

(No Model.)

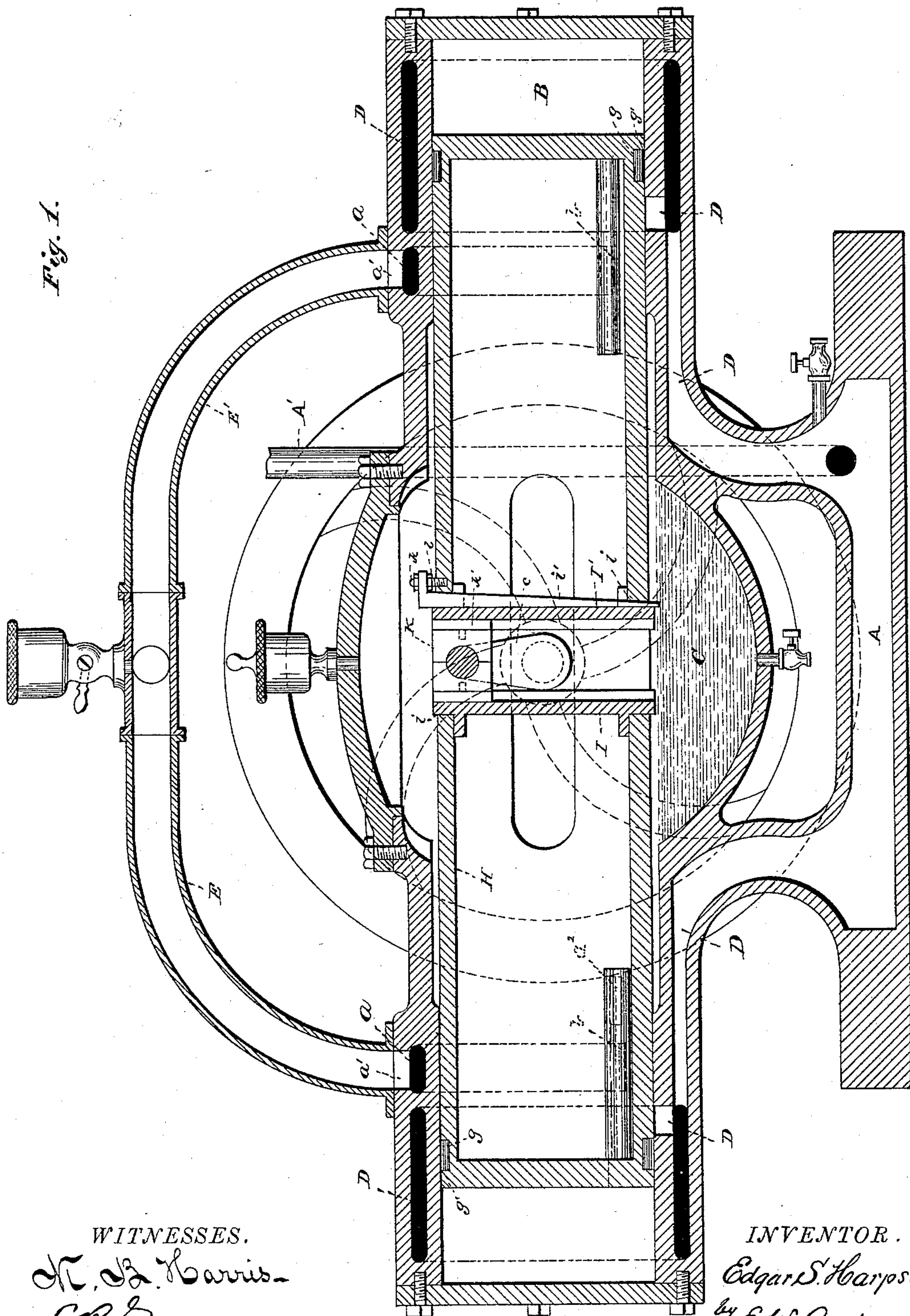
3 Sheets—Sheet 1.

E. S. HARPST.  
STEAM ENGINE.

No. 395,325.

Patented Jan. 1, 1889.

Fig. 1.



WITNESSES.

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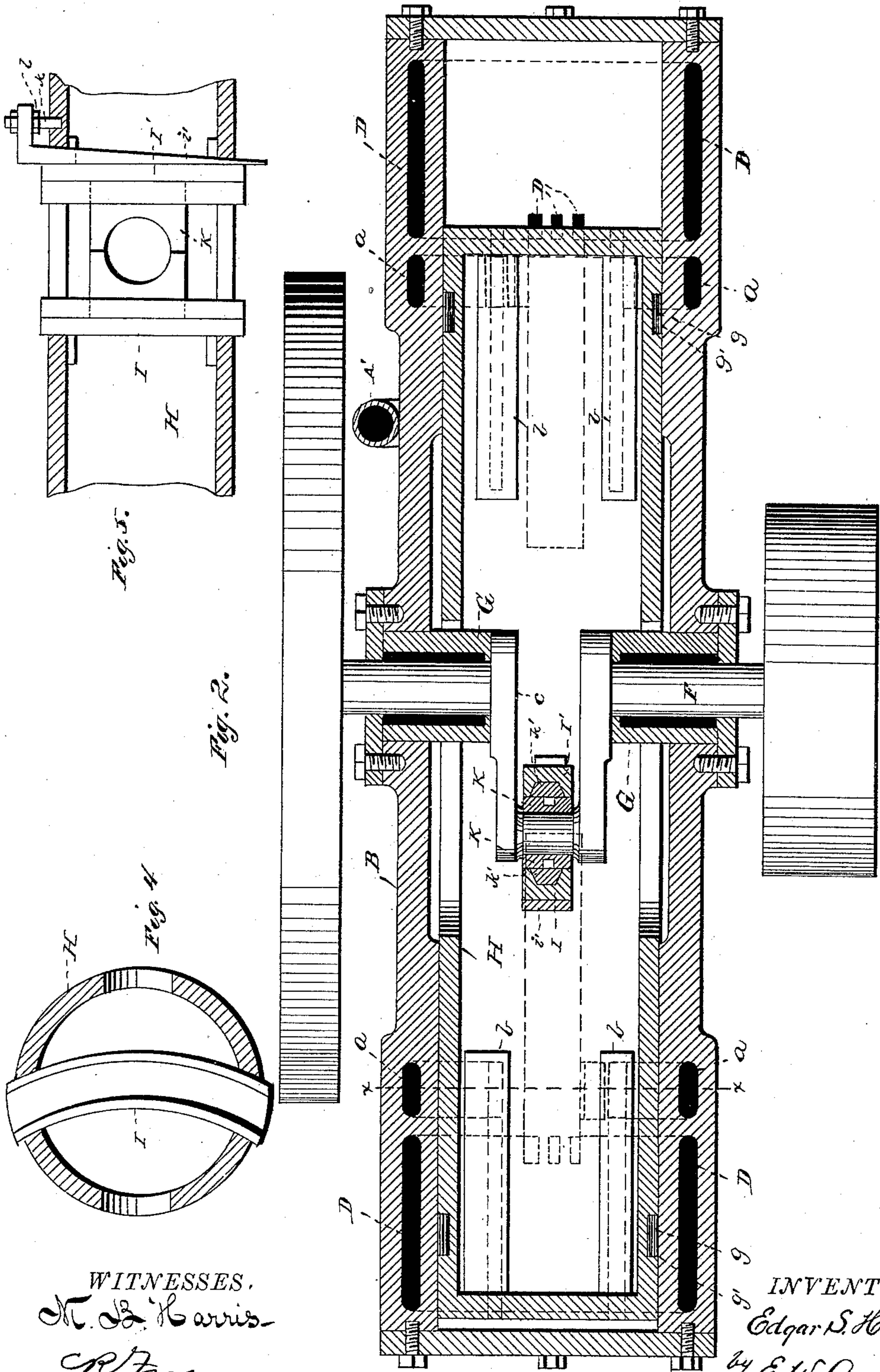
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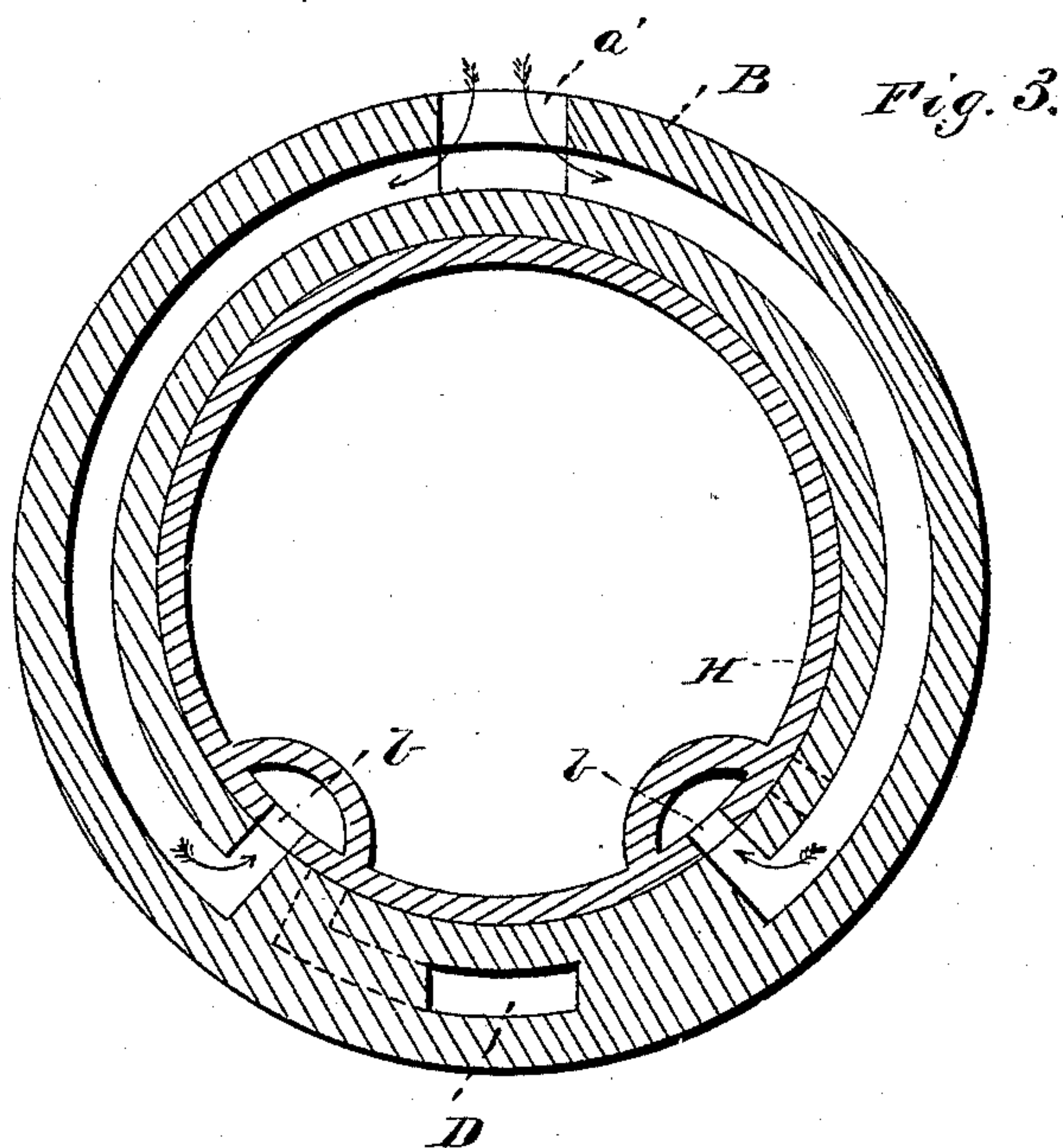
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# UNITED STATES PATENT OFFICE.

EDGAR S. HARPST, OF TYLER, TEXAS.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 395,325, dated January 1, 1889.

Application filed May 2, 1888. Serial No. 272,536. (No model.)

*To all whom it may concern:*

Be it known that I, EDGAR S. HARPST, a citizen of the United States, and a resident of Tyler, in the county of Smith and State of Texas, have invented certain new and useful Improvements in Steam Pumps and Engines; and I do 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a representation of my invention and is a vertical longitudinal section thereof. Fig. 2 is a horizontal section of the same. Fig. 3 is a transverse section of cylinder, showing steam and exhaust ports. Fig. 4 is a transverse view of piston, showing guideway; and Fig. 5 is a detail of crank-pin brasses, key, and guides.

The invention relates to improvements in steam-engines; and it consists in the construction and novel combination of parts, as hereinafter set forth.

The object of the invention is to provide a steam-engine having few parts and so constructed as to avoid the use of eccentrics, slide-valves, valve-rod, piston and connecting rods, stuffing-boxes, and glands, thus increasing the actual power by decreasing the friction.

Referring by letter to the drawings, A designates a hollow bed, and B the cylinder, preferably integral with the base, and within which the piston operates. An oil-well, C, in the bed opens into the cylinder, and when filled with oil lubricates the crank and connections during the revolution of the crank-shaft as said crank passes through the oil. Steam-ports *a* have an outward opening, *a'*, at the top of the cylinder, and extend circumferentially through the shell of the cylinder to an inward opening, *b*.

D shows the exhaust-ports arranged at the bottom of the cylinder below the longitudinal line of the steam-port openings *b*, and communicating through the hollow of the cylinder with the exhaust-pipe A'.

E E' designate the steam-pipes opening through the cylinder and registering with the ports *a'*.

F shows the main shaft, having bearings G

in the cylinder, and provided with the crank portion *c*, which turns in the middle opening of the piston. The bearings G preferably extend to the crank through the piston.

H represents the piston, which is preferably hollow and provided with opposite steam-ports, *a''*, which extend longitudinally for a short distance through the shell, and have openings *e e'*, the openings *e'* at certain times registering with the inward openings of the steam-ports in the cylinder. The piston is provided on each side of its open middle portion with diametrically-opposite longitudinal slot-openings, through which the main shaft extends, and allows the longitudinal stroke of the piston, and the said slots are sufficiently wide to allow the piston to oscillate, by means as hereinafter explained, without striking the main shaft. Annular packing-rings *g* are seated in the recess *g'* near the outer ends of the piston. The spirally-oscillating motion of the piston during its stroke is accomplished as follows:

II' designate laterally-curved ways or guides running transversely and vertically through the open middle portion of the piston at each side of the crank-pin, and having their ends resting in the rectangular bearings *i* through the piston-shell. One of said ways, I', is longitudinally beveled or inclined on one side, and a key, *i'*, having an inclined surface, is placed against the way I', as shown, and is designed to adjust the said way I' to or from the crank. The vertical adjusting movement of the key *i'* is accomplished by means of the screw *k*, which extends through an opening in the outwardly-turned end of the key and engages a threaded opening in the piston. A locking-nut, *l*, is placed on the set-screw, so as to bear against the lower side of the outwardly-turned end of the key and serves to hold said key in its adjusted position.

K designates the crank-pin brasses, having the longitudinal ribs or projections *k* preferably pivoted thereon, adapted to engage the grooved ways or guides. The object in so constructing the guideways and the crank-pin brasses is to impart a spirally-oscillating motion to the piston during its stroke in either direction, which motion alternately opens and closes the steam and exhaust ports.

I prefer to make the guides or ways of chan-



nel-iron case-hardened; but it is obvious that the said ways may be made of any suitable material. Therefore I do not limit myself to the use of channel-iron.

5 It will be observed that the steam-port openings *b* are on a different horizontal plane, and that the piston in oscillating closes the opening at one end of the cylinder and opens the port at the opposite end, and that when the  
10 piston is at the extreme limit of its stroke in either direction the exhaust-port allows the free escape of steam.

The engine herein described is equally adaptable to steam-pumps.

15 Having described my invention, what I claim is—

1. In a steam-engine, the curved guides transversely in the piston and the crank-pin  
20 brasses having projections adapted to engage said guides, substantially as specified.

2. In a steam-engine, the crank-pin brasses having the pivoted ribs thereon, the laterally-curved guideways of the piston, and the ad-  
justing-key, substantially as specified.

25 3. In a steam-engine, the combination, with the piston having the longitudinal slots, the cylinder, and the crank-shaft having bearings therein, of the laterally-curved transverse

ways having their ends seated in the rectangular bearings, the inclined adjusting-key hav- 30  
ing the downwardly-turned end, the set-screw, and the crank-pin brasses, substantially as specified.

4. In a steam-engine, the combination of the cylinder, the hollow slotted piston, the crank- 35  
shaft having the crank within the piston, and oscillating mechanism engaging the crank-pin, substantially as specified.

5. A steam-engine consisting of a cylinder, a slotted piston having transverse curved 40  
guides, and a transverse crank-shaft passing through said piston and engaging said guides, substantially as specified.

6. The combination, with a steam-cylinder and a crank-shaft extending transversely 45  
through the same, of an oscillating reciprocating piston having a curved yoke engaging the crank by a slide movement and provided with ports, substantially as specified.

In testimony whereof I affix my signature in 50  
presence of two witnesses.

EDGAR S. HARPST.

Witnesses:

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T. R. BONNER.