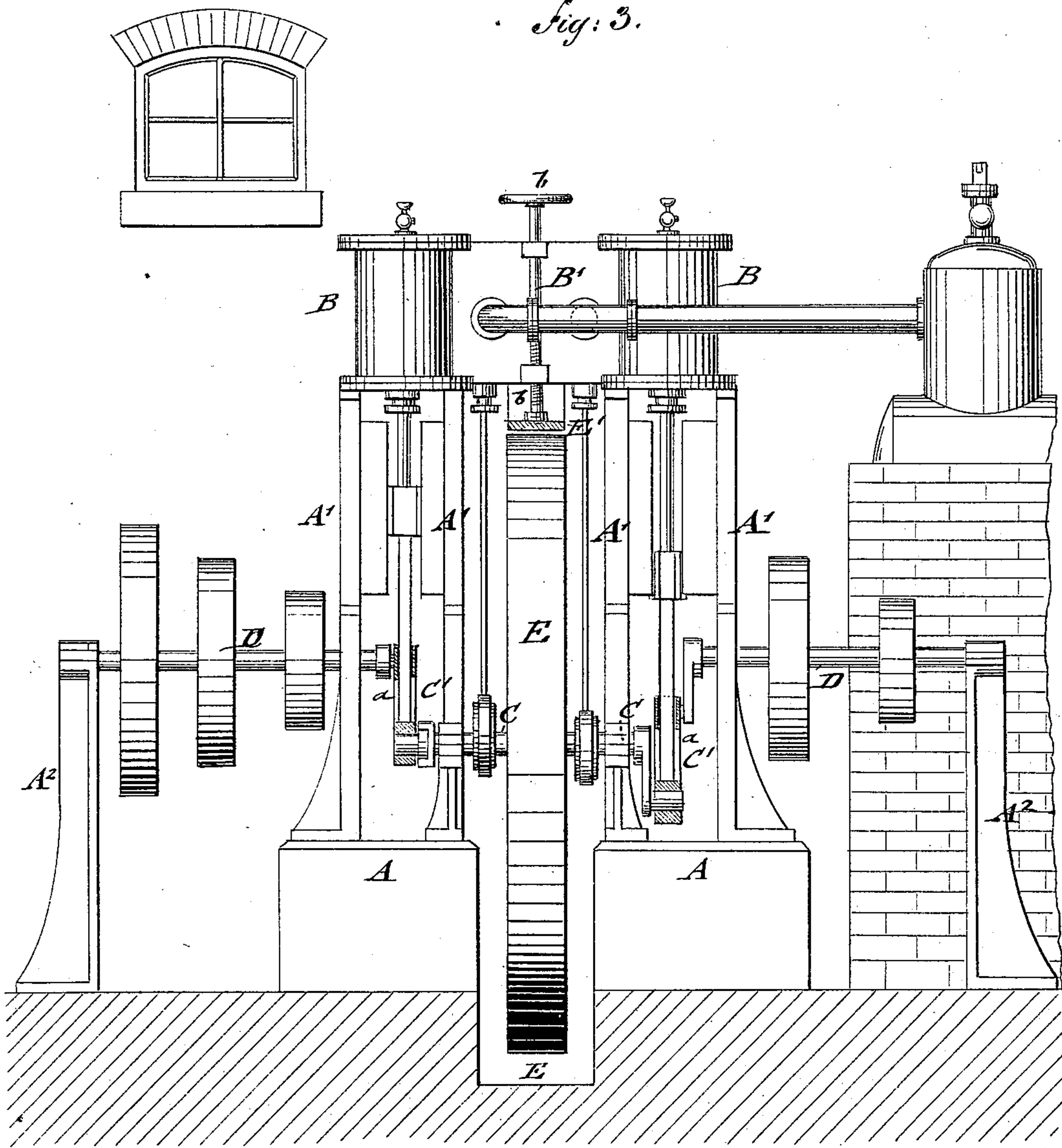
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C. RAUB.  
STEAM ENGINE.

No. 250,454.

Patented Dec. 6, 1881.

Fig. 3.



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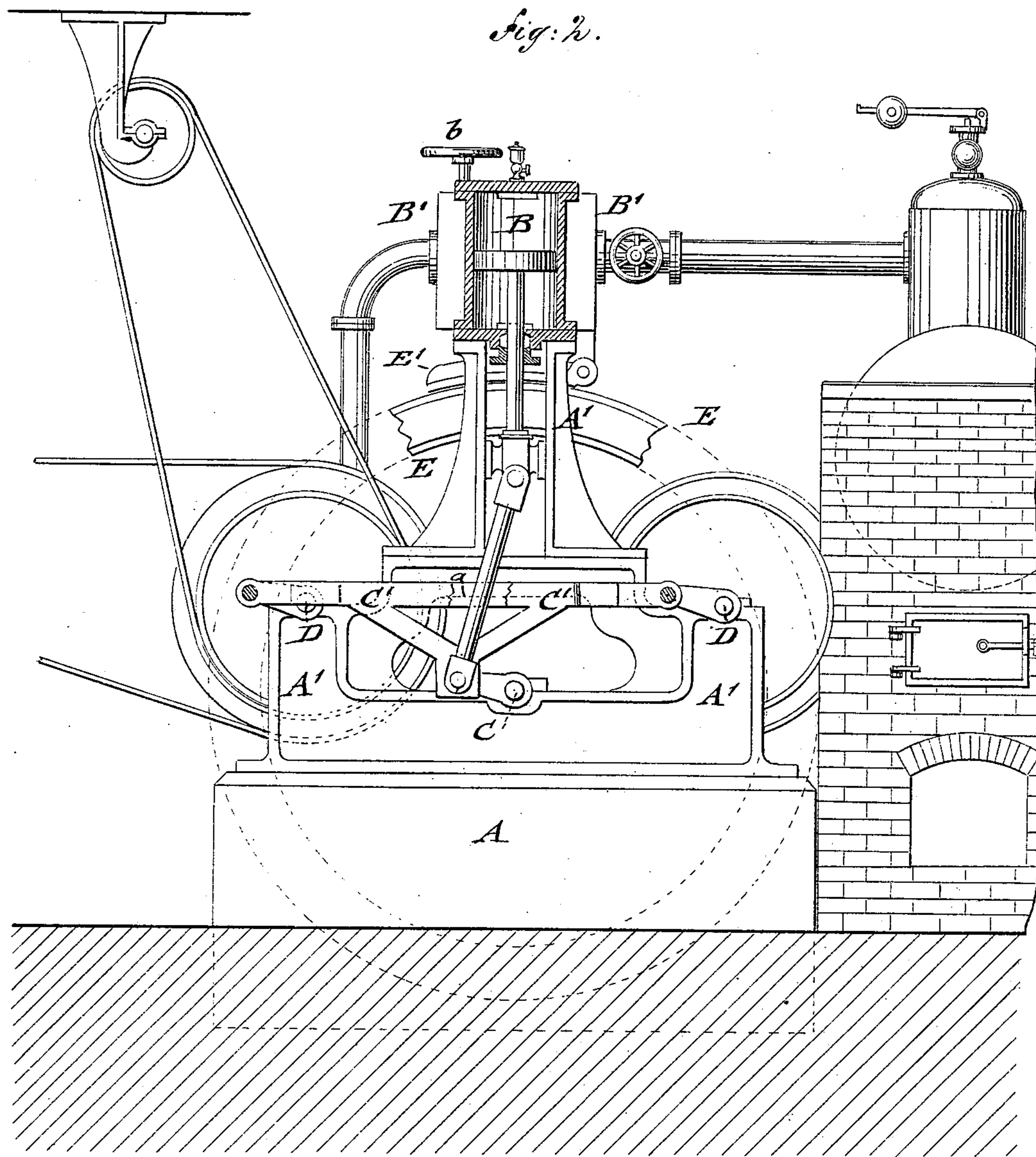
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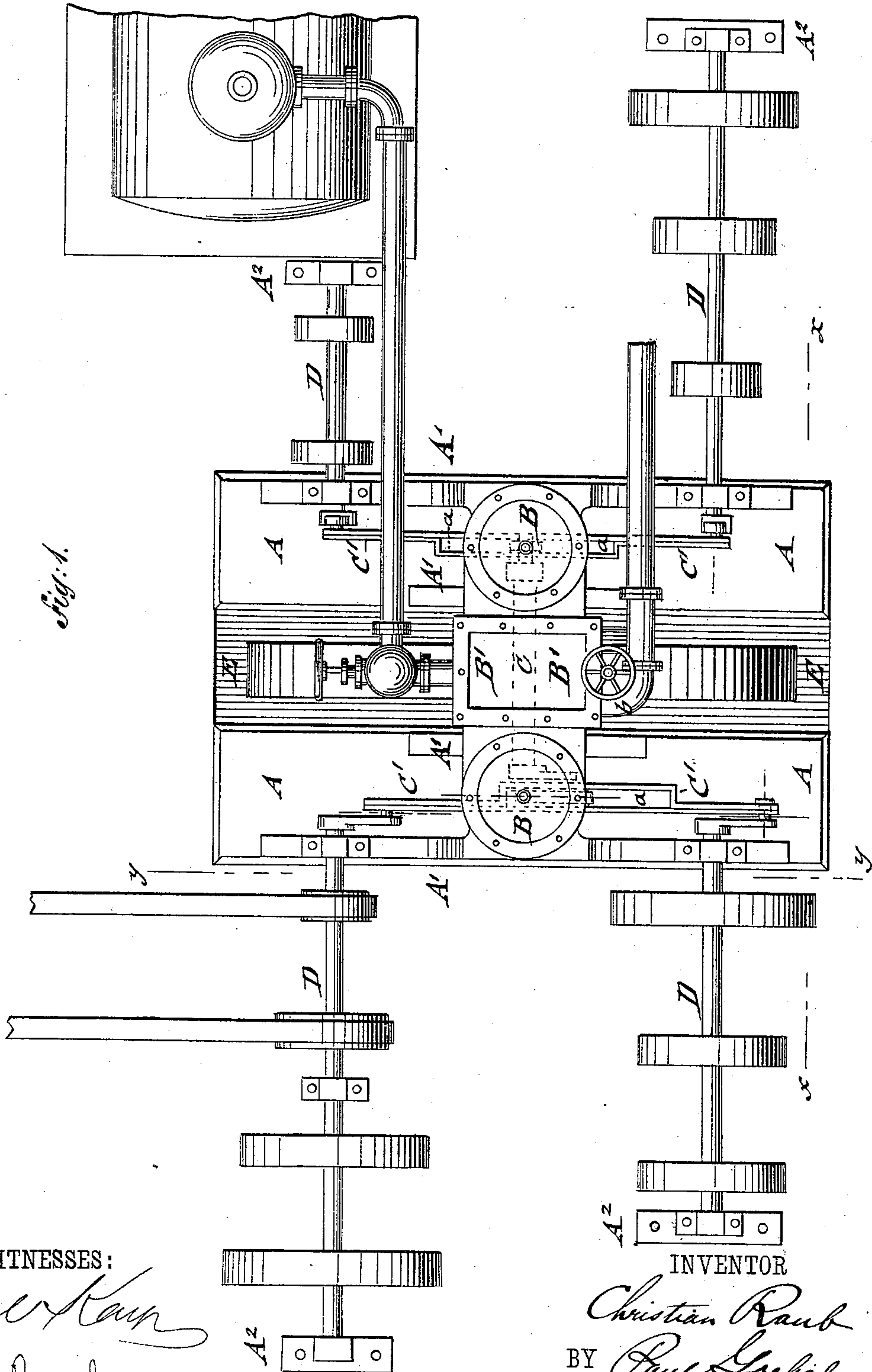
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# UNITED STATES PATENT OFFICE.

CHRISTIAN RAUB, OF NEW YORK, N. Y.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 250,454, dated December 6, 1881.

Application filed September 13, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, CHRISTIAN RAUB, of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

It is a well-known fact that stationary and marine engines are subject to various irregularities in their motions, so as to cause not only wear and tear in the engines themselves, but also in the machinery connected thereto. The irregularities referred to may be ascribed principally to the relative position of the steam-cylinder or motive power toward the other parts of the engine, and, secondarily, to the necessity of overcoming the dead-points, which are caused by the relative position of the fly-wheel and of the transmitting-gear to the steam-cylinder, and which produce vibrations and unequal motion of the engine.

The object of this invention is to furnish a steam-engine in which the working parts are arranged symmetrically to and equidistantly from the centrally-located cylinder, so as to dispense not only with a fly-wheel, in its ordinary sense, as a means to overcome the dead-points, but secure a high degree of uniformity and steadiness in the motion of the engine; and the invention consists of a steam-engine having two vertically-arranged cylinders, the axes of which are located within the vertical transverse center plane of the entire engine. The motion of the steam-pistons is transmitted by connecting-rods to an intermediate crank-shaft vertically below the steam-cylinders, and by coupling-rods to horizontal crank-shafts arranged equidistantly from the intermediate shaft. A balance-wheel is placed upon the intermediate shaft, centrally to the steam-cylinders and their transmitting parts, the balance-wheel having a connection with a friction-brake to instantly stop the engine at any point of its motion. From the symmetrical crank-shafts of the engine the power is transmitted in different directions, either directly or by means of pulleys and belts, to the machinery to be driven.

In the accompanying drawings, Figure 1 represents a plan view; Fig. 2, a vertical transverse section on line *y y*, Fig. 1, and Fig. 3 a vertical longitudinal section on line *x x*, Fig. 1.

Similar letters of reference indicate corresponding parts.

A in the drawings represents the bed-plate, upon which are arranged four vertical standards, A', that support at their upper ends two vertical steam-cylinders, B, that are transversely connected by a double steam-chest, B', from which the steam is alternately supplied to the cylinders B. The double steam-chest B' is connected to the boiler in the usual manner, the steam-supply to the cylinders being regulated by slide-valves, which are operated by connecting-rods and eccentrics from a transverse intermediate crank-shaft, C, vertically below the steam-cylinders. The cross-heads of the piston-rods of the steam-cylinders B are guided in guideways of the vertical standards A'. To the cross-heads of the piston-rods are pivoted the connecting-rods, which are again pivoted at the lower ends to the cranks at both ends of the intermediate shaft, C, as shown clearly in Figs. 2 and 3. By the alternate working of the pistons of the steam-cylinders power is alternately transmitted to the opposite cranks of the intermediate shaft, C, the cranks being so attached to the shaft C as to form an angle of ninety degrees with each other. The cranks of the intermediate shaft, C, are connected by coupling-rods C' with the cranks of four transmitting-shafts, D, which are arranged equidistantly to and at both sides of the shaft C, the transmitting-shaft D being supported in bearings of the standards A', and of auxiliary standards A<sup>2</sup> at suitable distances therefrom, as shown clearly in Fig. 1. The coupling-rods C' are of triangular shape, and provided with recesses or openings *a* for the passage and play of the connecting-rods extending from the cross-heads down to the cranks of the intermediate shaft, C.

The transmitting-shafts D may be of any desired length and provided with any number and size of pulleys, for transmitting power, either directly or by means of belts, to the different machines and parts of a factory.

The intermediate shaft, C, is provided at its center, intermediately between the supporting-standards and eccentrics governing the slide-valves of the steam-cylinders B B, with a large balance-wheel, E, which may be used, if desired, for transmitting power, but which also



serves, in connection with a brake-shoe, E', operated by a screw and hand-wheel, b, for instantly stopping the engine whenever required.

The steam-cylinders B and the intermediate shaft, C, are located in the vertical transverse plane of the center of gravity of the entire structure and the balance-wheel in the longitudinal plane of the center of gravity of the engine. Owing to this disposition of the parts, no vibratory motions which affect detrimentally the regular motion of the engine will take place, and consequently almost the entire force of the steam is changed into motive power.

As the transmitting-shafts D are disposed equidistantly from and symmetrically to the intermediate shaft and to the vertical transverse plane of the center of gravity of the engine, no dead-points of the driving-shaft such as are found in the old systems of stationary steam-engines, and which required the full momentum of the fly-wheel, occur in my improved steam-engine.

By the relative disposition of the cylinders, intermediate shaft, and transmitting-shafts the dead-points of intermediate crank-shaft, C, are overcome by the momentum of the symmetrical transmitting-shafts D, which are then already for a quarter of a revolution beyond a line drawn through their dead-points, while the transmitting-shafts D are carried over the dead-points by the intermediate shaft, C, which has then already passed for a quarter of a revolution over the line of its dead-points.

It is obvious that the number of symmetrical crank-shafts D may be increased according to the disposition of machinery to be driven by the motive power, the speed being regulated by the diameters of the transmitting-pulleys and other well-known means.

The advantages of my central power-engine consist, first, in the complete and most efficient use of the steam employed; secondly, in the uniform and steady motion of the engine and in the absence of any detrimental vibrations; thirdly, in the effective way of overcoming the dead-points without strain and loss of power; and, fourthly, in the more convenient application of the motive power to the

different transmitting-shafts and machinery to be driven.

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

1. A steam-engine consisting of two vertical steam-cylinders connected by a double steam-chest, of an intermediate crank-shaft arranged below the same, of a number of transmitting-shafts arranged equidistantly from and at both sides of the intermediate shaft, and of coupling-rods connecting the intermediate shaft with the transmitting-shafts, substantially as and for the purpose set forth.

2. In a steam-engine, the combination of two vertical steam-cylinders, which are established at and within the vertical transverse plane of the entire structure, with an intermediate crank-shaft within the same plane, and with transmitting-shafts which are located equidistantly at both sides of said transverse plane, substantially as specified.

3. In a steam-engine, the combination of two steam-cylinders, which are arranged at and within the vertical transverse plane of the center of gravity of the engine, with an intermediate crank-shaft located within the same plane and carrying a central balance-wheel, and with transmitting-shafts coupled to the intermediate crank-shaft at both sides of the transverse plane, substantially as set forth.

4. In a steam-engine, the combination of two vertical steam-cylinders and an intermediate crank-shaft located in the same vertical plane below the cylinders, with a balance-wheel placed centrally upon the crank-shaft, and with a brake-shoe and mechanism whereby the same is applied to the balance-wheel so as to quickly stop the engine, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two witnesses this 13th day of August, 1881.

CHRISTIAN RAUB.

Witnesses:

PAUL GOEPEL,  
CARL KARP.