

(No Model.)

2 Sheets—Sheet 1.

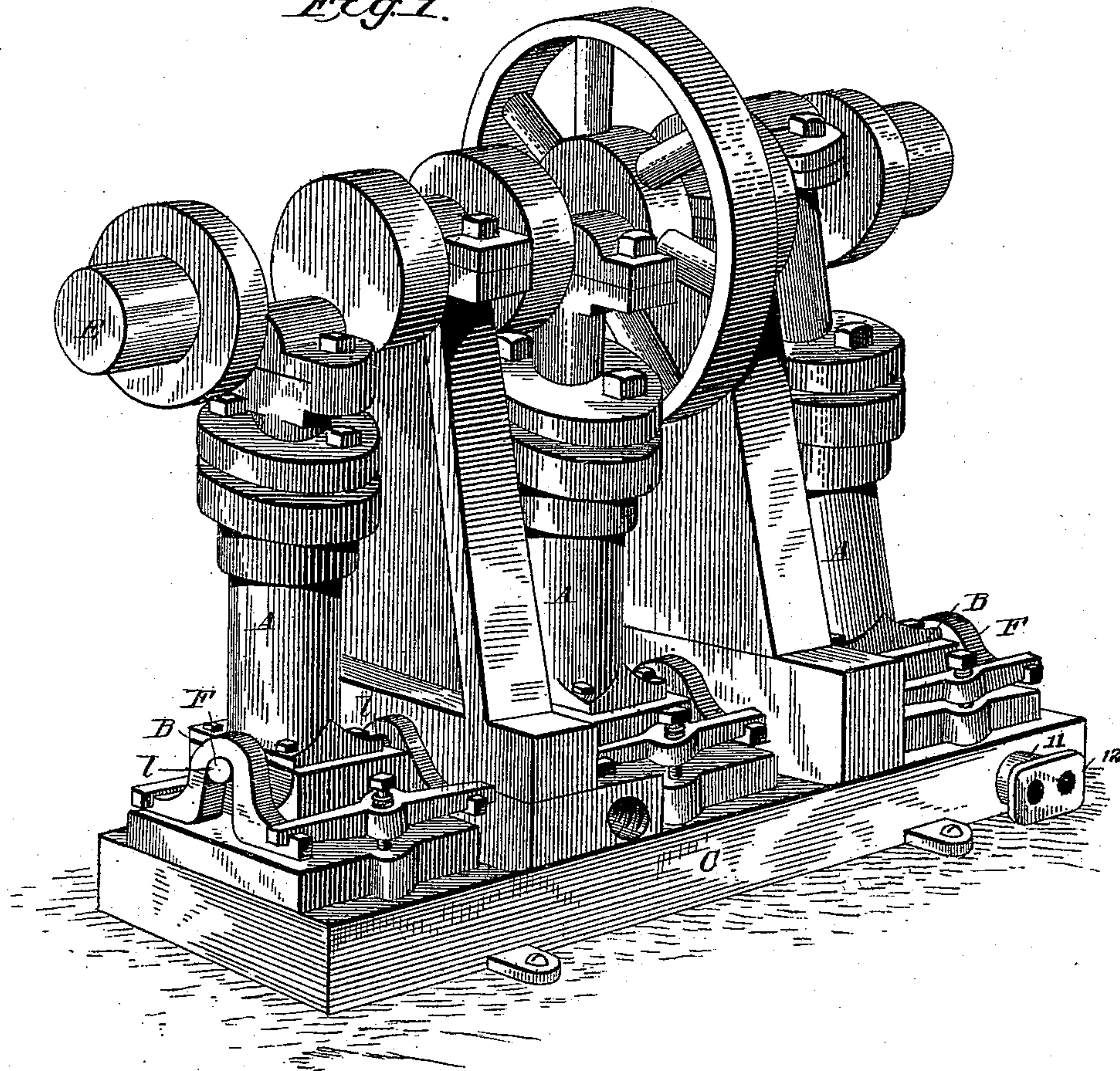
E. ANDREWS.

PUMPING ENGINE.

No. 354,822.

Patented Dec. 21, 1886.

*Fig. 1.*



Witnesses

*Edwin L. Yewell,*  
*Wm. H. Huntmann.*

Inventor

*E. Andrews*

By his Attorneys

*Johnston, Reinohl & Dyre*



(No Model.)

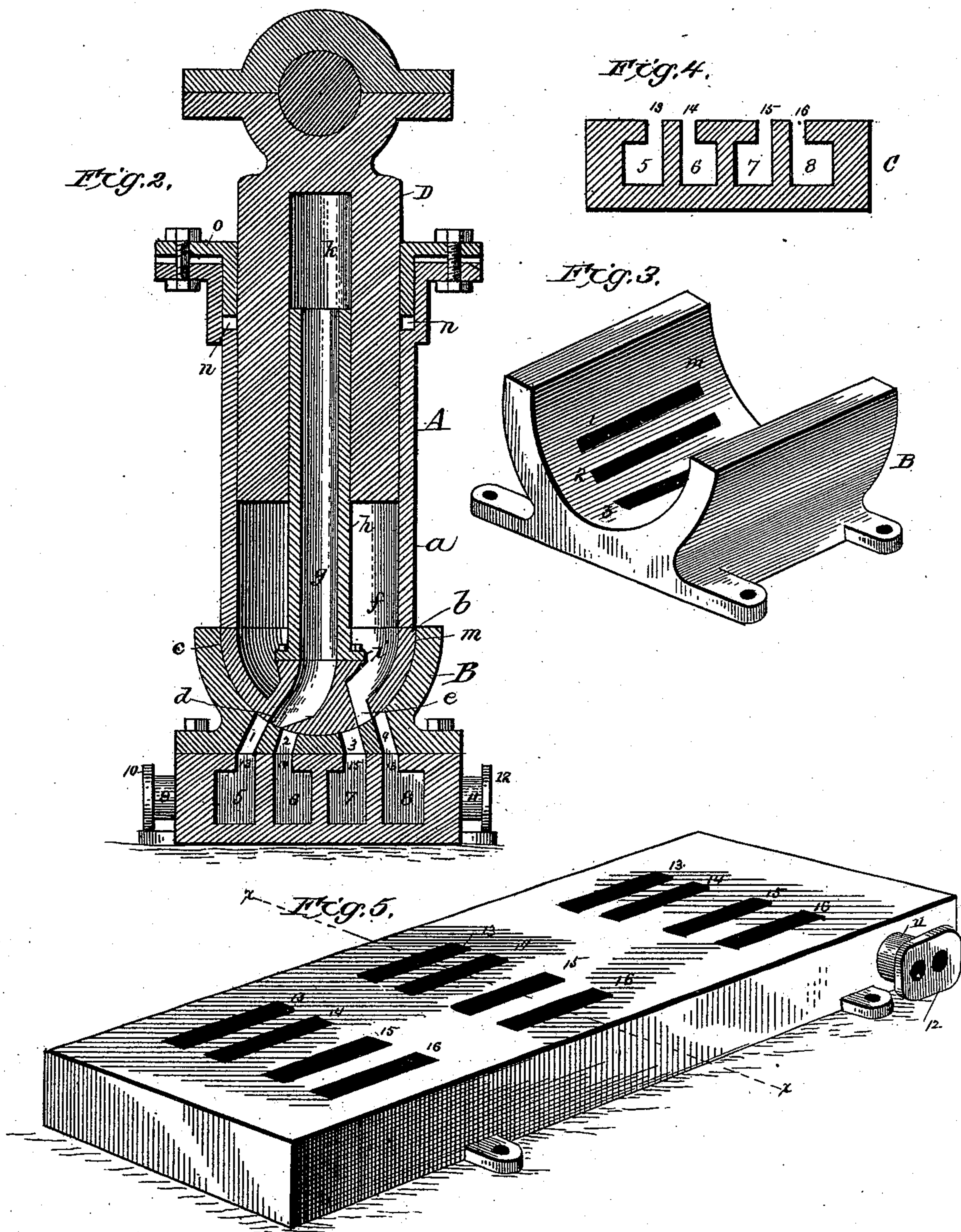
2 Sheets—Sheet 2.

E. ANDREWS.

PUMPING ENGINE.

No. 354,822.

Patented Dec. 21, 1886.



Witnesses

Edwin T. Jewell,  
Wm J. Huntmann

Inventor

E. Andrews

By his Attorneys

Johnston, Reinold & Dyre



# UNITED STATES PATENT OFFICE.

EDWARD ANDREWS, OF POTTSVILLE, ASSIGNOR OF ONE-HALF TO ROBERT H. COLEMAN, OF CORNWALL, PENNSYLVANIA.

## PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 354,822, dated December 21, 1886.

Application filed September 28, 1886. Serial No. 214,778. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD ANDREWS, a citizen of the United States, residing at Pottsville, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Pumping-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to pumping-engines, and has for its object the construction of a simple and effective engine for pumping liquids or fluids which can be produced at comparatively small cost; and it consists in the constructions hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a perspective of a triple-cylinder pumping-engine constructed in accordance with my invention. Fig. 2 is a vertical section of one of the cylinders. Fig. 3 is a perspective of one of the detachable seats in which the cylinders rest. Fig. 4 is a cross-section of the bed-plate on the line *x x*, Fig. 5; and Fig. 5 is a perspective of the bed-plate.

Reference being had to the drawings and the letters thereon, A A A represent the cylinders, B B B the detachable seats for the cylinders, and C the bed-plate. The cylinders are made in two sections, *a b*, which are bolted together. The lower section, *b*, is provided with a convex bearing-surface, *c*, and two ports or passages, *d e*, are cut through said lower section. The port *e* communicates with an annular chamber, *f*, and the port *d* communicates with a chamber, *g*, in a central projection, *h*, secured to the lower section, *b*, of the cylinder at *i*.

D represents the piston or plunger, which has a chamber, *k*, formed in it corresponding in diameter with the projection *h*, and is of a depth equal to the length of said projection. The lower section, *b*, of the cylinders is also provided with trunnions *l l*, which project laterally from opposite sides, and the pistons are connected directly to the wrist-pins of the crank-shaft E.

The detachable seats B are provided with a

concave surface, *m*, which corresponds with the bearing-surface *c* on the lower section of the cylinders, and has passages 1 2 3 4 formed through the bottom thereof, which communicate with the chambers formed in the bed-plate, and with which the ports *d e* in the cylinders communicate, as will hereinafter more fully appear.

The bed-plate C has chambers 5, 6, 7, and 8 formed in it, which extend nearly throughout the length thereof, and are grouped in pairs, the chambers 5 and 6 being in communication with the pumps, and 7 and 8 with the engines, according to the use to which the engine and pump are applied. The chambers 5 and 6 terminate in a pipe, 9, having two chambers and a flange, 10, and the chambers 7 and 8 terminate in a pipe, 11, having a flange, 12, for connection with a suitable pipe through which a liquid or fluid may be conducted to and from the engine and pump. The passages 1 2 3 4 in the seats B correspond with the ports 13 14 15 16 in the upper surface of the bed-plate, and communicate therewith when the seats are secured in their positions on said plate.

The cylinders are held in their seats by equalizing-yokes F, which are fully described and claimed in another application of even date of filing, Serial No. 214,777, and need not therefore be herein described. The pistons are provided with the usual packing-chambers, *n*, and glands *o*.

The operation is as follows: When the engine is used to pump liquids—such as water—steam or other motor-fluid is conducted into the chamber 7 in the bed-plate, from which it passes up through the ports 15, through the passages 3 and ports *e* into the several cylinders, and drives the pistons or plungers D up. While the pistons are rising or making their outstroke, water or other liquid is drawn into the chamber *g* in the projection *h*, from the chamber 6 in the bed-plate, through passage 2 in the seat B and port *d* in the cylinder. Upon the descent or instroke of the pistons the spent motor-fluid is exhausted through port *e*, passage 4, and chamber 8, and the liquid being pumped is discharged through port *d*, passage 1, and chamber 5 to a suitable pipe for conducting it to any desired place for use.



When it is desired to pump a fluid such as air or gas, the motor-fluid is admitted to the chamber *g* in the projection *h*, and the fluid to be pumped is admitted to the annular chamber *f* in the cylinders.

It will be observed that by the connection made between the several pistons and the crank-shaft the engine has no "dead-center," and that the contents of each cylinder are expelled by the power of the motor-fluid being exerted upon the pistons in the other two cylinders of the series.

Having thus fully described my invention, what I claim is—

1. A cylinder having a hollow projection and an annular fluid-chamber, a port communicating with the chamber in the projection, and a port communicating with the annular chamber, both of said ports entering the cylinder on the same side of the piston, in combination with a piston for expelling the fluid from both chambers, substantially as described.

2. A vibrating cylinder having a convex bearing-surface at one end, a tubular projection extending nearly to the opposite end of the cylinder, and an annular fluid-chamber, separate ports communicating with the cham-

ber in the projection and with the annular fluid-chamber, in combination with a ported seat having a concave bearing-surface, and a piston conforming to the working-cylinder, substantially as described.

3. A cylinder having a hollow projection in the center thereof and a bearing-surface at one end, a hollow piston fitting over said projection, separate ports communicating with both chambers in the cylinder, in combination with a bed-plate having supply and discharge passages formed therein, and a ported seat interposed between the cylinder and the bed-plate, substantially as described.

4. A triple vibrating-cylinder pumping-engine in which each cylinder is provided with two receiving-chambers, and a single-acting piston connected to a crank-shaft, as described, whereby the contents of each cylinder are expelled by the power exerted upon the other two pistons.

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

EDWARD ANDREWS.

Witnesses:

S. A. TERRY,  
D. C. REINOHL.