

(No Model.)

R. K. EVANS.
LOW PRESSURE STEAM MOTOR.

No. 401,020.

Patented Apr. 9, 1889.

Fig 1.

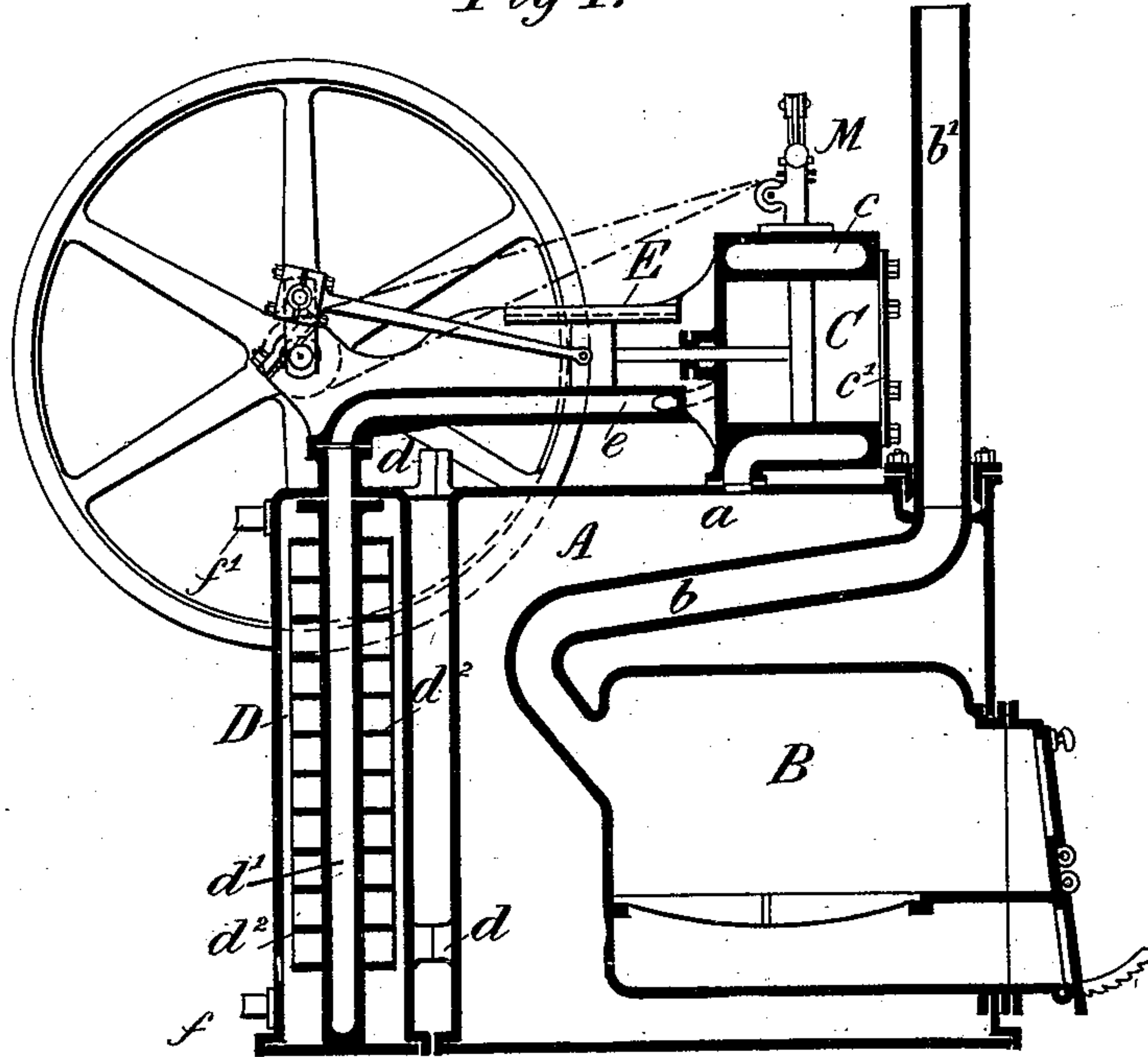
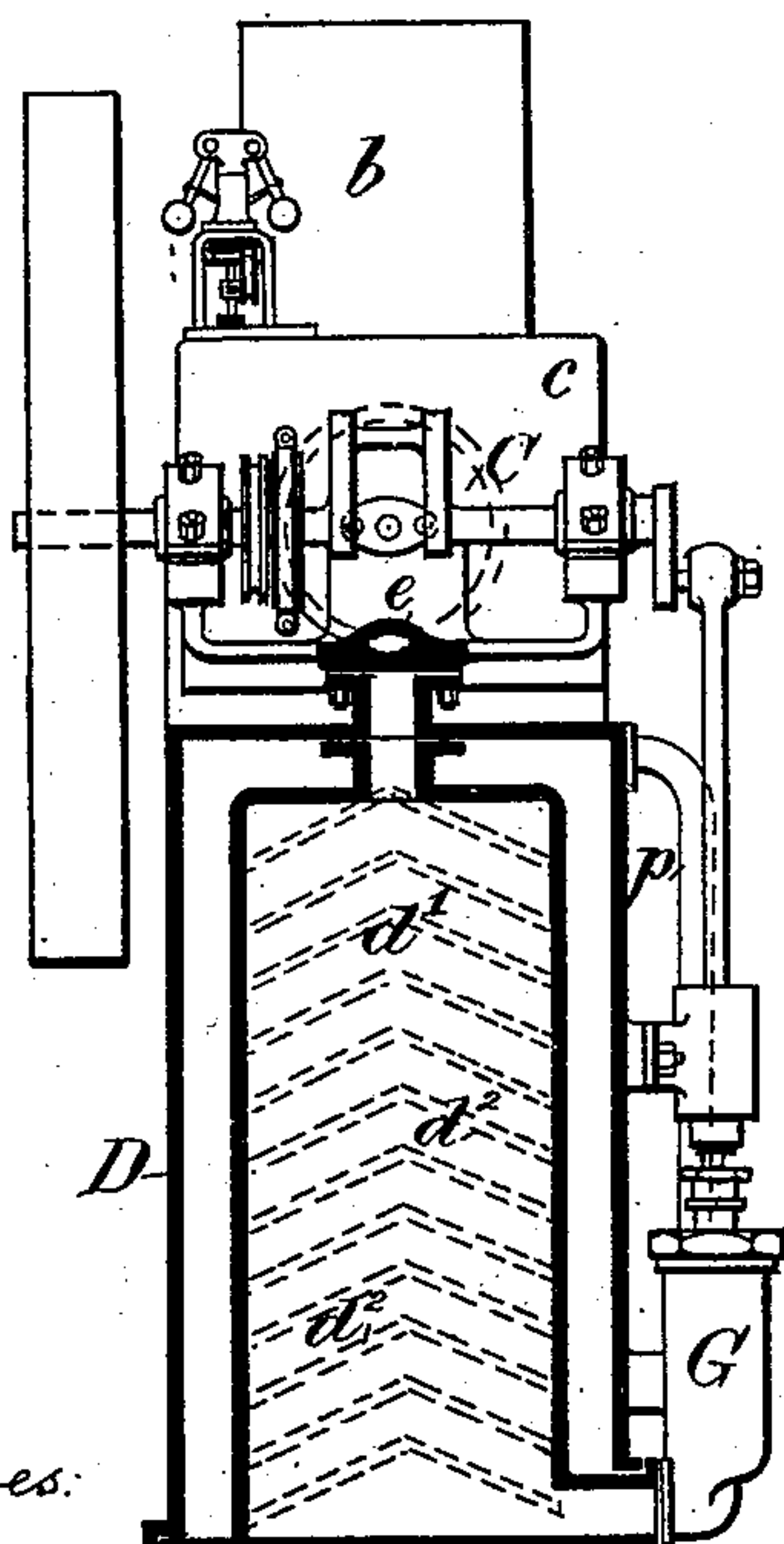


Fig 2



Witnesses:

W. D. Porter.

L. B. Porter.

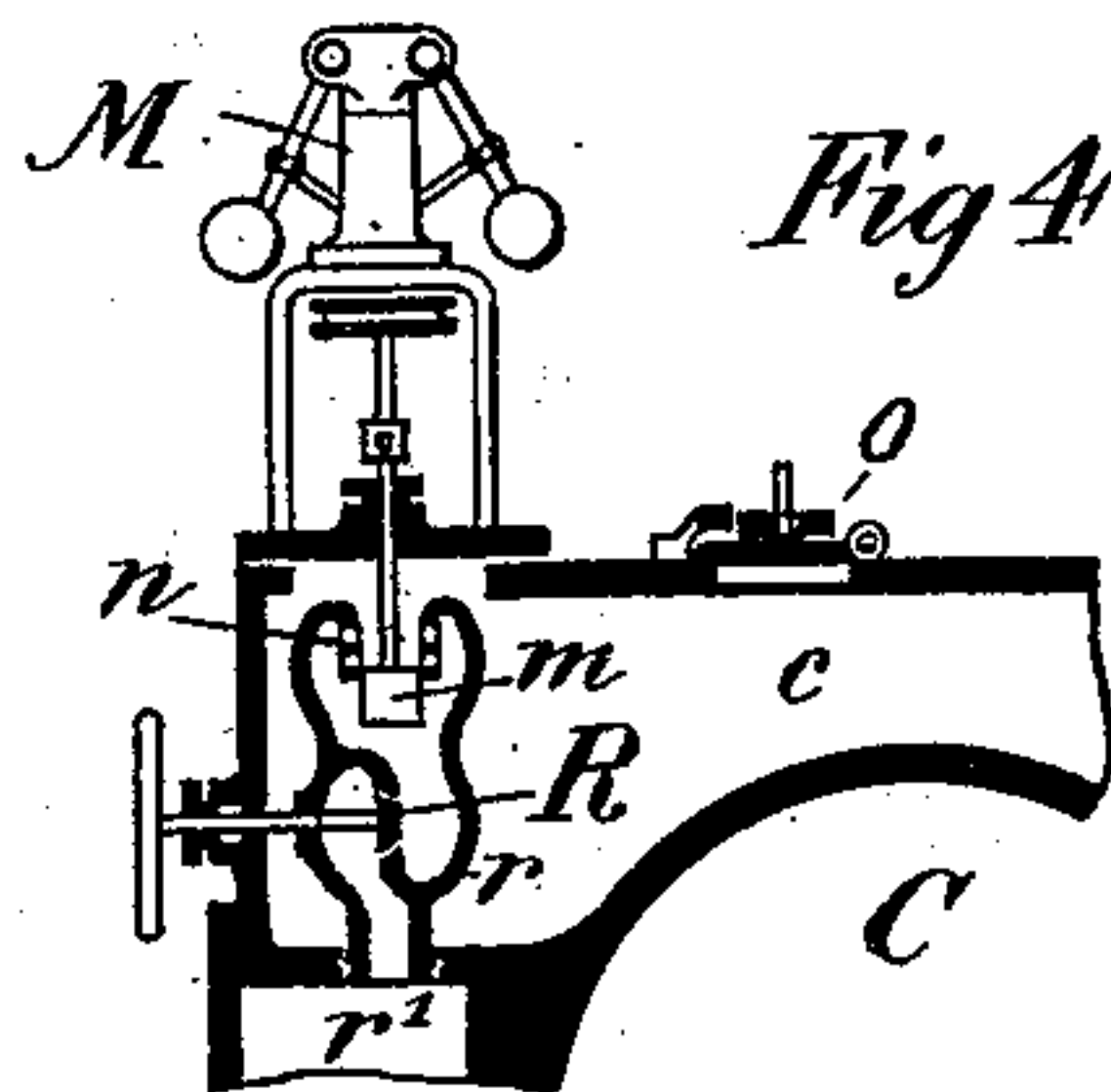
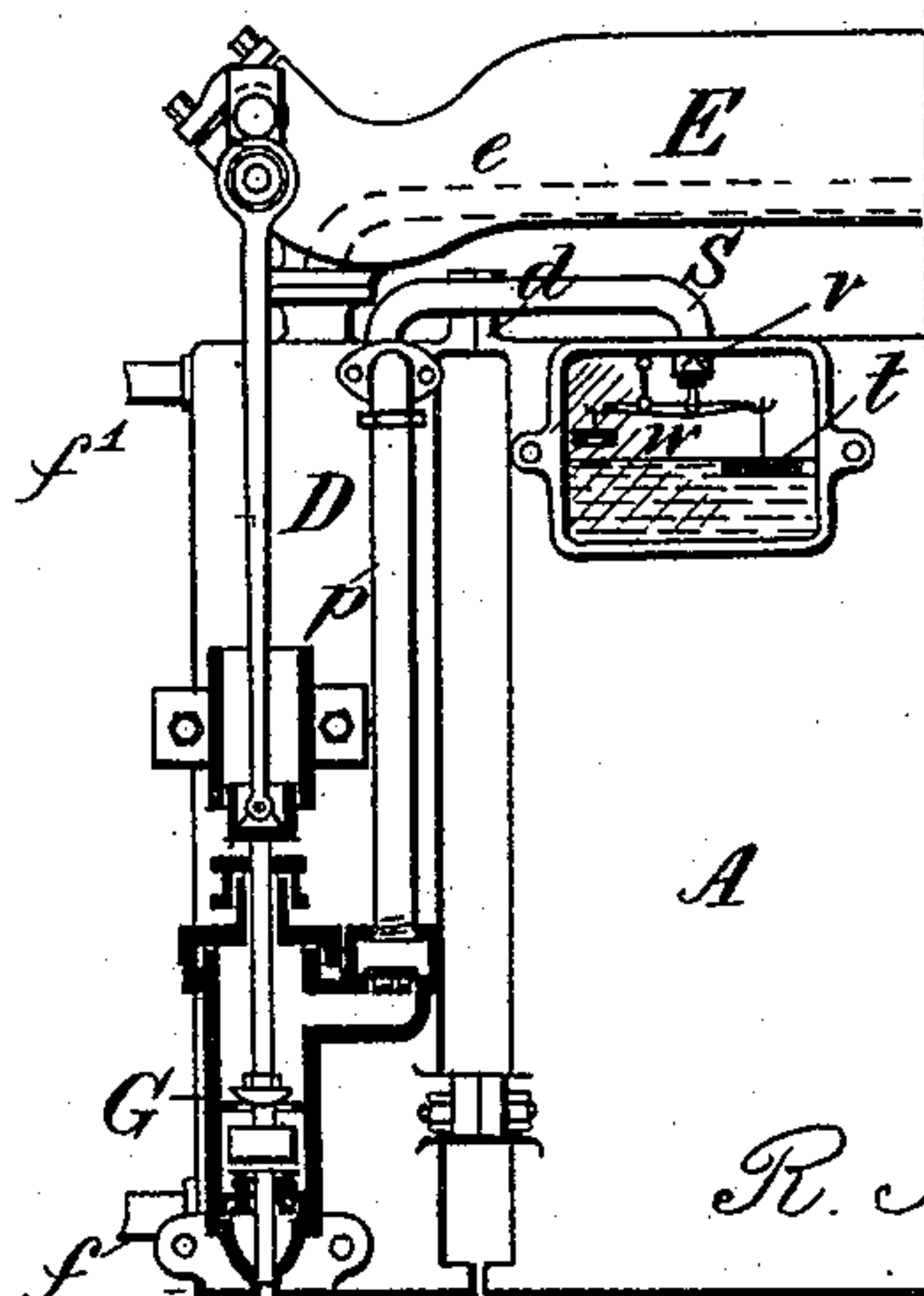


Fig 3.



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UNITED STATES PATENT OFFICE.

RICHARD KENDALL EVANS, OF WHISTON GRANGE, ROTHEHRAM, COUNTY OF YORK, ENGLAND.

LOW-PRESSURE STEAM-MOTOR.

SPECIFICATION forming part of Letters Patent No. 401,020, dated April 9, 1889.

Application filed June 12, 1888. Serial No. 276,854. (No model.)

To all whom it may concern:

Be it known that I, RICHARD KENDALL EVANS, a subject of the Queen of Great Britain and Ireland, and a resident of Whiston Grange, Rotherham, in the county of York, England, have invented an Improved Form of Low-Pressure Steam-Motor, of which the following is a specification.

This invention relates to a certain improved form of low-pressure steam-motor.

The object of the invention is to construct a simple, safe, and cheap engine for use where small power is required. The motor is worked by steam at or about atmospheric pressure, and is consequently free from liability to explosion of the boiler.

The particulars of the invention lie in the form and arrangement of the various component parts and their combination together to form an efficient motor.

I will describe my invention in reference to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of the complete motor. Fig. 2 is a part end elevation with part of exhaust-pipe and condenser in section. Fig. 3 is a detail of air-pump and feed device. Fig. 4 is a detail of regulating-valve governor and equilibrium-valve.

Similar letters refer to similar parts in all of the figures.

The boiler A is of cast-iron, and preferably of horizontal, rectangular, or chest-like form. Within it is placed the furnace B, provided with usual fittings, having a wide flat flue, *b*, returned and arranged, substantially as illustrated, with as great a part of its length as is convenient below working water-level, so as to expose as much heating-surface as possible. To the upper end of the flue *b* is fixed the chimney *b'*. On the top of the boiler A is placed the cylinder C, which is steam-jacketed for its full length, and, if desired, over both ends. Steam is admitted to jacket *c* from boiler A through passage *a*. The cylinder is provided with the usual piston, valve-chest, ports, and slide-valve. The piston-rod is connected to a crank, upon the shaft of which a fly-wheel is fixed, all in the ordinary manner. The cylinder, valve, chest, steam-

jacket, piston-rod guide, and crank-shaft bearings may all be cast in one piece, E, as shown, a passage, *e*, for the exhaust being formed in the casting, preferably of an oval section, to economize space and material, as best illustrated in section, Fig. 2. The back or cylinder end of the casting E is fixed to the boiler, and the fore end below the crank-shaft bearings preferably to the top of an upright surface-condenser, D, placed close to the front of the boiler and rigidly bolted thereto at lugs *d d*. The back cover, *c'*, of the cylinder is bolted on, so as to provide for easy removal. The exhaust-pipe *e* leads into the top of the surface-condenser D, and exhaust-steam passes into the central chamber, *d'*, thereof, which is or may be provided externally with flanges, webs, or gills *d² d²*, preferably arranged "herring-bone" fashion, as shown in Fig. 2, so as to expose as much surface as possible to the cold water. Water is admitted to condenser D from the main or cistern, or any convenient source, by pipe *f*, and circulating through the space outside the condensing-chamber *d'* escapes by overflow-pipe *f'*.

An air-pump, G, of usual construction, worked from the crank-shaft, as shown, or in any suitable way, is connected to the lowest part of chamber *d'* and exhausts the condensed water and air therefrom. The pump delivers this water through pipe *p* to the top part of the condenser, and thus the hottest water will always be at the top of the condenser, from whence the feed-supply to the boiler is delivered through pipe S. The feed is automatically regulated by the device shown in Fig. 3. A float, *t*, of stone or other suitable material, is suspended from one end of a lever centered upon any convenient internal part of the boiler-shell, and having a suitable adjustable weight, *w*, at its other end. To the lever is connected the spherical or conical valve *v*, having its seating in the base or foot of pipe S. When the water is at working-level, the float *t* holds up the valve *v* to its seat, closing the delivery-pipe S, when the water in the condenser will flow to waste; but when the level falls below working-level the weight *w* falls, valve *v* is opened, and the

supply will continue until normal working-level is restored. A sheet of strong glass may be placed in the side of the shell in front of the float and valve, so that the water-level
5 may at all times be visible.

The regulating-valve R is placed in a casing, *r*, upon a steam-pipe, *r'*, leading to the slide-valve chest and within the steam-jacket *c* of cylinder C, and its spindle is extended
10 and furnished with a hand-wheel conveniently placed outside the jacket *c*, as illustrated in Fig. 4. An equilibrium-valve is also provided. This is preferably of the form illustrated in Fig. 4.

15 *m* is a piston-valve upon the foot of the spindle of governor M, which may be of any ordinary centrifugal type. The valve *m* works in the open end of the casing *r*, which is provided with steam-apertures *n*. The valve
20 which is shown in normal position of rest controls the apertures, and as the governor rises with increasing speed the valve *m* is drawn up, closing successively the ports *n n* and thereby throttling the admission of steam to
25 the slide-valve.

To prevent the pressure in the boiler rising above atmospheric pressure, a safety-valve, or pair of safety-valves, O, is or are provided on the cylinder-jacket, as illustrated, or in any
30 suitable position on the boiler. This safety-valve may be of any approved construction, and may be advantageously locked in by a cap, so as to prevent overloading.

What I claim as my invention, and desire to
35 secure by Letters Patent, is—

1. A low-pressure steam-motor comprising a boiler, a surface-condenser secured to the boiler, a steam-engine secured on top of the boiler and condenser and having its steam

and exhaust apertures connected directly 40 with said boiler and condenser, respectively, an air-pump driven by said engine and forcing the condensed water into the upper part of the condenser-jacket, and a feed-water pipe provided with an automatic regulator and
45 connecting the upper part of said condenser-jacket with the boiler, whereby the steam is caused to go through a constantly-recurring cycle of changes within the motor, substantially as set forth. 50

2. In a low-pressure steam-motor, the combination, with a boiler, of a steam-jacketed cylinder and connection, valve-chest, guides, bearings, and exhaust-passage cast in one, an upright surface-condenser, an air-pump with 55 a delivery-pipe, *p*, to upper part of condenser, a feed-pipe, *S*, from top of condenser to steam-space of boiler, automatic feed-regulating float *t*, suspended lever and weight *w*, and valve *v*, all arranged substantially as herein 60 described.

3. In a low-pressure steam-motor, the combination, with a boiler carrying on its top a steam-jacketed cylinder fitted and cast in one with the piston-rod guides and crank-shaft 65 bearings, and an upright condenser arranged as specified, of steam-pipe with regulating and equilibrium valves placed in the steam-jacket of the cylinder, and a governor actuating the latter, all arranged as set forth. 70

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD KENDALL EVANS.

Witnesses:

WALTER J. SKERTEN,
J. CRAWHALL CHAPMAN.