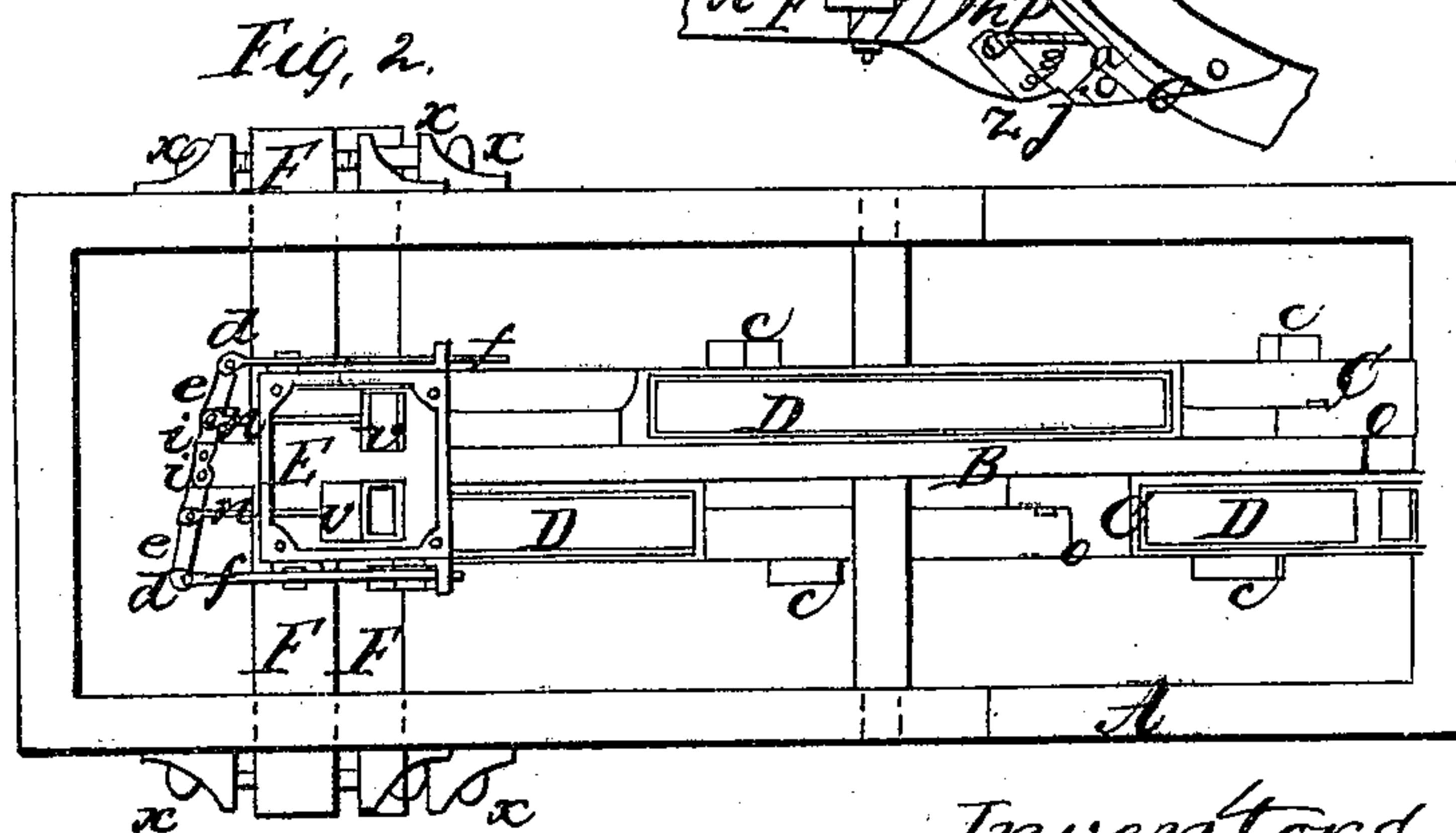
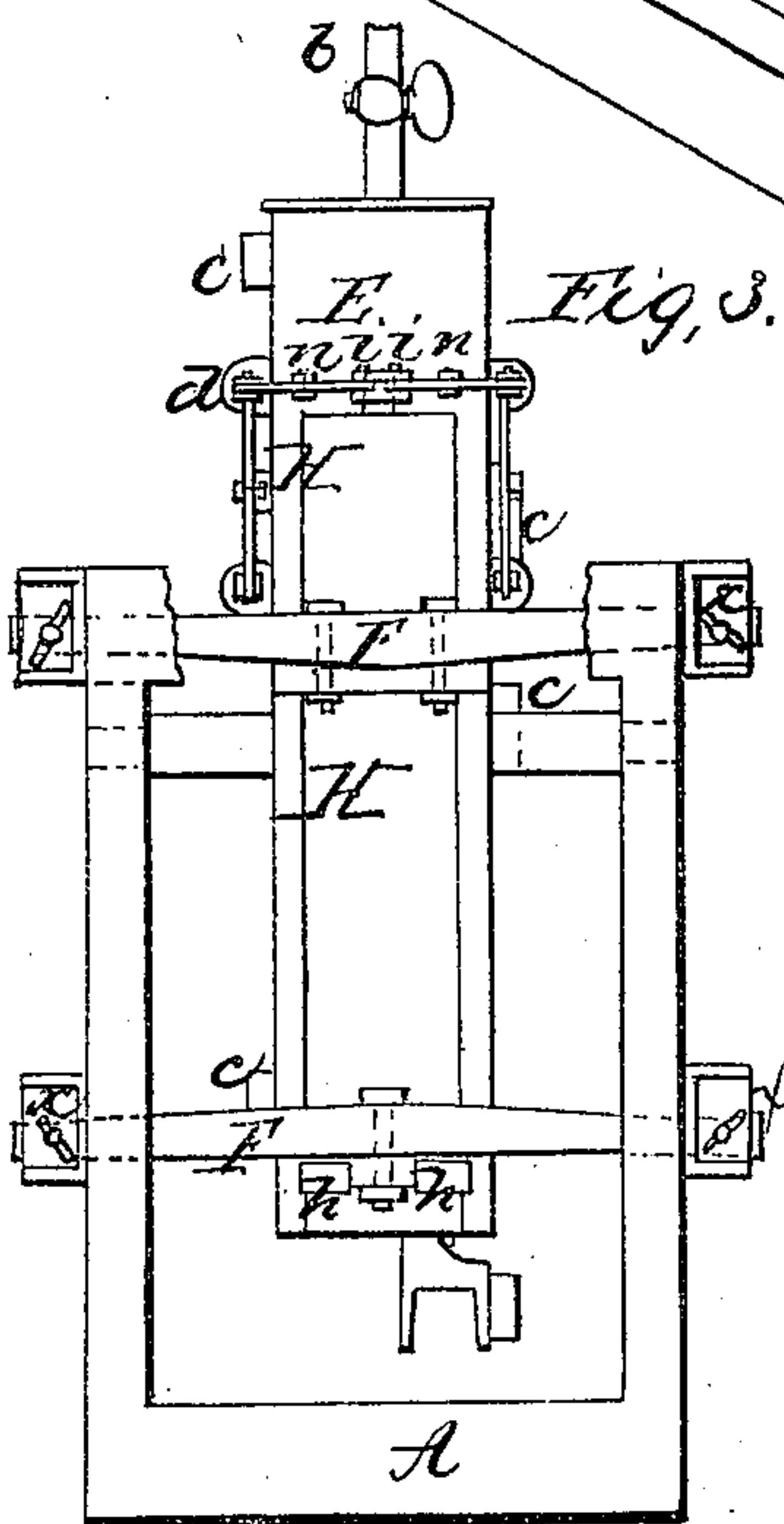
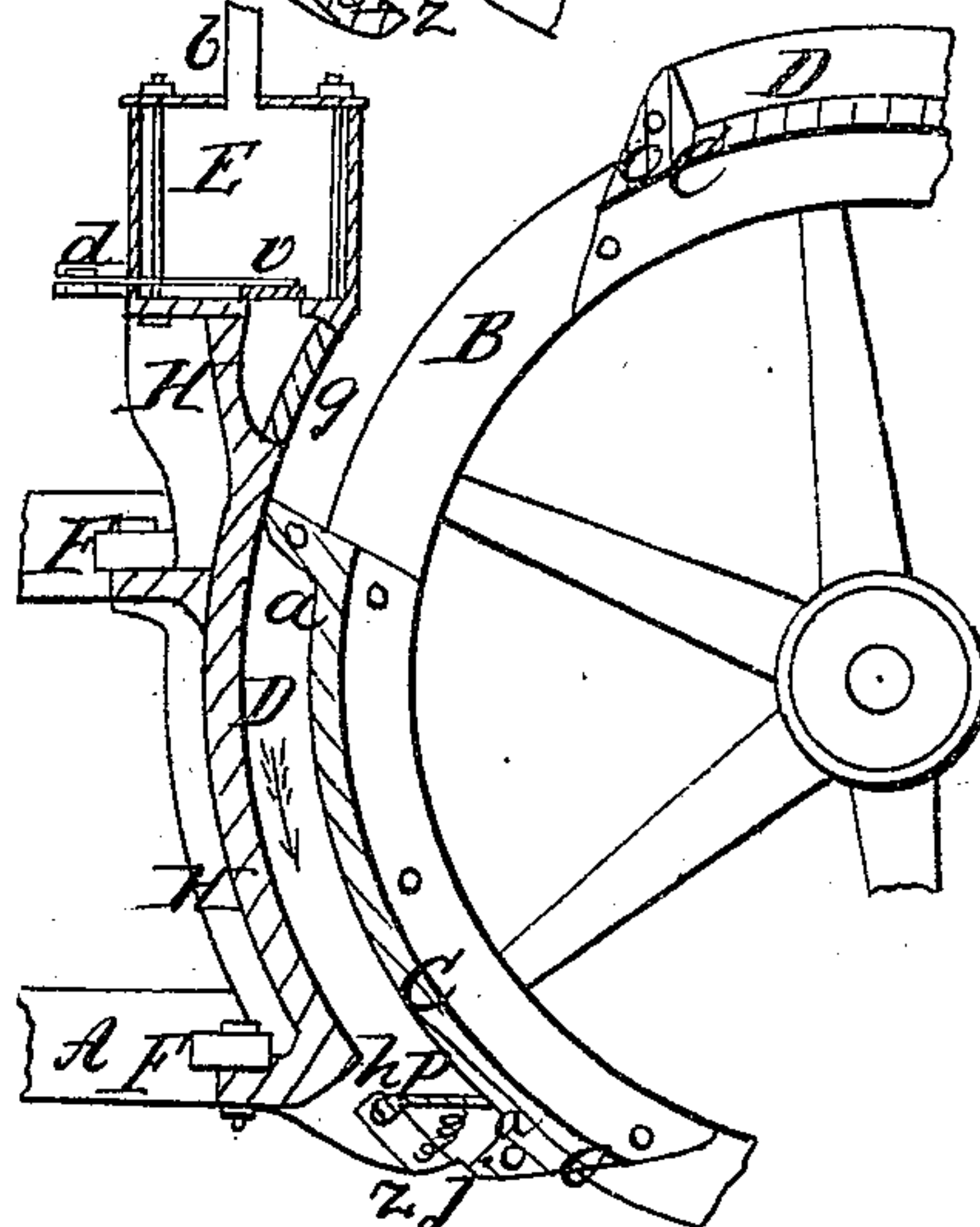
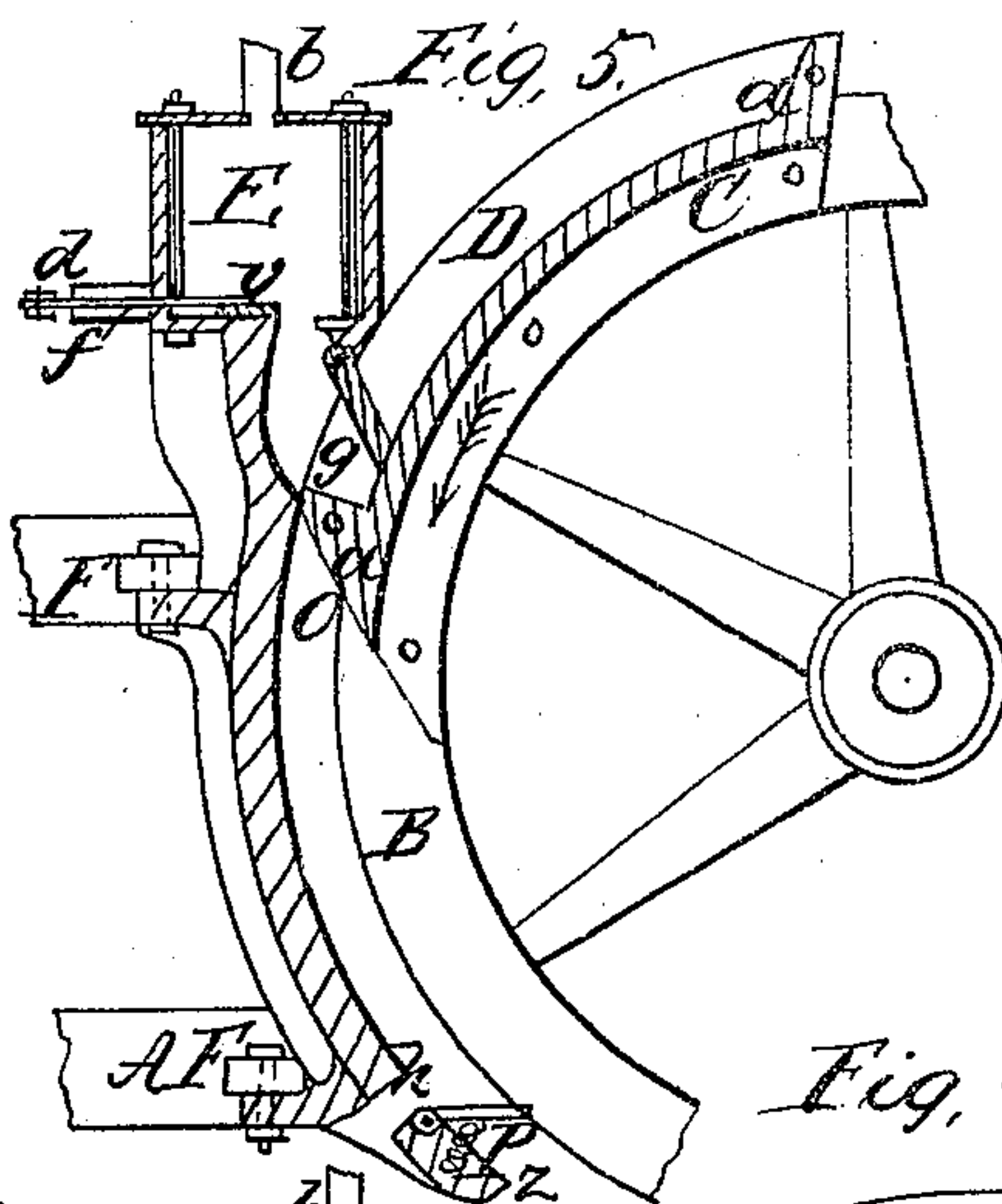
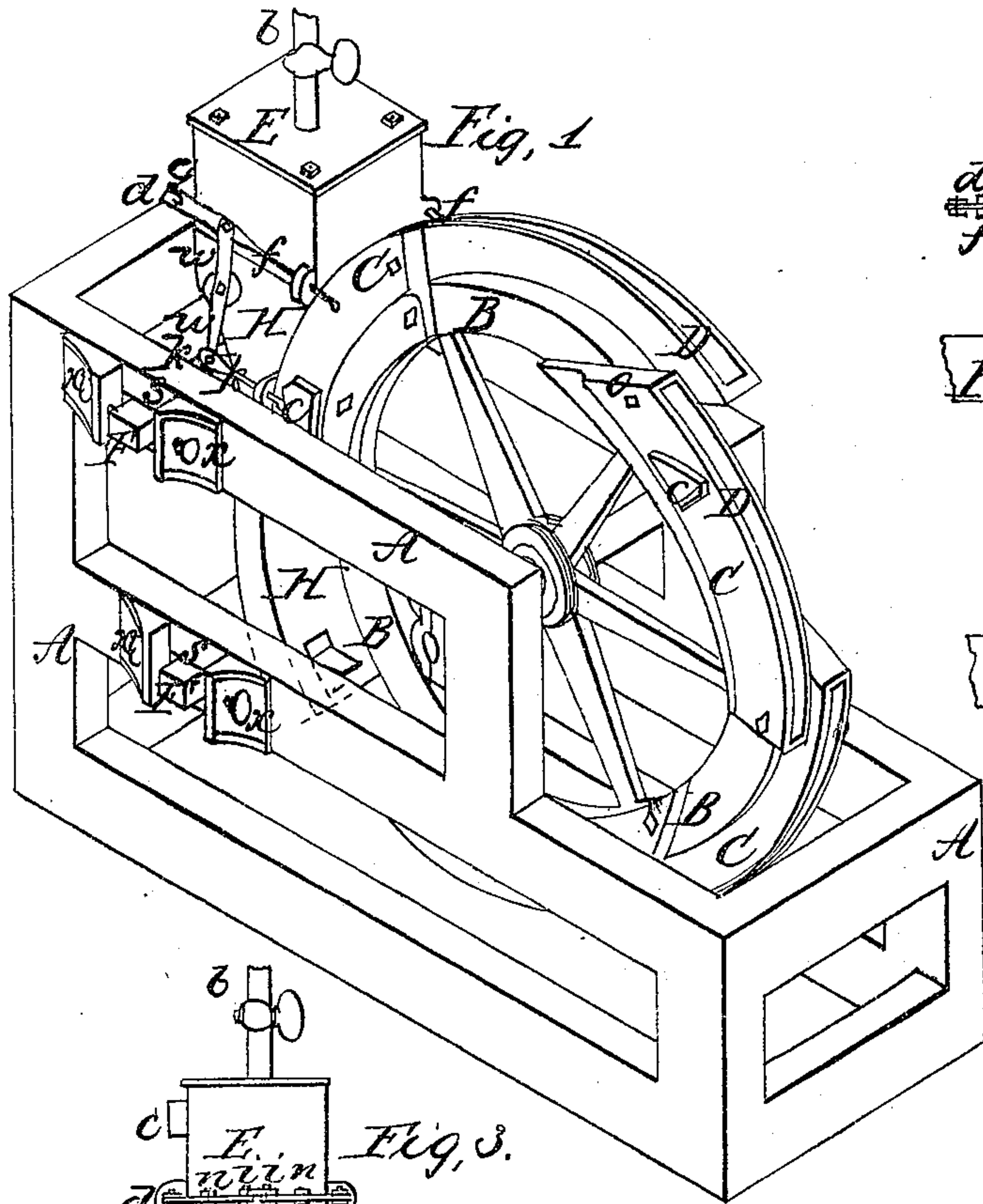


*Sumner & Youman.*

*Rotary Steam Engine.*

*N<sup>o</sup> 84,076.*

*Patented Feb. 10, 1869.*



*Witnesses,  
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W. H. Pratt*

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Levi Sumner  
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# United States Patent Office.

LEVI SUMNER AND JAMES YOUMANS, OF DAVENPORT, IOWA.

Letters Patent No. 87,076, dated February 16, 1869.

## IMPROVEMENT IN ROTARY STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, LEVI SUMNER and JAMES YOUMANS, of Davenport, in the county of Scott, and State of Iowa, have invented a new Rotary Steam-Engine; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use our invention, we will proceed to describe it.

In the accompanying drawings—

Figure 1 is a perspective view of the engine.

Figure 2 is a plan of the same, the top of steam-chest being removed to show the valves.

Figure 3 is an elevation of the rear end.

Figure 4 is a vertical section of a portion of the engine, longitudinally through the segments, steam-chest, &c., showing it when the steam is escaping.

Figure 5 is same section, but showing the segment at the time when the steam is acting.

Figure 6 is a cross-section of a segment.

The blue color represents a section-surface, and the gray, a real or natural surface.

A is the frame-work, which may be of wood, as here shown, or of iron.

B represents a wheel, to the rim of which are bolted segments C, on each side alternately, or these segments may be cast solid with the wheel B.

The segments are hollow, and open at top, as shown, forming a chamber, D, to receive the steam, said chamber being closed at each end, as shown at *a*, figs. 4 and 5.

E is the steam-chest, supplied by the pipe *b*.

The steam-chest stands upon an upright, H, which is formed in a curve, to fit against the segments C steam-tight.

This upright H is supported and held in position by bars F F, to which it is bolted, said bars resting in a slot, *s*, in the frame-work A, and adjusted to fit the wheel or segments by the set-screws *x x x*.

*f f*, in figs. 1 and 2, are sliding rods, connected, at *d*, with the bars or rods *e e*.

These bars *e e* turn on pivots *i i*, and are connected, at *n*, with the valve-rods, to move the valves *v v*.

*c c* are cams, placed on the side of the segments C, to push back the sliding rods *f*, thereby opening the valves *v*.

*h h* are openings in the upright H, to allow the steam to escape when the segment has moved to the proper point.

*g* is a valve in the upright H, and closes into the surface, as at *g*, fig. 4, but when the steam is let in behind, it swings out into the segment-chamber, as at *g*, fig. 5, which it fits, and keeps the steam from escaping in that direction.

The engine operates as follows:

When the segment C reaches the point at which the cam *c* comes in contact with the rod *f*, the rod is pushed back, opening the valve *v*, as at *v*, figs. 2 and 5.

The steam throws the swinging valve *g* outwards, and into the chamber D, which it closes, confining the steam, as at *g*, fig. 5.

This segment is therefore driven forward, in the direction of the arrow, until the cam *c* reaches another sliding rod, *k*, which is connected with the rod *f* by the vibrating bar *w*, pivoted in the middle.

At this point the cam *c* pushes back the rod *k*, which throws forward the rod *f*, and closes the valve *v*.

The steam may thus be cut off at any point desired, by placing the rod *k* at a suitable distance below rod *f*, so that the cam may reach it sooner or later, as required.

After the valve *v* is closed, the steam works expansively, still driving the wheel forward, until the chamber D reaches the open hole *h*, when it escapes.

To cause the steam to pass out through the holes *h* into the escape-pipe, (not shown,) and to prevent it from passing out of the chamber into the open air at *j*, the spring-valve *p* is placed as shown.

The inclined plane *o*, at forward end of segment, presses down the valve *p* in passing, when it is immediately thrown back into the chamber, and held there by the resistance of the spring *z*.

The segments are so placed on the opposite sides of the rim B, alternately, that before the steam escapes and pressure ceases on one side, the steam is admitted on the other, and the power is thus applied continually.

For the purpose of reversing the motion, instead of doing it by gearing, in the usual manner, we propose to place another upright and steam-chest at the opposite end of the machine, that is, one at each end, and, with a suitable adjustment of the valves and rods, the motion will be reversed by merely changing the steam from one end of the machine to the other.

Having thus described our invention,

What we claim, is—

1. A steam-engine, consisting of a series of segmental chambers, D, mounted upon a rotary axis, and having the segmental plate H, with the valves *g* and *p*, arranged to operate in connection therewith, substantially as described.

2. The arrangement of the valves *v* with the rods *n*, *e*, *f*, *w*, and *k*, in combination with the actuating-cams *c*, substantially as shown and described.

LEVI SUMNER.  
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Witnesses:

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