

No. 664,631.

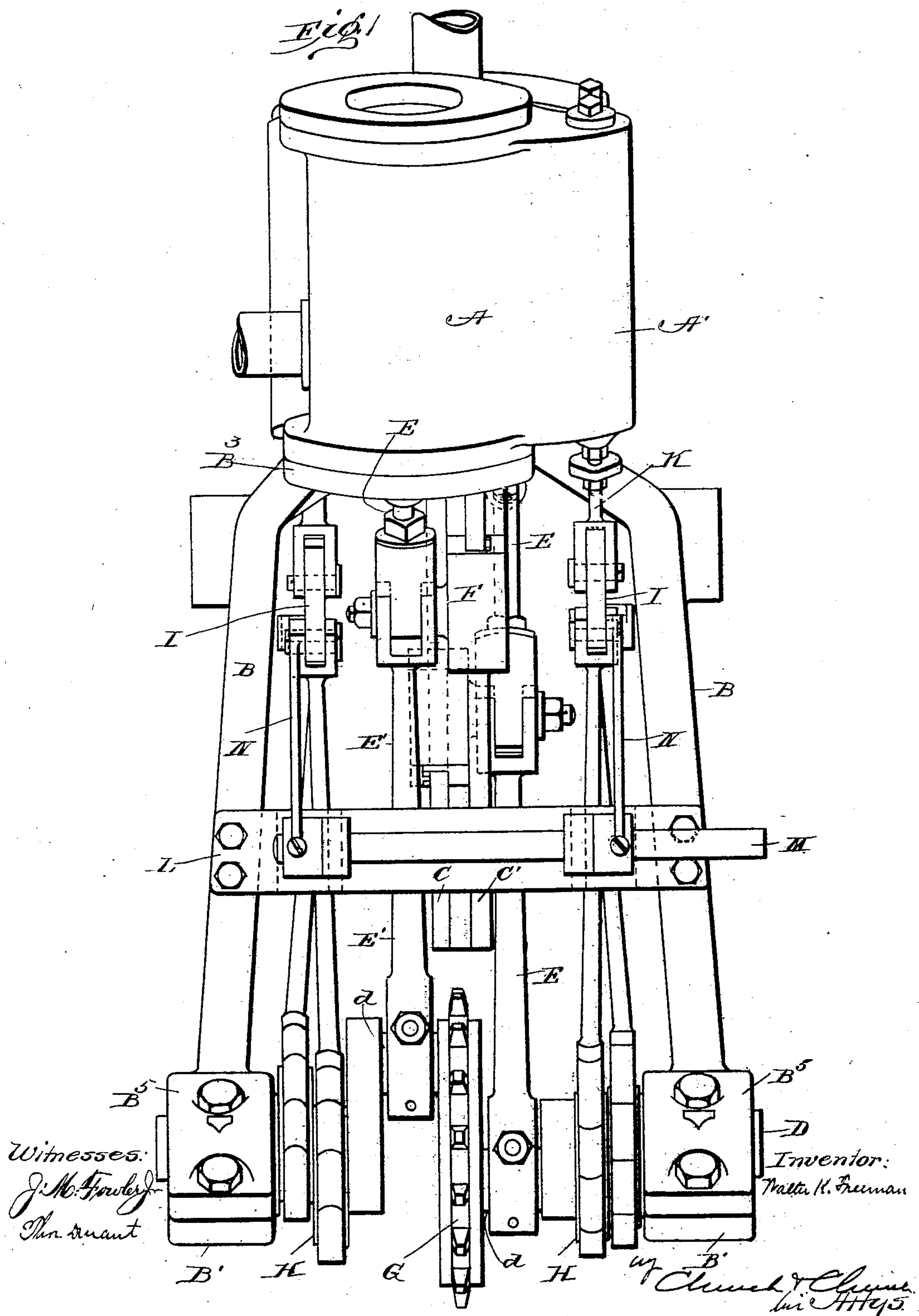
Patented Dec. 25, 1900.

W. K. FREEMAN.
STEAM ENGINE.

(Application filed Oct. 3, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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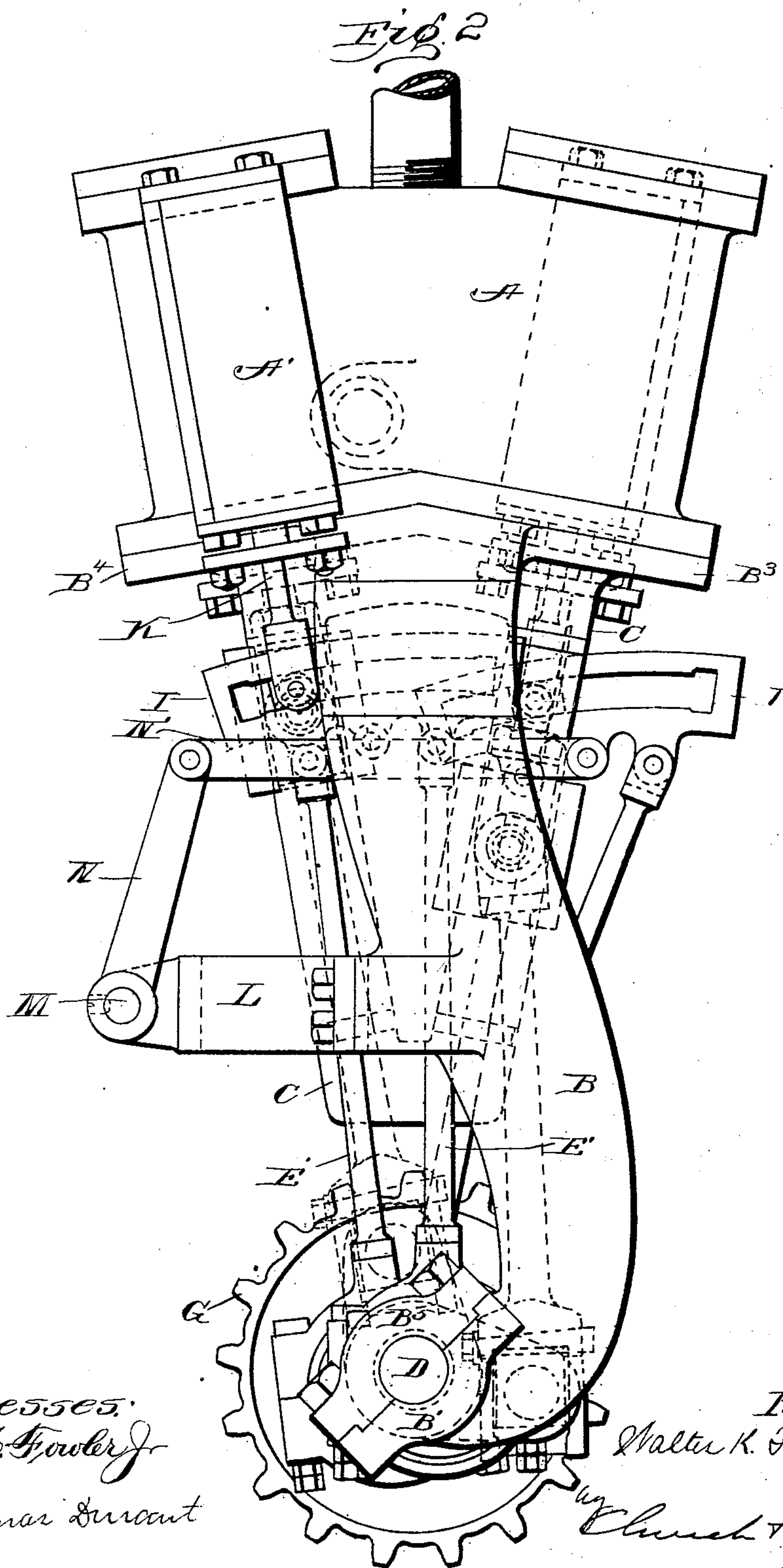
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Witnesses:

J. M. Fowler

Thomas Durant

Inventor:

Walter K. Freeman

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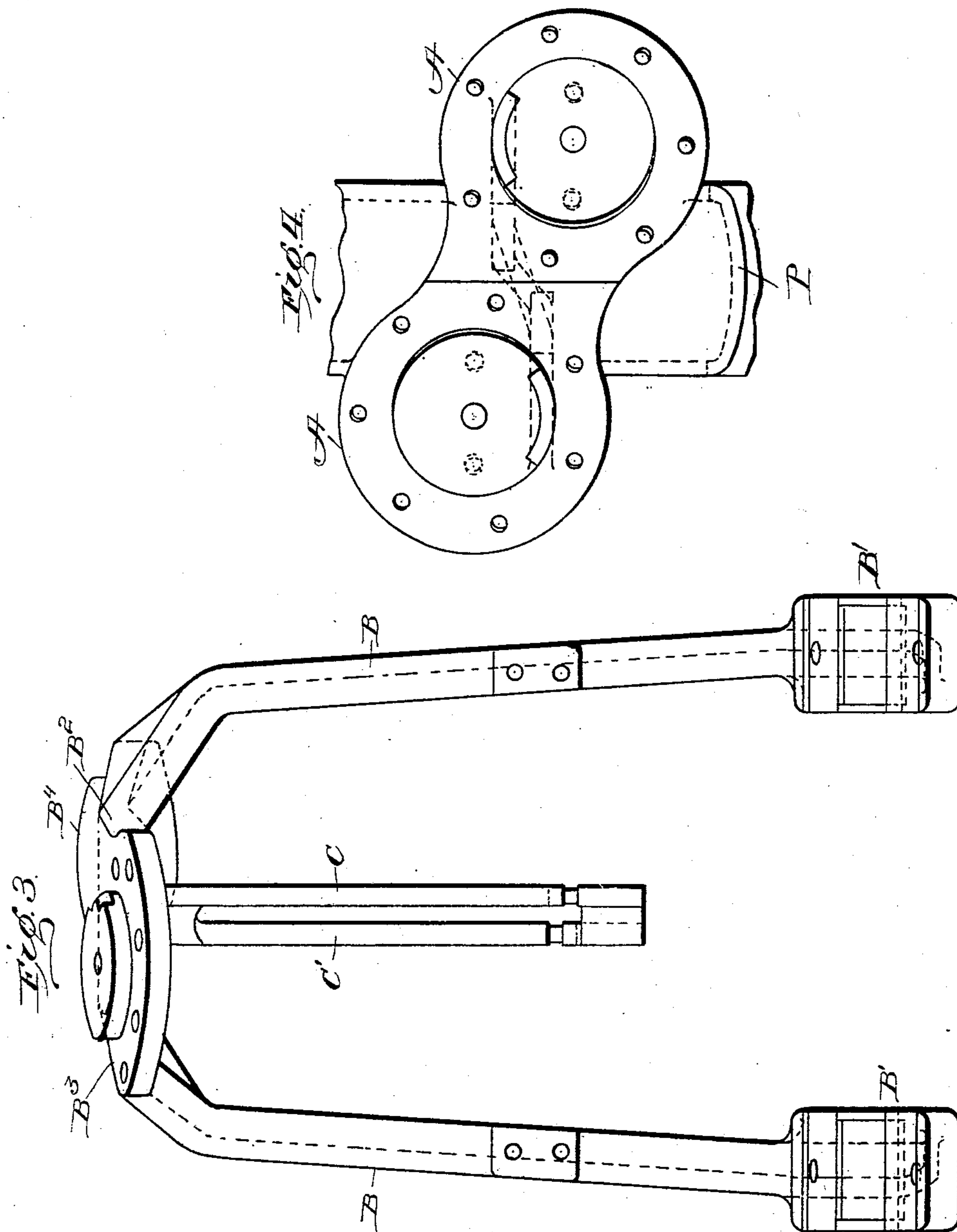
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UNITED STATES PATENT OFFICE.

WALTER K. FREEMAN, OF SARATOGA SPRINGS, NEW YORK.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 664,631, dated December 25, 1900.

Application filed October 3, 1900. Serial No. 31,897. (No model.)

To all whom it may concern:

Be it known that I, WALTER K. FREEMAN, a citizen of the United States, residing at Saratoga Springs, county of Saratoga, State of New York, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in steam-engines, the improvements being particularly designed for use in connection with engines adapted for driving automobile vehicles. In engines designed for this purpose it is highly desirable that the cylinders and the crank-shaft, with their intermediate parts, should be connected in one rigid structure with a capacity for movement as a unit, whereby the relation between the cylinders and the crank-shaft will not be disturbed by strains or distortions of the vehicle-frame due either to the action of the supporting-springs or to running over uneven ground, and in my present engine I have aimed to produce a structure wherein the desirable ends above mentioned are fully attained.

The invention may therefore be said to consist in the general construction and arrangement of the parts of the engine which constitute the intermediaries between the cylinders and the crank-shaft, together with a construction whereby the cranks through which the power is applied may be brought close together in a direction longitudinally of the shaft.

Referring to the accompanying drawings, Figure 1 is a front elevation of an engine embodying my present improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a detail elevation of the frame connecting the cylinders and crank-shaft, together with the guides for the slides; and Fig. 4 is a top plan view of the frame illustrated in Fig. 3 and showing the relative arrangement of the cylinders.

Like letters of reference in the several figures indicate the same parts.

In the engine illustrated I employ double or twin cylinders A, with independent connections with the crank-shaft D and independent valves for controlling the supply and ex-

haust of pressure to said cylinders, the valves being mounted in valve-chests A'. The cylinders and valve-chests are preferably made in one integral casting, and the cylinders are set off at an angle to each other or on different radii with respect to the crank-shaft, whereby the cylinders may be brought more nearly into a single plane transversely of the crank-shaft and the cranks located correspondingly close together, as illustrated clearly in Figs. 1 and 4.

For supporting the crank-shaft and cylinders in their proper relation I provide an intermediate frame, which is in the form of an integral casting having two somewhat widely separated depending arms B, provided at the bottom with bearings B' for the crank-shaft and united at the top by a bridge B², which latter has formed upon it the heads B³ and B⁴ for the cylinders A. The arms B of the intermediate frame are preferably curved toward the rear, as illustrated in Fig. 2, and the bearings B' are located on the under side of the crank-shaft, while the cooperating portions B⁵ of the bearings overlie the crank-shaft, and as a consequence the direct thrust of the pistons on the crank-shaft is taken up by that portion of the bearing which is on and constitutes an integral part of the intermediate frame. The intermediate frame is provided at a point between two depending arms B with a third depending member which is in the form of two guides C C' for the slides of the engine. These two guides C C' converge toward the crank-shaft and are united at the lower end, as shown in Fig. 2, and constitute a rigid and integral part of the intermediate frame or casting.

In assembling the engine the two cylinders are bolted rigidly on the heads B³ B⁴, and the crank-shaft is mounted in the bearings B'. The slides F, to which the piston-rods E are connected, are mounted on the guides C C', respectively, and the connecting-rods E' extend from said slides downwardly to the cranks d on the crank-shaft. These cranks d are located close together, and, in fact, only sufficient space is left between them for the accommodation of the drive or sprocket wheel G, which may be of any usual or approved type. The eccentrics H for operating the links I of the valve-controlling mechanism

are mounted outside of the crank-shafts, but between the arms B of the frame, and the valve-rods K, extending from said links to the valve, pass up at front and rear of the arms B of said frame, as clearly illustrated in Fig. 1.

For operating or controlling the links a cross-piece L is bolted to the front side of the arms B, and on this cross-piece there is journaled a rock-shaft M, having upwardly-extending arms N, to the ends of which arms the secondary links N' are connected, as usual in this type of link valve-gearing. By manipulating the rock-shaft M the position of the links may be adjusted and the valves reversed or the lead of the valves varied in accordance with well-understood principles.

By reference to Figs. 3 and 4 it will be seen that the guides C C' for the slides are set out of alinement with each other in order to provide sufficient room for the body of the slides, as illustrated in Fig. 1.

The slides F are preferably formed with a pin or journal projecting directly therefrom, and this pin or journal constitutes the connecting medium between the piston-rods and connecting-rods, although I do not claim such construction herein, the same being reserved for an application filed contemporaneously herewith.

It will be observed that in the construction of engine illustrated and described the entire working parts of the engine are embraced between the two arms B of the intermediate frame and that the crank-shaft and cylinders are connected by said frame in one rigid entity, and, furthermore, by setting the cylinders at a slight angle to each other, as illustrated, they may be brought as nearly as desired into the same plane, thereby shortening the crank-shaft and permitting the whole structure to be brought within a compass well adapted for automobile use. The intermediate frame may be a casting of usual cross-sectional form or hollowed out, as illustrated at P in Fig. 4, in order to lighten the structure and at the same time afford sufficient strength to insure a rigid unyielding frame. The said intermediate frame, constituting, as it does, the lower heads for the cylinders, materially lightens the construction of the engine and dispenses with the necessity of providing a special connecting mechanism between said cylinders and the intermediate frame, inasmuch as the usual cylinder-head bolts perform this function.

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

1. In a steam-engine of the type described, the combination with the cylinders and the crank-shaft and driving connections as described, of an intermediate frame formed in a single casting and having three depending members, two of said members constituting the connection between the cylinders and crank-shaft and lying outside of the driving

connections and the third of said members being located at an intermediate point and constituting the guides for the slides of the driving connections; substantially as described.

2. An intermediate frame for connecting the cylinders and crank-shaft of an engine of the type described having the two depending arms B terminating in bearings B' underlying the crank-shaft, a bridge B² connecting said members at the upper end and having the cylinder-heads formed thereon and an intermediate member depending from said bridge and having the slideways C C' formed thereon; substantially as described.

3. In an engine of the type specified, the combination with the crank-shaft, the intermediate frame formed in a single casting and having bearings at the lower end for said crank-shaft, the cylinder-heads formed integral with said frame and set at different angles to each other with relation to said crank-shaft whereby the cylinders may be brought into proximate parallel planes transversely of the crank-shaft, a member depending from said frame at an intermediate point and having converging guides for the slides of the driving connections formed thereon and driving connections for the crank-shaft located on opposite sides of said intermediate depending member and between the connecting-arms of the intermediate frame; substantially as described.

4. In an engine of the type specified, the combination with the twin cylinders formed in an integral casting and at an angle with relation to each other and the crank-shaft with driving mechanism interposed between the crank-shaft and cylinders, of an intermediate frame formed in an integral casting with two arms, one located on each side of the driving mechanism and having bearings for the crank-shaft in their extremities and a connecting portion at the upper end of said arms formed integral with the cylinder-heads and an intermediate depending portion forming the guideways for the slides, the said guideways being set out of line with each other to afford room for the bodies of the slides and converging toward the crank-shaft; substantially as described.

5. In an engine of the type specified, the combination with twin cylinders, crank-shaft and intermediate driving mechanism, of an integral frame formed with depending side arms B having bearings in their extremities for the crank-shaft, a connecting-bridge at the upper ends of said arms, an intermediate depending member constituting converging guideways for the slides, a cross-piece uniting said arms at an intermediate point and a valve-gear-controlling shaft journaled on said cross-piece; substantially as described.

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Witnesses:

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