

W. J. F. LIDDELL.

STEAM-ENGINE.

No. 190,441.

Patented May 8, 1877.

Fig. 1-

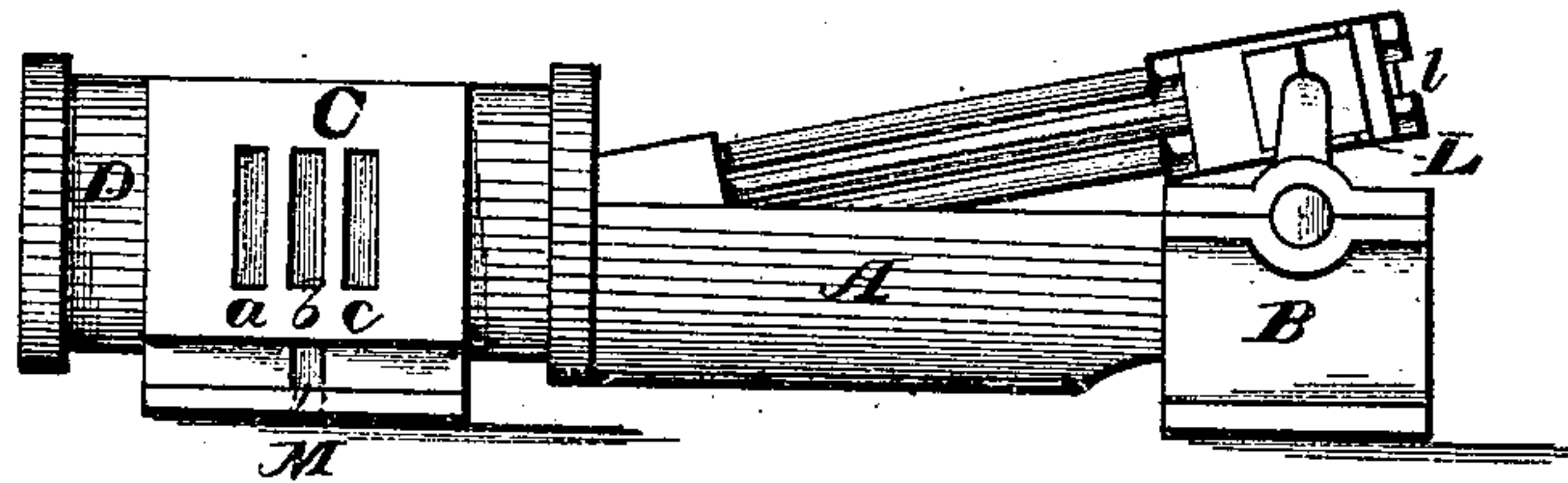


Fig. 2-

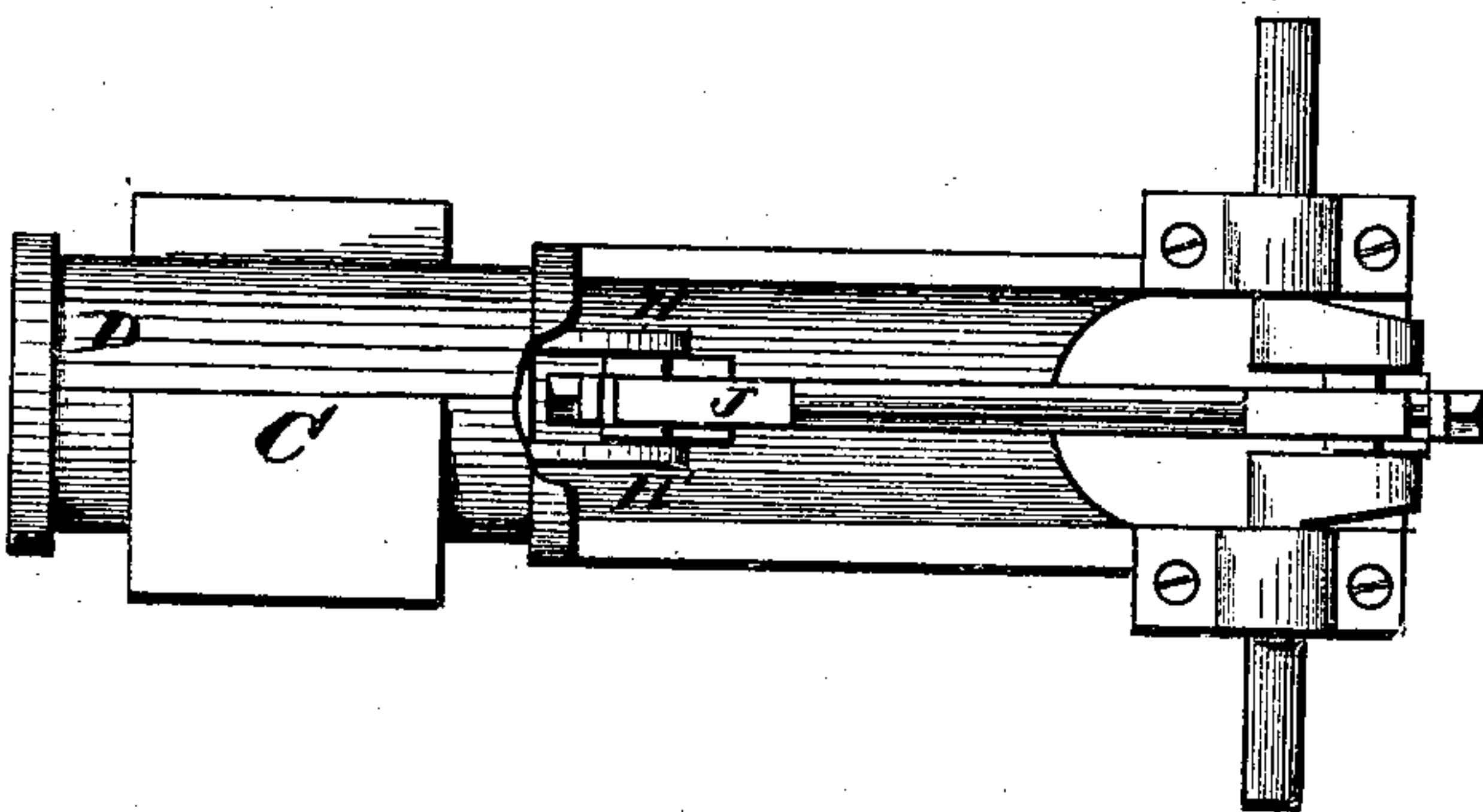


Fig. 3-

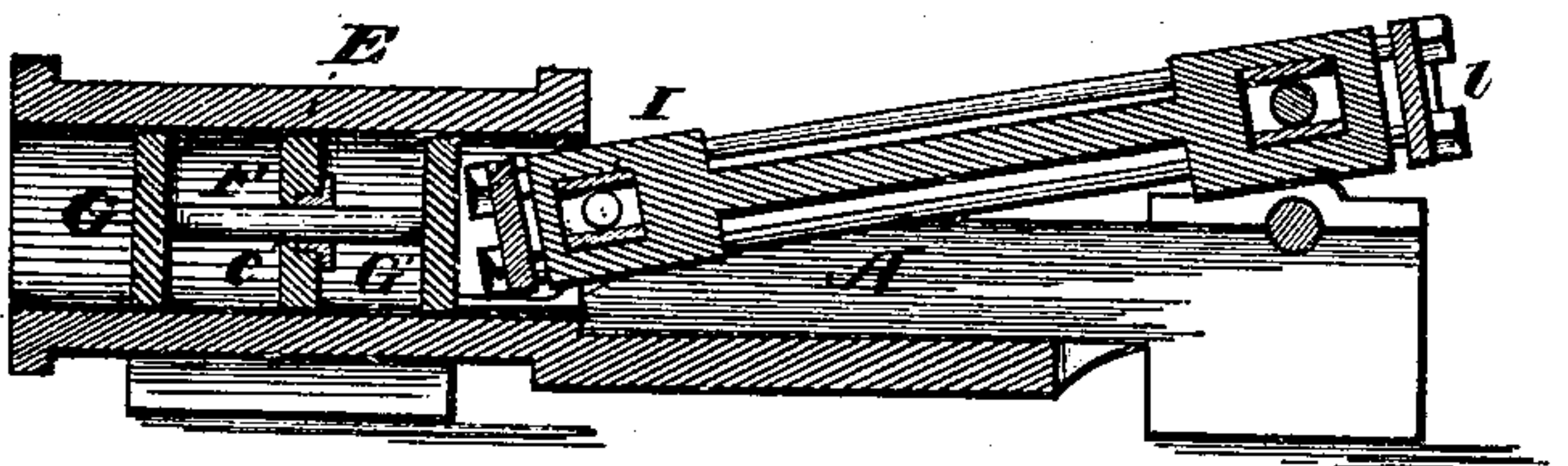


Fig. 4-

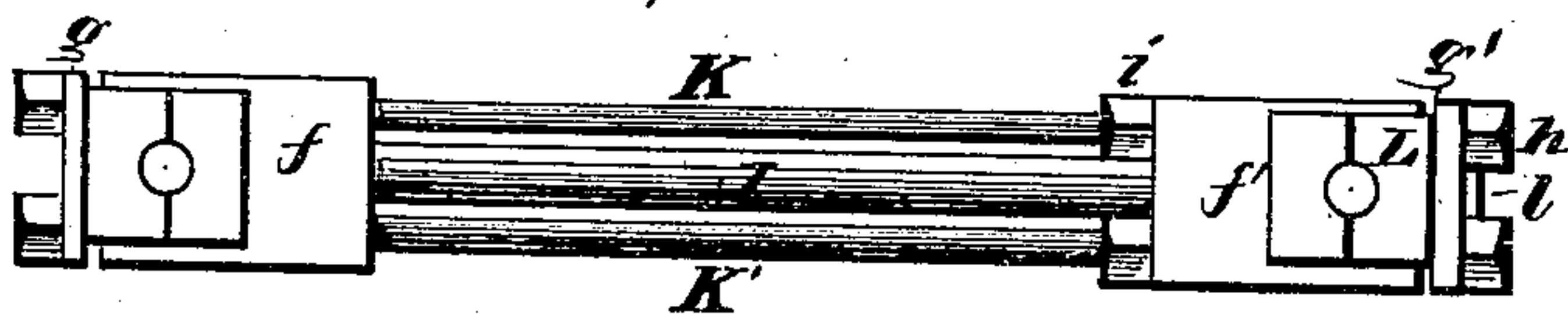
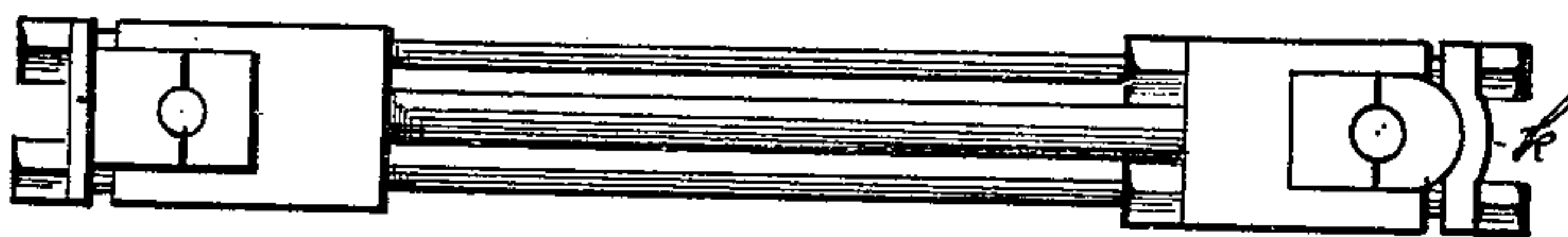


Fig. 5-



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# UNITED STATES PATENT OFFICE.

WALTER J. F. LIDDELL, OF CHARLOTTE, NORTH CAROLINA, ASSIGNOR TO  
FORBES LIDDELL, OF SAME PLACE.

## IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **190,441**, dated May 8, 1877; application filed  
August 15, 1876.

*To all whom it may concern:*

Be it known that I, WALTER JAMES FORBES LIDDELL, of Charlotte, in the county of Mecklenburg and State of North Carolina, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to certain improvements in steam-engines.

In the accompanying drawings, Figure 1 is a side view of my invention with the crank of the engine on its upstroke. Fig. 2 is a plan view of the same, with a portion of the cylinder cut away to show the construction of the pistons. Fig. 3 is a horizontal section of the cylinder and pistons. Fig. 4 shows the connecting-rod detached from the engine. Fig. 5 is a modified form of connecting-rod.

A is the engine-frame, having the cylinder D and journal-blocks cast solid therewith, the frame constructed with standards or supports B. The valve-seat C is formed on the side of the steam-cylinder D, or constructed separately and secured thereto. The cylinder D is constructed with a vertical central partition, E, having an aperture, *e*, through which passes a rod, F, to the ends of which rod the pistons G G' are firmly secured.

The partition E may be provided with suitable stuffing-boxes to pack the rod F, and thereby effectually prevent the escape of steam from one end of the cylinder into the opposite end of same.

The valve-seat C is constructed with steam-ports *a c* leading to the separate chambers of the cylinder, and an exhaust-port, *b*, leading down through the standard B.

Any desired form of valve may be employed, and it may be actuated by the ordinary or any improved valve-gear.

When steam is being admitted to one end of the cylinder to force the piston outward,

steam is at the same instant exhausting from the opposite end of the cylinder.

As the central partition E constitutes the resisting medium for the action of steam-pressure within the cylinder, the latter is constructed without heads, thereby allowing of the ready inspection of the interior of the cylinder.

The inner piston G' has the extended bearings H H' formed as a part thereof, and upon shaft I journaled in the ends of said bearings the inner end of the connecting-rod J has its bearing. Connecting-rod J is provided with two parallel rods, K K', which pass through heads *f f'*, and through links or straps *g g'*, placed at opposite ends of the rod, and are firmly secured in place by means of nuts *h* and jam-nuts *i*. L are the journal-bearings of the connecting-rod, and as they become worn, by turning up the nuts *h* they are caused to bear snugly on their respective journals.

To prevent the nuts *h* from working loose, a lock-bar, *l*, may be secured to the strap *g*, between the nuts, thus necessitating the removal of said lock-bar before the bars can be adjusted.

As the bearings in the ends of the connecting-rod wear unevenly, and mainly in line with the length of the rod, the piston gradually varies in its movement, and after a time is liable to strike the central portion, or the stuffing-box placed therein, which would result in the serious derangement of the working parts of the engine.

By employing a compensating connecting-rod, of the construction shown and described, I am enabled to cast the cylinder and journal-blocks on the engine-frame, and by simply adjusting the bearings in the connecting-rod, as they become worn, always insure the desired travel of the piston.

The journal-bearings may be used for a much greater length of time, than is the case where the ordinary connecting-rod is employed.

Instead of a flat strap, *g*, I may use an oval-ended strap, *k*, and bearings having their outer faces formed of corresponding shape.



The exhaust-passage M leads from the exhaust-port *b* down through the standard B, thus dispensing with exposed exhaust-pipes, and effectually concealing the exhaust-passage from view.

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

In an engine in which the cylinder and journal-block are cast on the engine-frame, the combination of the cylinder, having the partition E, the connected pistons G G', and

the compensating connecting-rod J, removably secured between extended bearings formed on the piston G', substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WALTER J. F. LIDDELL.

Witnesses:

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C. N. G. BUTT.