

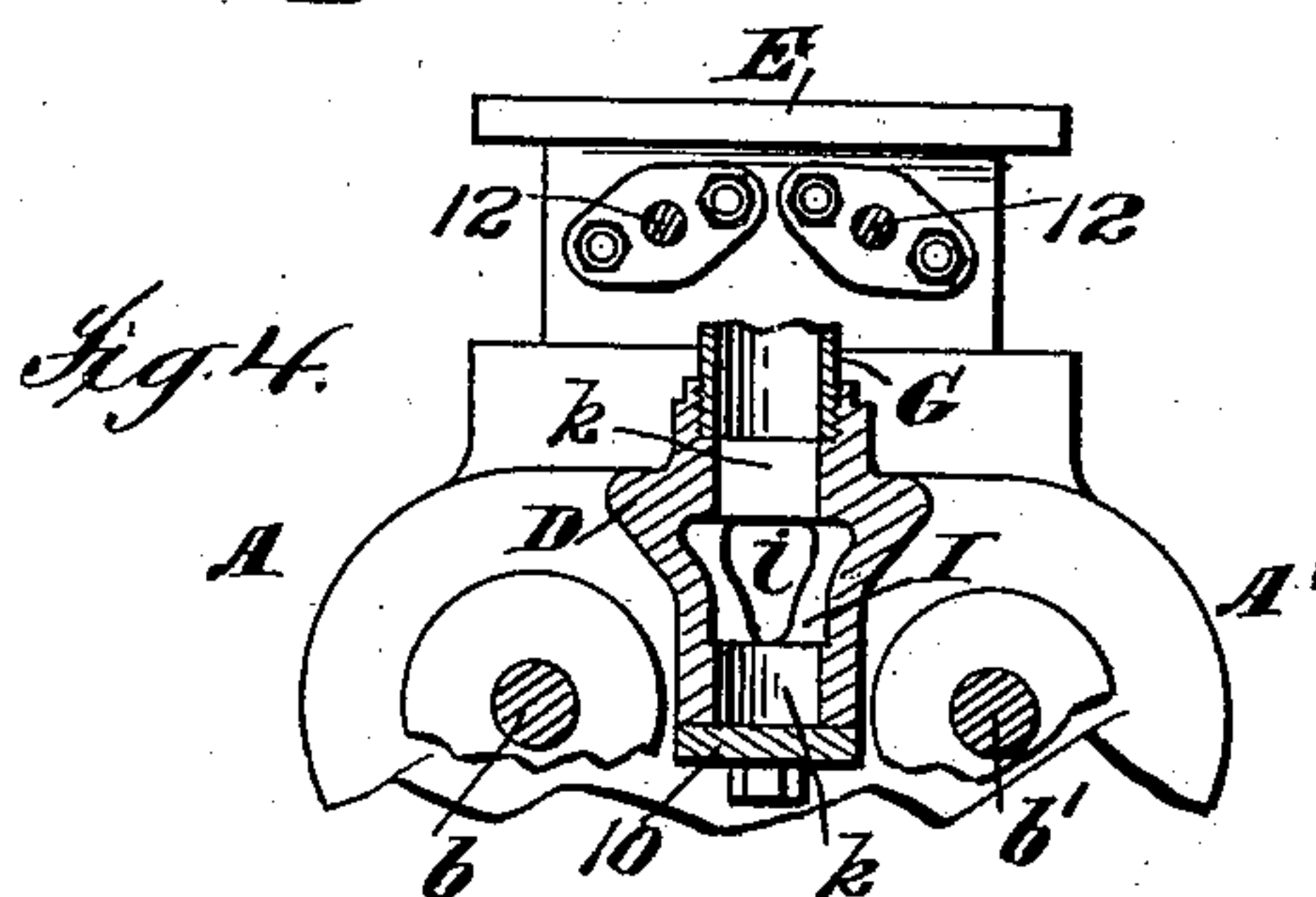
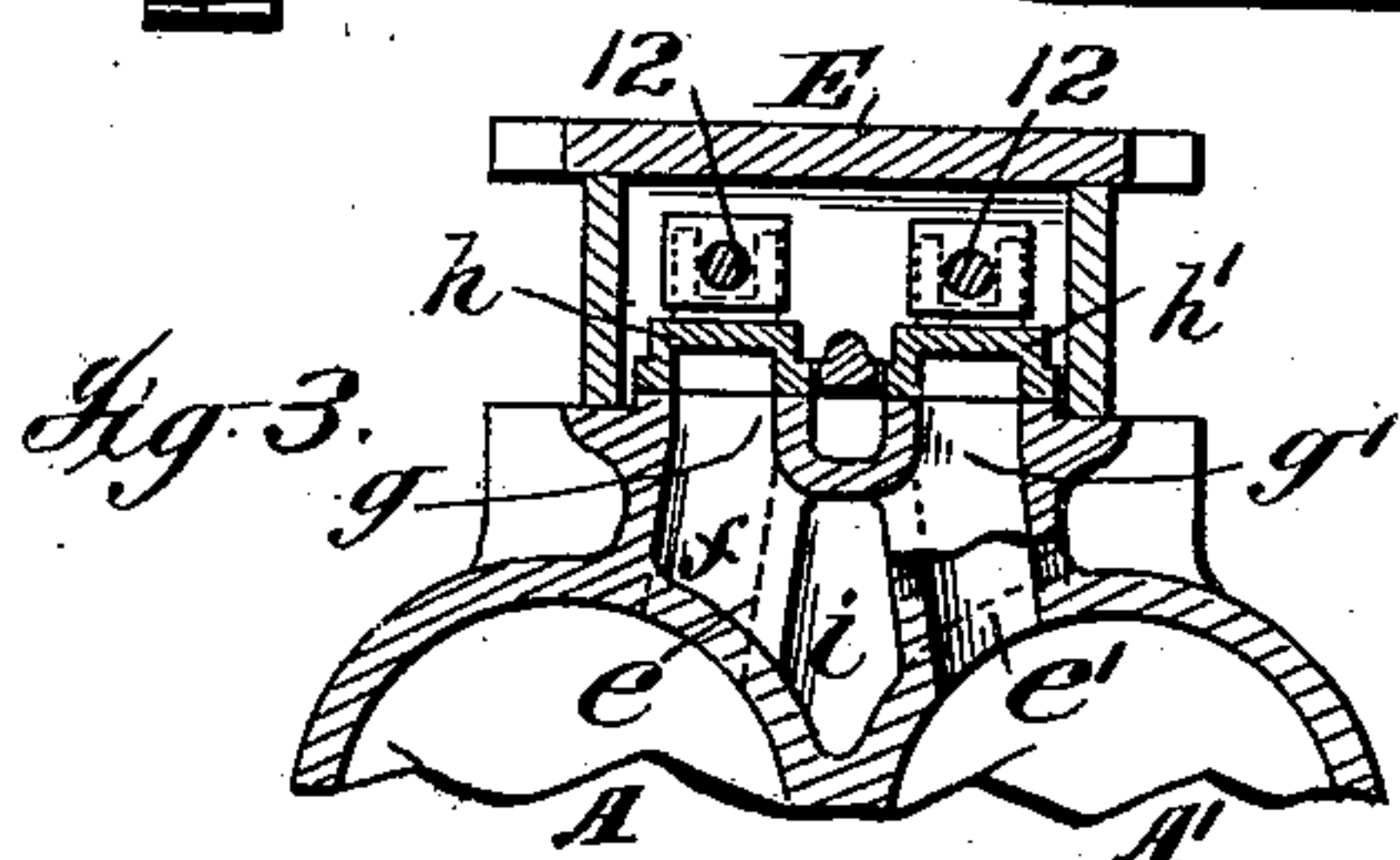
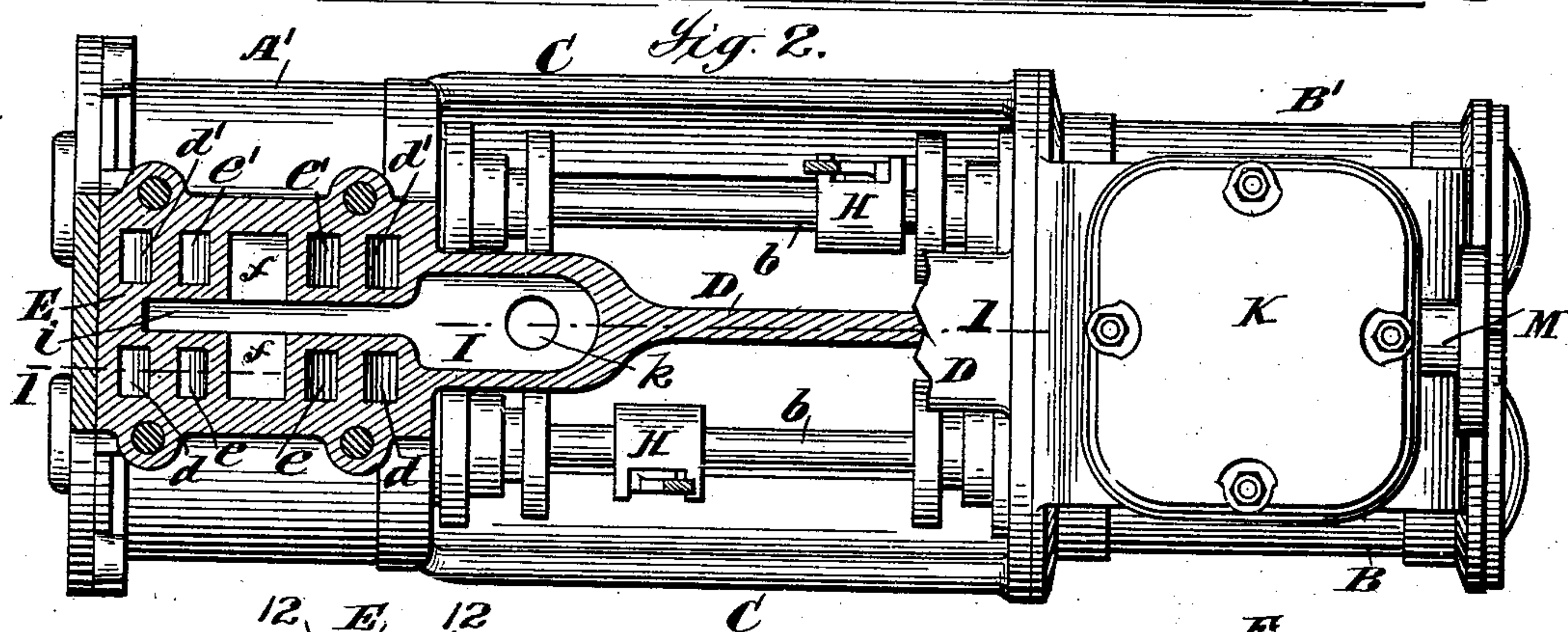
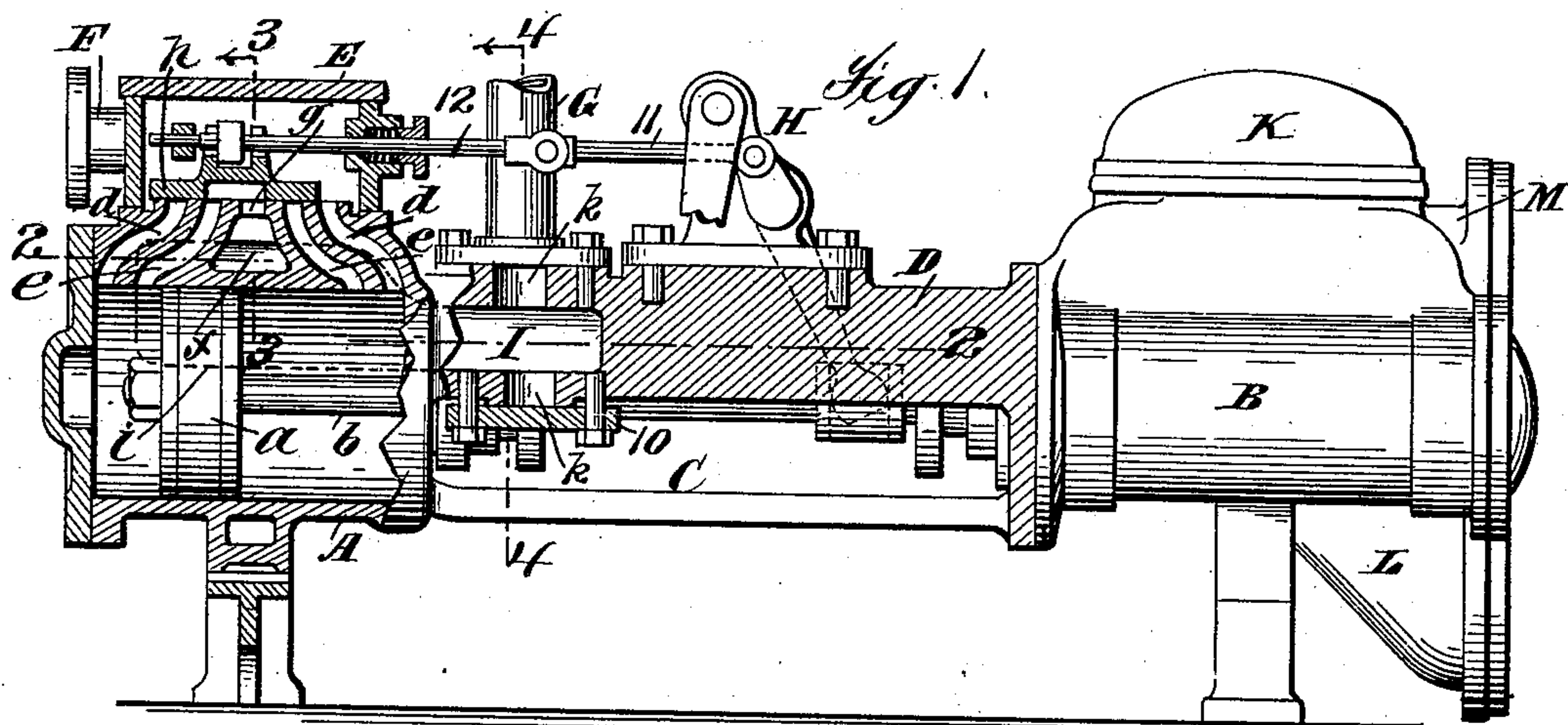
No. 685,317.

Patented Oct. 29, 1901.

C. C. WORTHINGTON.
STEAM ENGINE.

(Application filed Jan. 13, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 685,317, dated October 29, 1901.

Application filed January 13, 1899. Serial No. 702,029. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. WORTHINGTON, a citizen of the United States, residing at Irvington, county of Westchester, and State of New York, have invented certain new and useful Improvements in Steam-Engines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates especially to duplex steam-pumps, although applicable also to other duplex steam-engines, the chief object of the invention being to provide an improved duplex steam-pump which shall be of such compact form as to secure a high capacity with a construction of small size, and, further, to provide such a pump which shall be simple, cheap, and durable in construction, convenient for forming the required steam-pipe connections, and which shall present an improved appearance over such pumps now in use.

In attaining the objects above stated I have made certain improvements in the steam end of the pump, and the present invention includes certain features in the construction of duplex steam-cylinders, relating particularly to the exhaust-passages, all as fully described hereinafter and specifically pointed out in the claims.

For a full understanding of the invention a detailed description of a construction embodying all the features of the invention in their preferred form as applied to a duplex direct-acting steam-pump of a well-known class will now be given in connection with the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of the steam end of the pump, taken on the line 1 of Fig. 2, and an elevation of the pump end. Fig. 2 is a horizontal section and plan on the line 2 of Fig. 1. Figs. 3 and 4 are vertical cross-sections of the steam end on the lines 3 and 4 of Fig. 1.

Referring to the drawings, A A' are the steam-cylinders on opposite sides of the engine, and B B' the corresponding water-cylinders. The steam and water cylinders are preferably connected, as shown, by the side frames C and central frame-piece D, formed integral with the steam end and connected to the water end by the usual flange connection, the central frame-piece D forming the cradle

on which the valve movement is mounted and through which the steam exhausts, as described hereinafter. The steam-cylinders A A' on opposite sides of the engine and the cradle D are preferably formed integral, as shown, so that a single casting forms the steam end and cradle with the exception of the valve-chest, although it will be understood that the invention, broadly considered, is not limited to such an integral construction. The steam-cylinders are shown as having the usual pistons *a*, connected by piston-rods *b* directly to the pump-plungers on opposite sides of the engine, and the usual induction-ports *d d'* and exhaust-ports *e e'* for the respective cylinders A A', communicating, respectively, with the single steam-chest E on top of the cylinders and with the exhaust-cove *f* by exhaust-ports *g g'*, all these ports being shown as controlled for admission and exhaust by the D slide-valves *h h'* on the respective cylinders, although it will be understood that valves of any other suitable form may be used and that the form and arrangement of the ports may be varied as desired in accordance with the valve employed. It will be understood that the valves *h h'* may be actuated by any suitable movement. As shown, they are actuated by the usual cross-over valve movement H, mounted on the cradle D, as previously described, and connected to the valves *h h'* by links 11 and valve-rods 12, so that the valve on each side is operated from the other side of the engine, as usual in duplex direct-acting engines of the class shown. The induction-pipe F may be, and is shown as, connected directly with the steam-chest E at the end of the pump, as usual in such constructions, my improvements in the steam end relating particularly to the exhaust construction, which is as follows: The exhaust-cove *f*, which extends across both ports *g g'*, as shown in Figs. 2 and 3, connects centrally with an exhaust-passage *i*, which is made narrow horizontally, as shown, for compactness of construction and preferably extends downward between the steam-cylinders A A' and toward the pump end, opening beyond the cylinder ends into a chamber I, which is formed by an extension of the cylinder-casting and enlargement of the cradle D. With this chamber I the exhaust-pipe G connects by port *k*. The port *k* preferably

opens vertically from the chamber I either upward or downward; but it will be understood that this may be varied. As shown, the pipe G is above the chamber, and a second
 5 port *k* opens downward from the chamber I, and this construction is preferably used, so that the exhaust-pipe G may extend either upward or downward, as may be found more desirable in setting up the pump, the port *k*,
 10 to which the exhaust-pipe G is not connected, being then closed in any suitable manner, as by a cover 10, (shown on the lower port *k* in the drawings.)

The improved steam end for duplex pumps
 15 above described may be used in connection with a pump end of any construction suitable to secure a complete pump of the small size desired and corresponding to the reduced size of the steam end. I have shown in elevation
 20 a water end, which is preferably cast integral, having the water-cylinders B B' on opposite sides, which, with the pulsation-chamber portion of the pump above the water-cylinders, are secured to the end of the cradle
 25 D. Part K is the force-chamber, and L M, respectively, the suction and force mains, these suction and force mains preferably opening, as shown, at the end of the pump, so as to avoid any side connections, the pipe connec-
 30 tions of the steam and pump ends thus coming within the transverse dimensions of the pump itself, as is preferable, although not essential to the invention.

It will be seen that my invention provides
 35 a very simple, convenient, and compact construction of duplex steam-cylinders and steam end for a duplex-pump construction. While, however, the features forming the present invention are preferably used in a duplex di-
 40 rect-acting steam-pump, as shown, one object of the present invention being to provide such a pump of very small size for its capacity, it will be understood that the improvements herein claimed may be used in steam-engines
 45 of other classes and are applicable generally in steam-engine construction with two cylinders arranged side by side. It will be understood also that modifications in the construction shown may be made by those skilled in
 50 the art without departing from the invention and that I am not to be limited to the exact form or arrangement of parts shown in the drawings.

What I claim is—

55 1. A steam or similar engine having two cylinders arranged side by side with the exhaust-passage for the two cylinders formed between the opposite sides of the engine and extending longitudinally of the cylinders, and
 60 having an exhaust-chamber at the end of the cylinders between the portions of the cylinders above their centers into which the exhaust-passage leads and which is connected with the exhaust-pipe.

65 2. In a steam or similar engine, two cylinders arranged side by side and having the central narrow exhaust-passage *i* for the two cyl-

inders extending longitudinally of the cylinders between the portions of the cylinders above their centers, whereby the space be- 70
 tween the upper parts of the cylinders set close together is utilized for the exhaust-passage, said passage being enlarged widthwise beyond the end of the cylinders to form an exhaust-connection chamber. 75

3. In a steam or similar engine, two cylinders arranged side by side with cradle D beyond the ends of the cylinders and having a central exhaust-passage extending longitudi- 80
 nally of the cylinders and into cradle D and one or more vertical ports for connecting the end of the passage with the exhaust-pipe.

4. The combination with cylinders A, A' having central exhaust-passage *i*, of cradle D provided with chamber I into which pas- 85
 sage *i* opens and having one or more vertical connection-ports *k* for the exhaust-pipe.

5. In a steam or similar engine, two cylinders arranged side by side and formed inte- 90
 gral with their induction and exhaust passages and with a central exhaust-passage for the two cylinders extending longitudinally of the cylinders between the portions of the cylinders above their centers and connecting with the exhaust-pipe beyond the end of the 95
 cylinders.

6. In a steam or similar engine, two cylinders arranged side by side and formed inte-
 gral with a central exhaust-passage extend- 100
 ing longitudinally of the cylinders between the portions of the cylinders above their centers and opening into an exhaust-connection chamber beyond the inner end of the cylinders and formed integral therewith.

7. In a steam or similar engine, two cylin- 105
 ders arranged side by side and formed integral with a cradle, as D, and having a central exhaust-passage extending longitudi-
 nally of the cylinders between the portions of the cylinders above their centers and connect- 110
 ing with the exhaust-pipe through the cradle.

8. In a steam or similar engine two cylinders arranged side by side and close together, and formed integral with a single wall be- 115
 tween the two cylinders, and with a central exhaust-passage for the two cylinders, the lower portion of which is formed by the space between the portions of the cylinders above their centers, said exhaust-passage extending longitudinally of the cylinders between the 120
 cylinder steam-ports to a point beyond the cylinder steam-ports, and an exhaust-chamber into which said exhaust-passage opens having one or more vertical ports for connect- 125
 ing with the exhaust-pipe, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES C. WORTHINGTON.

Witnesses:

B. W. PIERSON,

CHARLES H. TOWNE.