

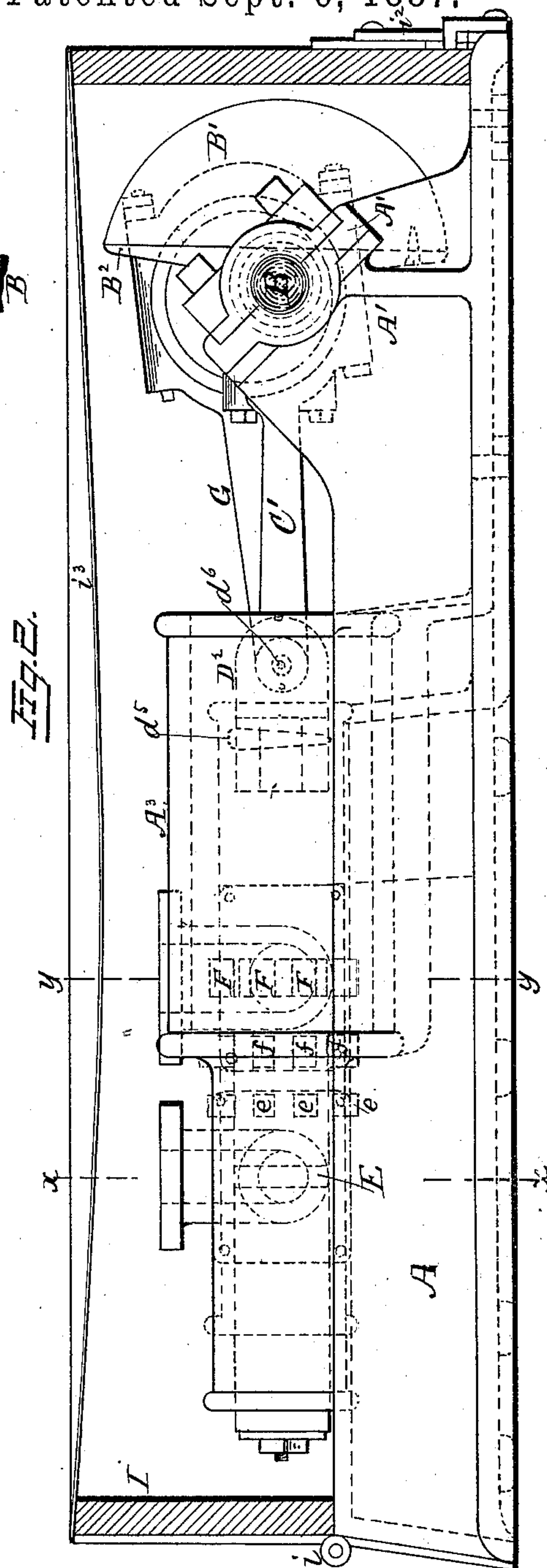
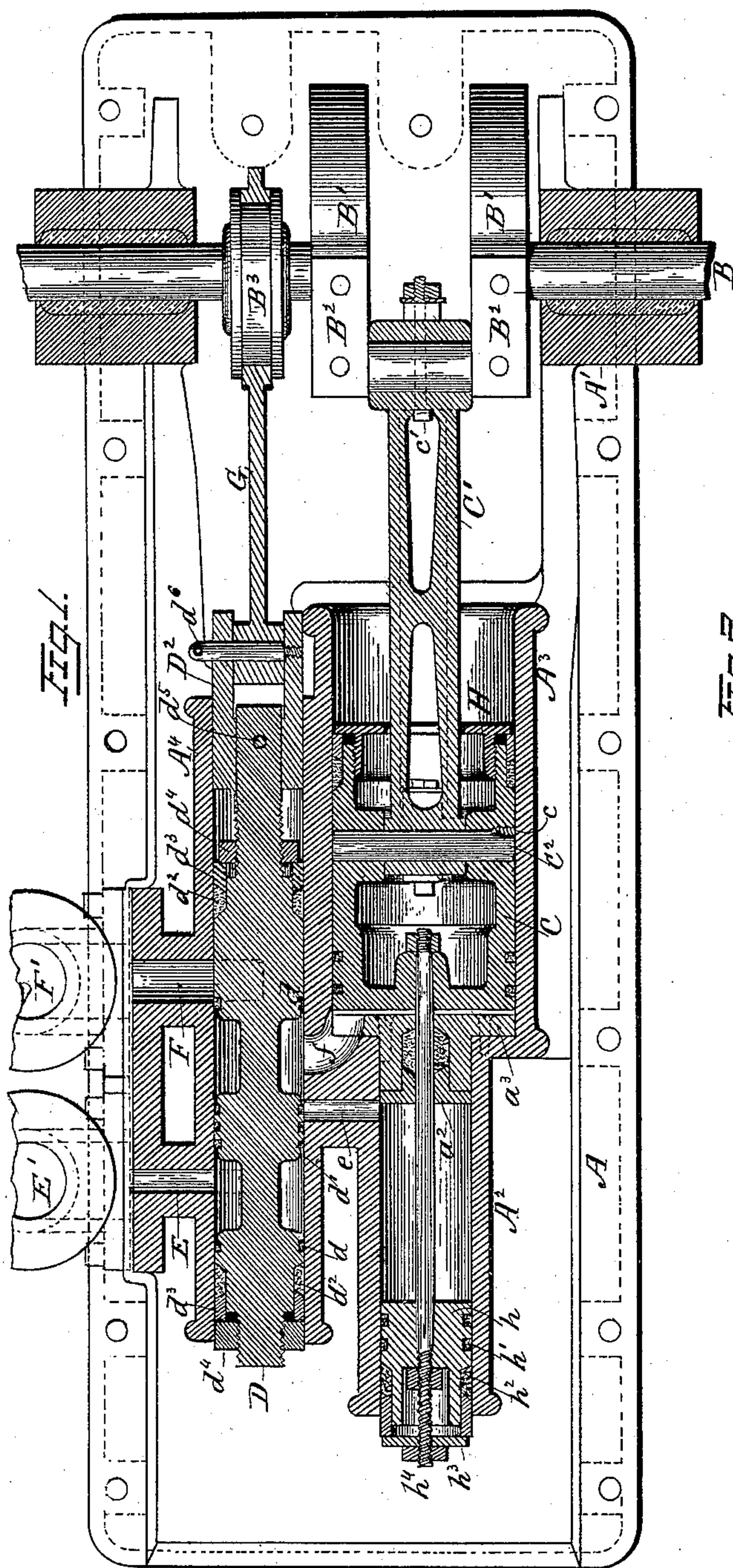
(No Model.)

2 Sheets—Sheet 1.

McC. YOUNG.
COMPOUND STEAM ENGINE.

No. 369,674.

Patented Sept. 6, 1887.



Witnesses:
E. Murdeman.
W. B. Masson

Inventor:
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Fig. 4.

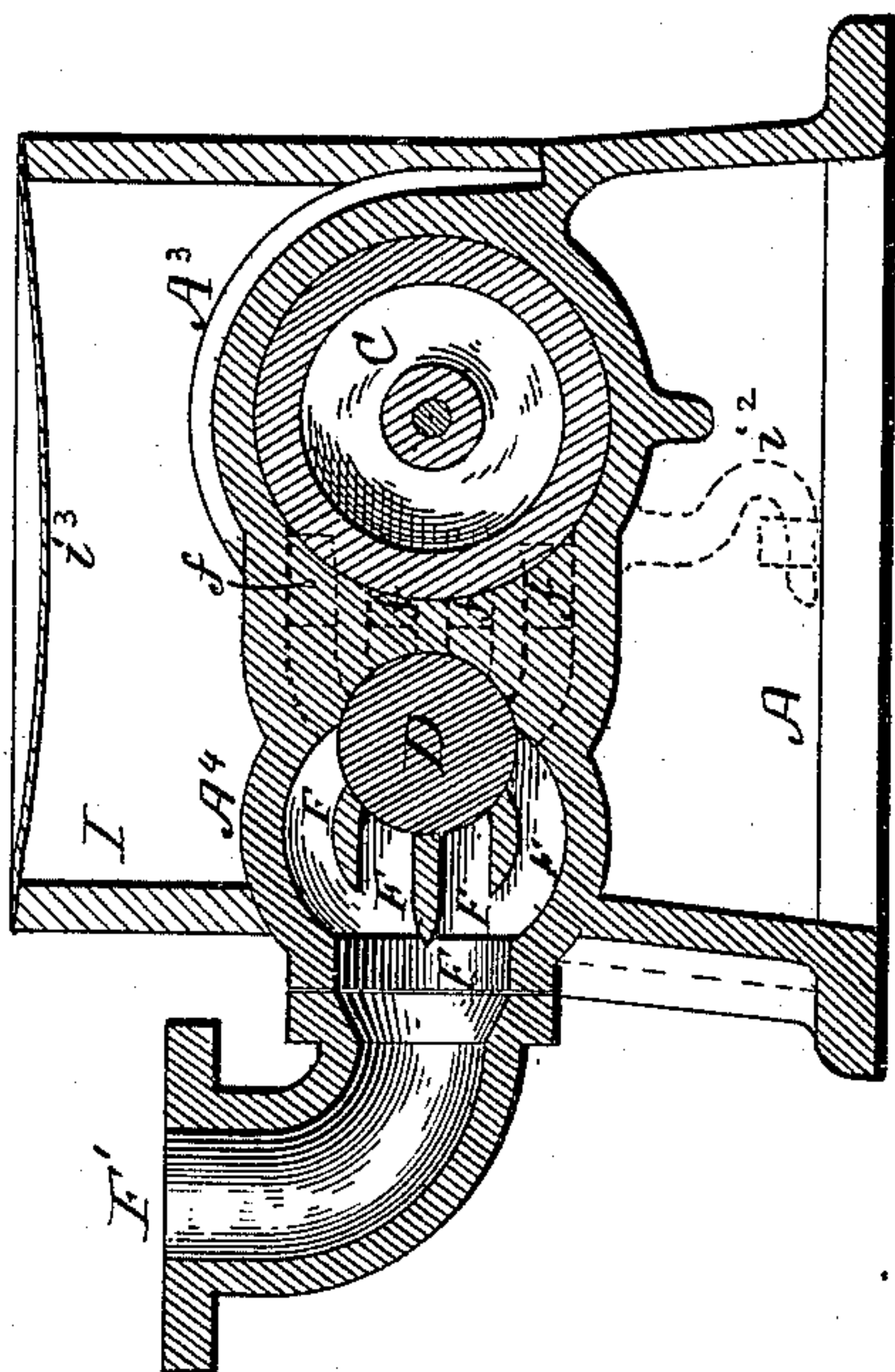
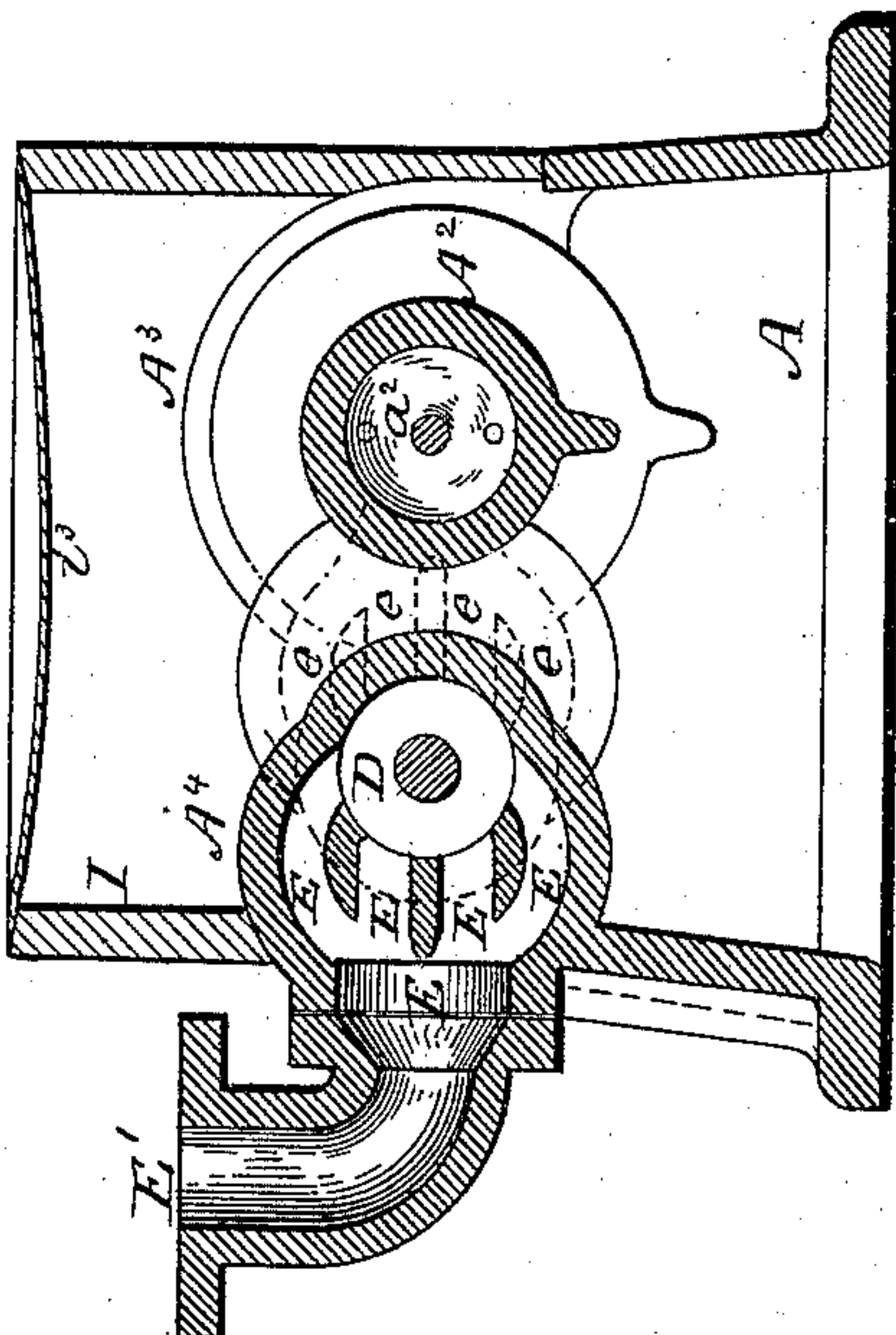


Fig. 5.



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UNITED STATES PATENT OFFICE.

McCLINTOCK YOUNG, OF FREDERICK, MARYLAND.

COMPOUND STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 369,674, dated September 6, 1887.

Application filed May 20, 1886. Serial No. 202,784. (No model.)

To all whom it may concern:

Be it known that I, McCLINTOCK YOUNG, a citizen of the United States, residing at Frederick, in the county of Frederick, State of Maryland, have invented certain new and useful Improvements in Compound Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in compound steam-engines in which the small and the larger cylinder are in line; and the objects of my improvements are to produce a simple, inexpensive, efficient, and economical engine. To render it simple and inexpensive it is composed of as few parts as possible, and to render it economical and prevent condensation it is peculiarly constructed and provided with a removable cover or casing of peculiar construction, as hereinafter described in connection with the drawings, in which—

Figure 1 is a horizontal section through the axis of the cylinders and valves of an engine constructed in accordance with my invention and having the casing removed. Fig. 2 is a side view of the same with the casing in section. Fig. 3 is a transverse vertical section of the engine on line *x x* of Fig. 2. Fig. 4 is a transverse vertical section of the engine on line *y y* of Fig. 2.

Similar letters refer to similar parts throughout the several views.

The frame A, with the lower boxes, A', for the crank-shaft B, the two steam-cylinders A² and A³, and the valve-chamber A⁴, with its steam-ports, are preferably cast in one piece. The cylinders A² A³, being in line, and the valve-chamber parallel thereto, can all be bored after being once placed on a boring-machine. Neither the cylinders nor the valve-chamber requiring heads, a considerable saving is made, besides rendering the pistons and valve quite accessible when necessary. The piston C of the large cylinder A³ being of hollow trunk form of great length, guides for the end of the connecting-rod C' are not necessary; but one end of said connecting-rod is pivoted upon a pin, C², retained by a small screw, c, and passing through hollow bosses projecting inward of the piston C, while the opposite end receives the crank-pin of the crank-shaft, said pin be-

ing made integral with the latter; and to properly balance the crank and the two pistons and connecting-rod said crank is provided with weights B', secured to said cranks by straps B², riveted thereto. The bore of the valve-chamber A⁴ is of uniform size throughout its length, and within it is placed the piston-valve D. This valve is provided with packing-rings d, and also with packing-rings d', the latter being to cut off communication between the steam-passage E, leading from the boiler through the flanged elbow-pipe E', and the exhaust-passage F, leading to the flanged elbow-pipe F', or between the steam-passage e, leading steam into the small cylinder A², and the passage f, leading to the large cylinder. The piston-valve is also provided with packing d², adjoining each end, compressed by packing-rings d³ and nuts d⁴, engaging with the screw-threaded ends of the valve, to assist the rings d in preventing escape of steam. To the end of the valve D is secured, by a pin, d⁵, a link, D², which is made to fit the bore of the valve-chamber, and is provided with lugs to receive the pin d⁶, that also passes through the boss on the end of the eccentric-rod G; and if the pin d⁵ projects on the sides the walls of the valve-chamber may be slotted a short distance for its passage and for the free motion of the valve. The eccentric-rod carries the eccentric-strap inclosing the eccentric B³, that is set upon the shaft about one-sixteenth of a circumference in advance of right angle with the crank.

Within the small cylinder A² is placed the piston h, provided with packing-rings h' and a stuffing-box ring, h², that is compressed by a washer and nut, h³, upon the outer end of the piston-rod h⁴, and the opposite end of said piston-rod is secured to one end of the piston C of the expansion-cylinder A³, the rod h⁴ passing through a stuffing-box, a², formed within a cap, a³, that closes the opening between the two cylinders, and is retained by screws engaging with the bottom of the large cylinder.

The piston C is provided with packing-rings and a stuffing-box, H, around its outer end, to assist the rings in rendering the parts steam-tight. Bolts c' are used in place of straps upon the outer end of the connecting-rod C', to take

up the wear on the boxes and hold the caps in their places.

To retain the heat of the engine and prevent dust settling on the working parts, the whole engine is surrounded by a casing, the sides I of which are preferably made of wood hinged at *i* to the frame of the engine, and retained at the opposite end by a hook, *i*², so that it can be instantly removed to examine the engine and as quickly closed; but the top of this casing is closed by some pliable material, *i*³, as enameled cloth. The object of this flexible covering is to permit the quantity of air retained thereunder to vary. As the cylinders are open at their ends and are of unequal size, the area of the large cylinder being about four times that of the small one, there will be a slight suction when the large piston is drawn in, and an excess of air in the casing when it is driven outward, and thus to retain the same air within the casing while said casing is nearly air-tight some flexibility of these parts is required.

The steam is admitted through the elbow-pipe E', and thence through the passage and ports E into the valve-chamber, and when the small piston *h* is at the end of its stroke adjacent to the stuffing-box, steam is admitted by the movement of the valve in the rear of said piston through the passage or ports *e*. When this small piston has nearly completed its outward course, the steam is shut off, and then, just before the completion of its stroke, communication is opened by the valve between the small steam-cylinder A² and the expansion-cylinder A³, through the ports *e* and the ports *f*, and forces the large piston C to the end of its stroke toward the crank-shaft, at the same time carrying the small piston *h* to the inner end of its course. Shortly before the completion of the stroke of the large piston C the valve closes the communication between the two cylinders, and the exhaust-ports F are opened and put in communication with the ports *f*, so that a large portion of the steam in the expansion-cylinder escapes before the piston has reached the end of its course. The above operation is repeated for each revolution of the crank-shaft.

Having now fully described my invention, I claim—

1. In a compound engine, the combination of a small and a large cylinder located on the same line and having the outer ends of each open, and in the large cylinder a hollow trunk-form piston carrying the piston-rod of the small piston, with a longitudinally-sliding valve interposed between the steam-inlet and the small cylinder, and also between the large or

expansion cylinder and the steam-outlet, substantially as and for the purpose described.

2. In a compound engine, the combination of a small and a large cylinder located on the same line, and in the large cylinder a hollow piston having secured at one end the piston-rod of the small cylinder, with a valve-chamber open at both ends and a cylindrical longitudinally-sliding valve therein, substantially as and for the purpose described.

3. In a compound engine, the combination of a small and a large cylinder located on the same line and open at both ends, with a valve-chamber parallel to said cylinders, and also open at both ends, and a valve therein adapted to open and close the ports of both cylinders, substantially as described.

4. In a compound engine, the combination of a small and a large cylinder located on the same line and open at both ends, with the piston therein and the stuffing-boxes secured to the outer ends of said piston and moving therewith, substantially as and for the purpose described.

5. The combination of a small and a large cylinder located on the same line, with a valve-chamber open at both ends, with a valve and stuffing-boxes secured to the outer ends of said valve, substantially as and for the purpose described.

6. The combination of a small and a large cylinder located on the same line and open at their outer ends and a hollow piston carrying the piston-rod of the small cylinder at one end, with a valve-chamber open at both ends, a cylindrical longitudinally-sliding valve therein, and the engine-frame having shaft-boxes formed integral therewith, substantially as and for the purpose described.

7. The combination of a compound engine-frame and a large and a small cylinder with a casing and flexible covering, substantially as and for the purpose described.

8. The combination of an engine-frame and unequal-size cylinders located on the same line, and both cylinders having steam-ports to admit steam only on one side of the piston, with a cylindrical longitudinally-sliding valve and the hollow trunk-form piston having internal bosses and a transverse pin and the piston-rod of the small piston secured to one end of the hollow piston, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

McCLINTOCK YOUNG.

Witnesses:

Z. I. GITTINGER,
P. R. McCLURG.