

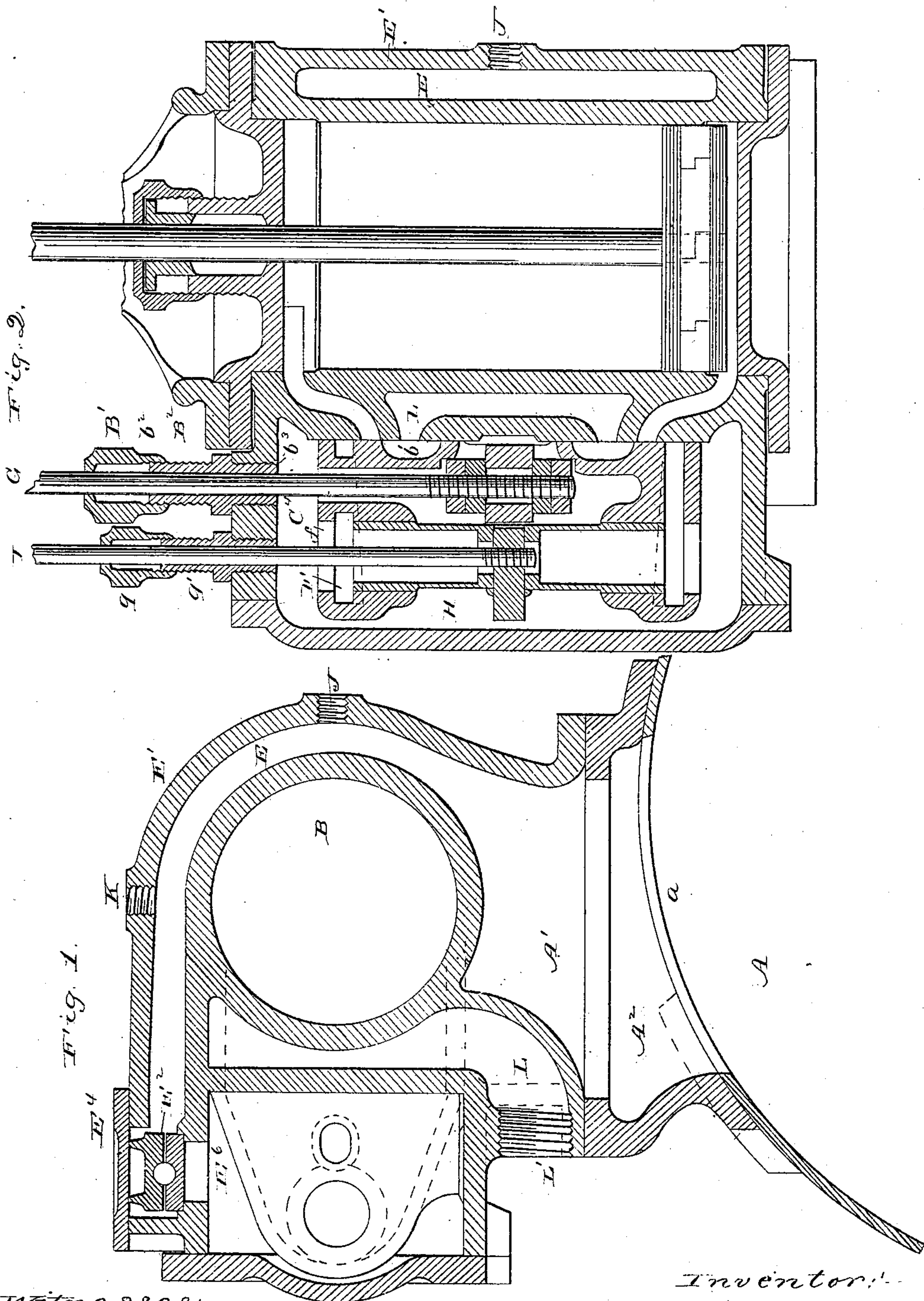
(No Model.)

3 Sheets—Sheet 1

W. A. CLARKE.  
STEAM ENGINE CYLINDER.

No. 270,875.

Patented Jan. 16, 1883.



Witnesses:

A. N. Low  
N. L. White.

Inventor:

Willard A. Clarke  
by Doubleday & Bliss  
attys.



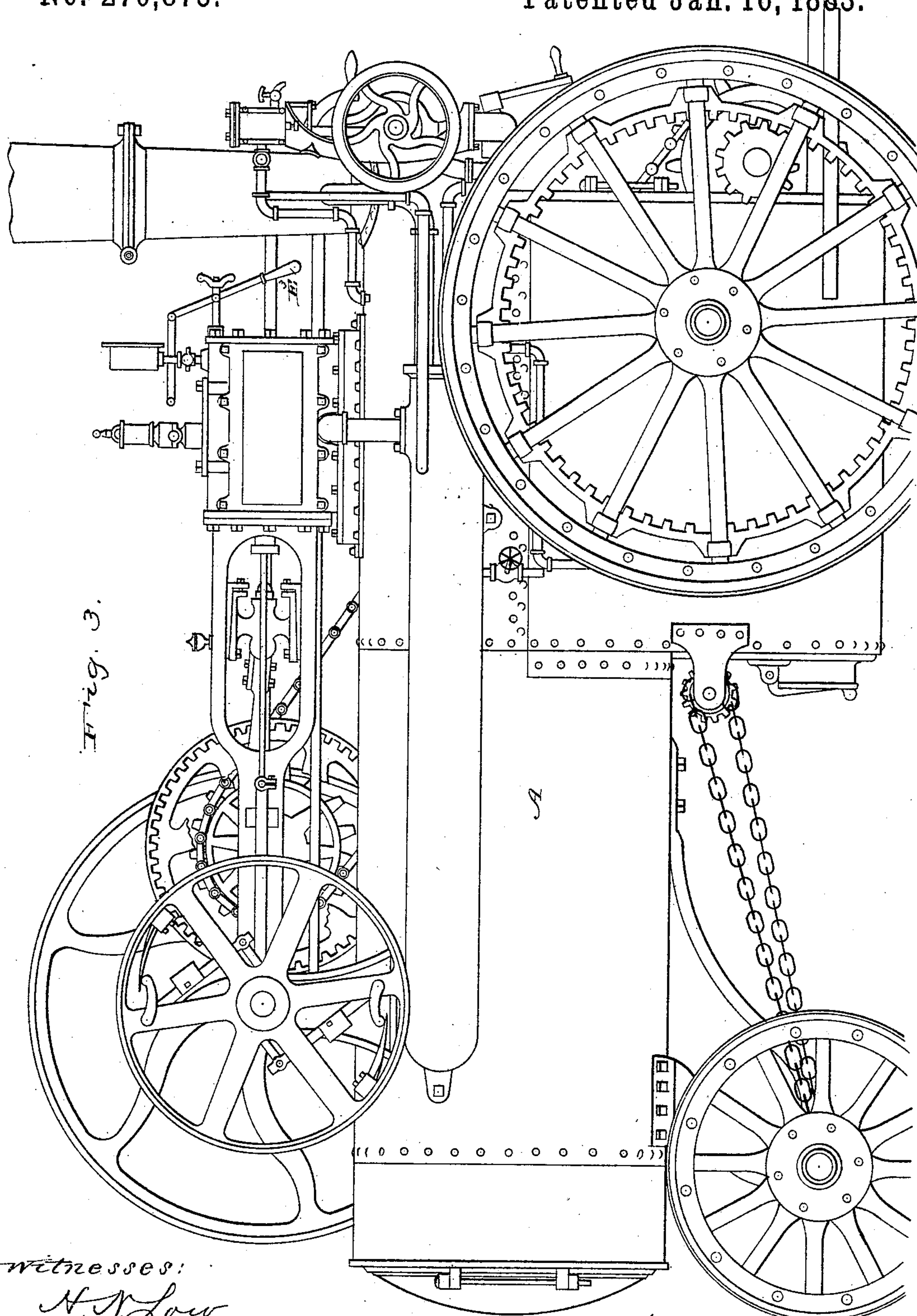
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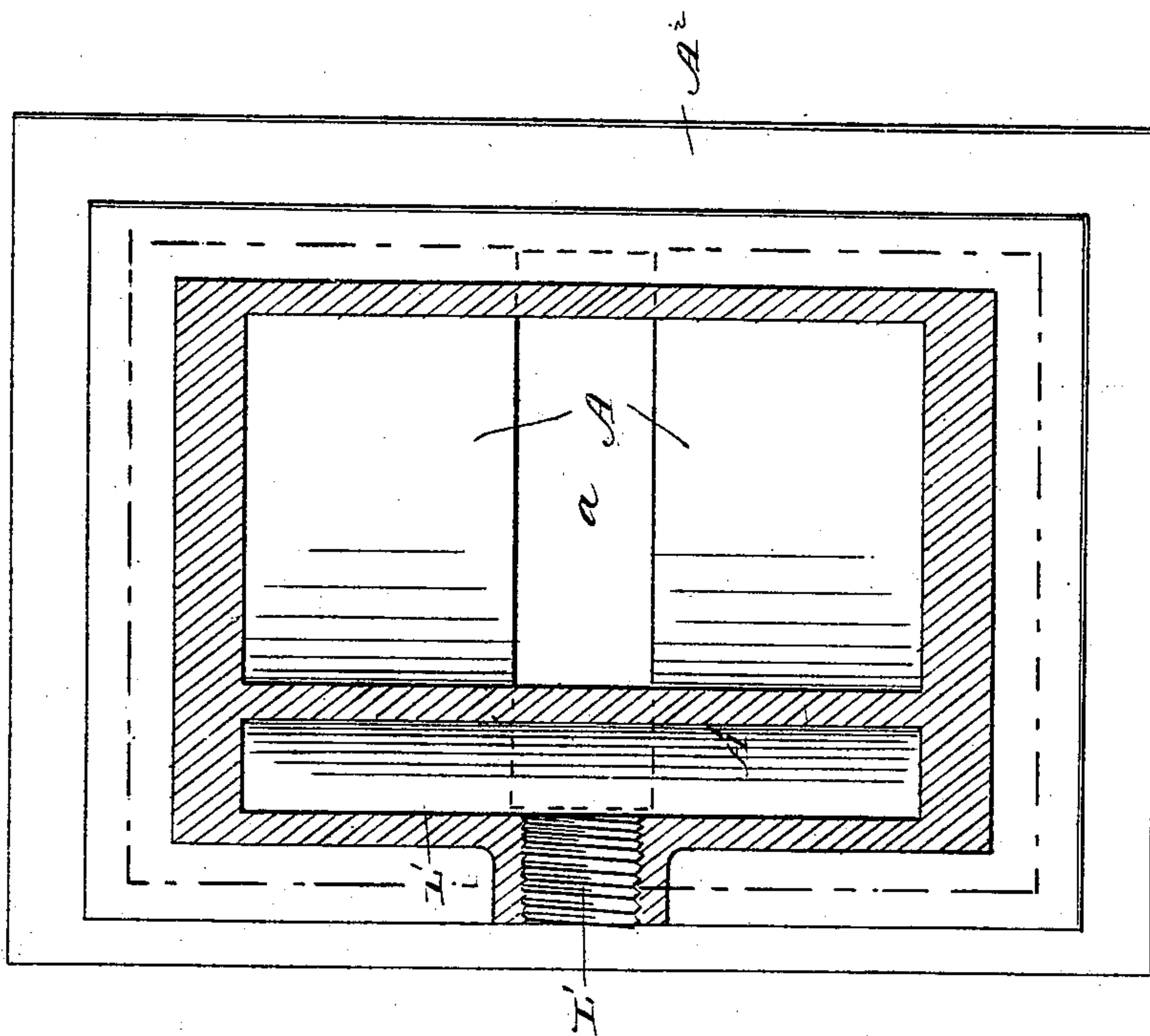
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Fig. 4.



Witnesses:

H. A. Low  
L. H. Marshall

Inventor:

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# UNITED STATES PATENT OFFICE.

WILLARD A. CLARKE, OF STILLWATER, MINN., ASSIGNOR TO THE NORTH-WESTERN MANUFACTURING AND CAR COMPANY, OF SAME PLACE.

## STEAM-ENGINE CYLINDER.

SPECIFICATION forming part of Letters Patent No. 270,875, dated January 16, 1883.

Application filed November 4, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, WILLARD A. CLARKE, a citizen of the United States, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Steam-Engine Cylinders, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a vertical section of a portion of the steam-boiler and of a cylinder constructed and arranged relatively to each other after my improved manner. Fig. 2 is a horizontal section taken centrally through Fig. 1. Fig. 3 is a side elevation of a traction or portable engine containing my improvements. Fig. 4 is a horizontal section through the exhaust-port and below the cylinder.

In the drawings, A represents the boiler proper, which, so far as the devices of this construction are concerned, may be of any preferred character. At *a* there is an orifice in the upper wall of the boiler, through which the steam passes to the steam-chest and the cylinder, it being guided thereto through a peculiarly-constructed passage-way, E. This passage-way is produced by casting the main piece of metal for the cylinder and chest with a wall or jacket, E', which is adapted to be secured firmly to the top of the boiler, and arranged to run in sufficiently close proximity to the wall of the cylinder to form the desired passage, the jacket or wall being upon the inner side of the cylinder—that is to say, upon the side over or nearest to the central longitudinal line of the boiler. It extends up to and across the top of the cylinder, and to a point directly above the steam-chest, with which it communicates by means of a valve, E<sup>2</sup>. This valve is operated by a handle, E<sup>3</sup>, projecting toward the engineer's platform. An opening is formed in the top wall or jacket, E', for the purpose of inserting and removing the valve E<sup>2</sup>. The latter is held in place by means of a cap-plate, E<sup>4</sup>, which can be bolted upon the top, as shown at Fig. 1.

The cylinder proper is supported by means of a web, A', cast with it and curved downwardly and outwardly, it being adapted to be rested upon and bolted to the box or frame A<sup>2</sup>, which in turn is fastened to the boiler. It will

be seen that the greater part of the circumference of the cylinder can, when the parts are constructed and related as described, be subjected directly to the heat of the upwardly-rising steam, and as a result the condensation of steam inside the boiler is entirely avoided. Moreover, any foam or spray that may rise through the aperture *a* and all water that may dash upward will be caught on one side or the other of the winding channel E and returned to the boiler. Thus the passage of water from the boiler to the chest or cylinder is prevented, owing to the increased distance between the water-level and the port E<sup>6</sup> into the steam-chest; and this is accomplished, it will be seen, without using the steam-drum ordinarily necessitated in portable or traction engines. The width of the jacket or outer wall, E', is substantially equal to the length of the cylinder, so that the sides of the cylinder are virtually surrounded by a jacket of steam when in operation. At J the wall E' is provided with an aperture, into which the whistle is inserted, and at K another aperture is formed for the attachment of the safety-valve, both the whistle and the valve being preferably united by screw threaded connection.

I am aware that use has been heretofore made of a steam-dome casting with three longitudinal walls to form two chambers—one for the live steam and the other to serve as a water-heater by means of the exhaust-steam—and that with it has been combined a cylinder cast in one piece with an outer jacket-wall parallel with the cylinder-wall, and cast also with three downwardly-projecting webs corresponding with the longitudinal walls of the steam-dome, and I do not claim such devices as my invention; but much difficulty has been experienced in making and using engines having parts thus constructed and arranged, as they necessitate numerous joints, which must be made perfectly steam-tight, and which come at points where great straining-pressure is exerted by the steam. When a feed-water heater is arranged within one of the chambers of the steam-dome, there is produced a much lower temperature upon one side of the central wall than upon the other, and as a result there are such variations produced by contraction and



expansion that it is impossible to preserve tight joints in the various walls. This is obviated in my construction, from the fact that I do not employ any part of the steam-dome for a water-heater, and therefore have virtually but a single chamber in the steam-dome, the exhaust-steam being conducted immediately away from these parts of the engine after leaving the cylinder. The small exhaust-chamber L is provided with an exhaust-pipe fitted into the aperture L', which pipe conducts the steam to a water-heater situated apart from the engine proper, and therefore there is no unusual cause for producing different temperatures on the opposite sides of the web or wall A'. My construction necessitates fewer joints to be brought together, the joint on the outer side being between the live-steam wall or web A' and the similar steam-wall of the lower box. Again, it has been customary in making cylinders of this general class—that is, those having a concentric jacket-wall—to carry the outer wall up around the inner side, across the top, and then downward for a considerable distance on the outer side, it being on the outer side still substantially concentric with the cylinder; and it has been further customary to take the steam from the crown part of the jacket or space thus formed through a small pipe to the steam-chest. As a result, in a structure of the kind last described, there is produced a comparatively large concave pocket or recess on the outside of the upper part of the cylinder, in which accumulates water of condensation, that interferes with keeping a uniform temperature around the cylinder. Again, by causing the steam to pass upward through a small orifice into the connecting-pipe, then along said pipe to a chamber over the chest, it (the steam) is compelled to take a winding passage, which interferes with its free and ready entrance to the cylinder. It will be seen that in my construction there is no chance for the accumulation of water in any part of the steam passage-way, for when said passage-way reaches the central vertical plane of the cylinder it is carried not downward but directly across to the top of the steam-chest, which insures that the steam shall have a perfectly free communication between the boiler and the chest, and also that any water that may rise into or be condensed in the passage-way shall be immediately returned to the boiler.

I do not herein claim any of the features relating to the cut-off valve shown, nor to any of the features other than those pertaining to the cylinder, having made the other features the subject-matter of other applications.

What I claim is—

1. The combination, with the boiler having the aperture *a*, of the cylinder B, and the steam-passage E, extending around the inner side of the cylinder from the bottom to the top on curved lines, and then extended from above

the top directly outward to points above the steam-chest, substantially as set forth.

2. In a traction or portable engine, the combination, with the cylinder, the steam-chest situated horizontally by the side of the cylinder, and the boiler provided with the aperture *a* below the cylinder, of the curved passage-way E and the port E' in the upper side of the steam-chest, substantially as set forth.

3. In a traction or portable engine, the combination, with the cylinder, and the boiler having aperture *a* directly under the cylinder, of the curved passage-way E, extending around the cylinder to the steam-chest, the valve E<sup>2</sup> for cutting said passage-way off from the steam-chest, and the plate E<sup>4</sup> bolted to the upper side above the chamber of the valve E<sup>2</sup>, substantially as set forth.

4. The combination, with the boiler having the aperture *a*, of the cylinder-casting formed with the cylinder proper, the wall E', extending around the cylinder, substantially as set forth, and provided with a screw-threaded aperture upon the inner side of the cylinder and a screw-threaded aperture above the cylinder, and a supporting-web, A', the cylinder, the web, and the wall E' being all formed in one piece of metal, substantially as set forth.

5. The combination, with the boiler having the aperture *a*, and the supporting box or frame fastened to the boiler, of the cylinder-support jointed to said frame or box upon two longitudinal lines only and two transverse lines, there being a single steam-passage between the outer longitudinal joint and the inner joint, as set forth.

6. In a steam-engine, the combination, with the boiler having the aperture *a*, and the frame or box secured to the boiler, of the cylinder-support having the inner wall, E', secured to the inner wall of the box or frame, and the wall or web A', which at the lower edge is secured to the outer wall of the box or frame, and which is curved or inclined upwardly and inwardly, and secured to the cylinder inside of the vertical plane of said outer wall of the bottom box or frame, substantially as set forth.

7. The combination, with the boiler having the aperture *a* and the supporting box or frame A', of the cylinder-casting having the cylinder proper, the inner wall, E', an outer wall provided with an orifice for the escape of the exhaust-steam, and the curved or inclined web or wall A', extending downward and outward from the cylinder, and connected with the outer vertical wall above the outer wall of the bottom support or box, substantially as set forth.

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

WILLARD A. CLARKE.

Witnesses:

L. C. PROCTOR,  
H. N. MCKUSICK.