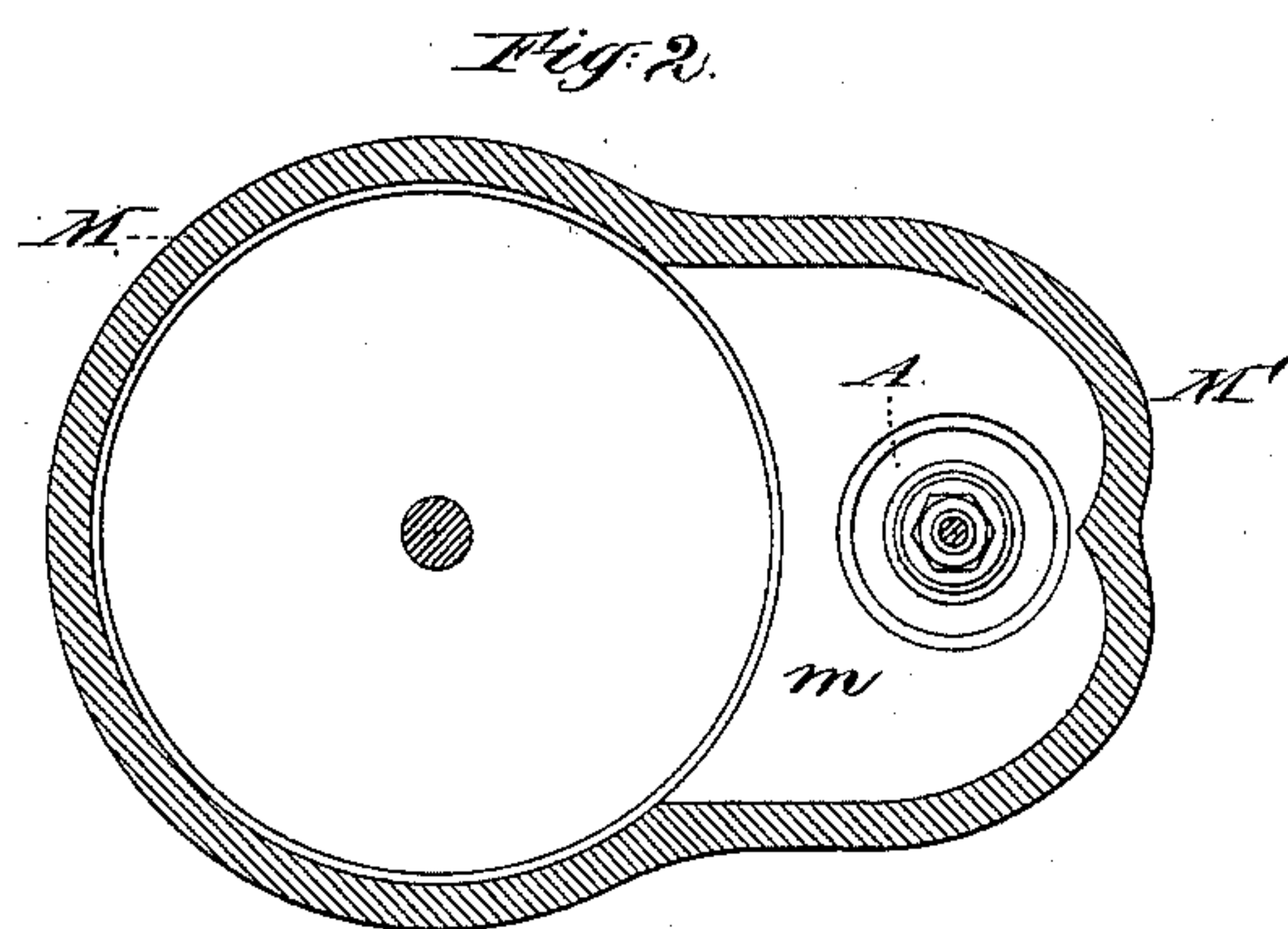
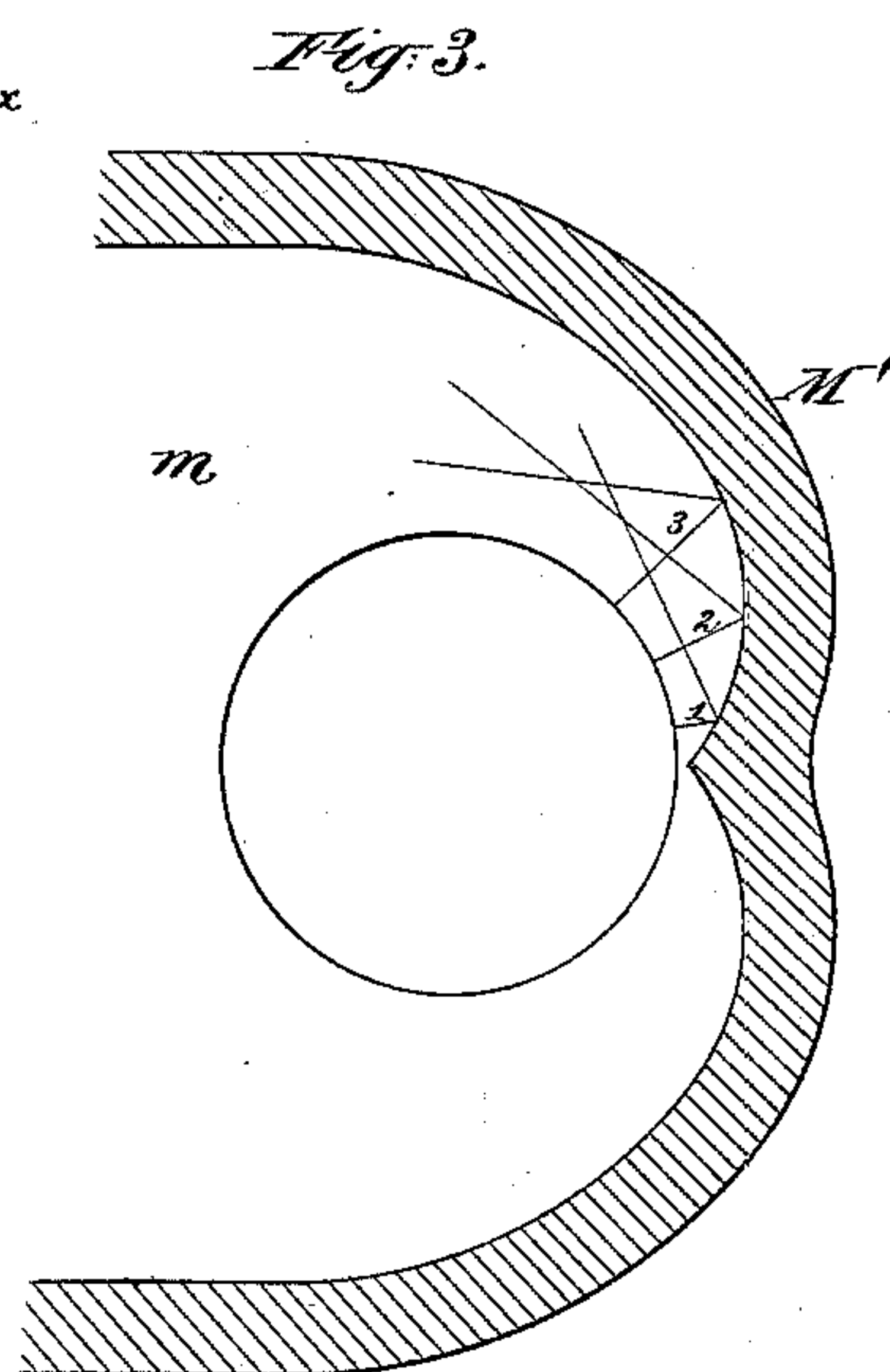
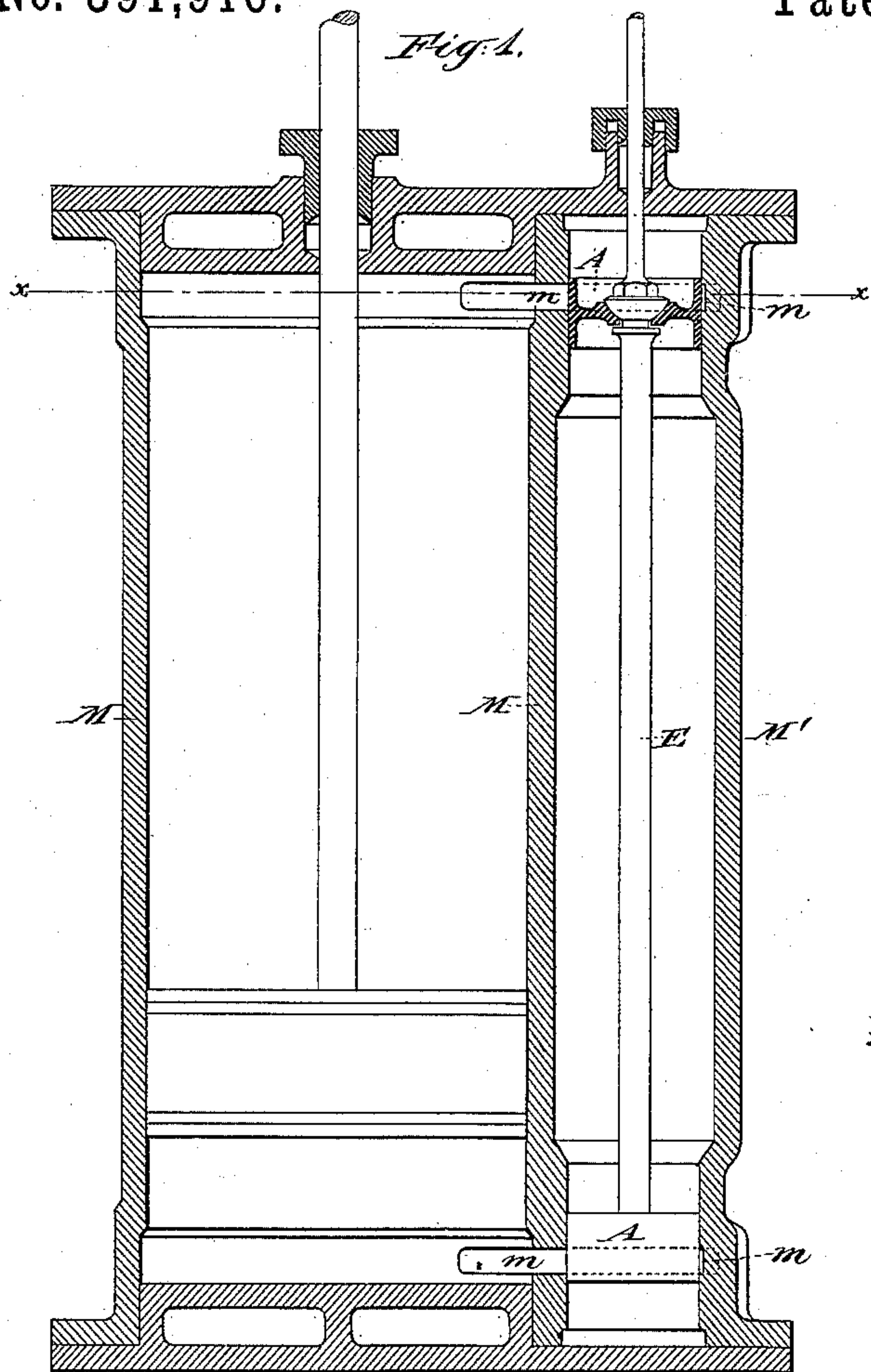


(No Model.)

C. T. PORTER.  
STEAM ENGINE.

No. 391,916.

Patented Oct. 30, 1888.



Witnesses:

Charles R. Searle,  
H. A. Johnstone.

Inventor:

Charles T. Porter.  
by his attorney  
Thomas Drew Stetson.



# UNITED STATES PATENT OFFICE.

CHARLES T. PORTER, OF SCHENECTADY, NEW YORK.

## STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 391,916, dated October 30, 1888.

Application filed October 13, 1887. Serial No. 252,201. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES T. PORTER, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement relating to Steam-Engines, of which the following is a specification.

My improvement is intended for use with what are known as "piston-valves." I will describe it as applied to the form of piston-valves set forth in the patent to me dated August 16, 1887, No. 368,422; but it may apply to other styles of piston-valves. I have devised a novel form of ports for use with such valves. The form reduces the amount of space in the valve-passages, and thus by well-known laws economizes the effect of the steam. Instead of obstructing the movement of the steam, the new form of port promotes it. The metal surfaces guide the current of steam continuously and smoothly to and from the valve, avoiding the concussions and regurgitations which the ordinary form involves. A piston-valve should be worked as near the main cylinder as is practicable. That side of the valve presented toward the main cylinder finds, of course, a liberal area of port communicating with the cylinder and delivers and receives steam directly. My invention has no effect on that side. The other side of the piston-valve—that farthest from the cylinder—in order to be of any effect, requires that the port shall be extended around. It is common to do so. I have in my said patent of August, 1887, shown the port as thus extended around but contracted in breadth on the side opposite to the cylinder. Still, everywhere the port in my said patent presents a surface nearly at right angles to the radial movement of the steam as it moves outward from the piston-valve in the induction of steam into the cylinder, or inward into the same valve in exhausting from the cylinder.

My present improvement is carried out by giving a wedge-shaped form to the metal surface exterior to the port on the side opposite to the cylinder. Preferably the angle of the wedge lies a little outside of the periphery of the valve. I will represent it as thus carried out; but there may be a little license in this regard—that is to say, the apex of the wedge

may coincide exactly with the periphery of the piston-valve, or not, as is preferred.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention as applied to an upright engine.

Figure 1 is a central vertical section through the main cylinder, valve-chest, and ports. Fig. 2 is a cross section on the line  $x x$  in Fig. 1; and Fig. 3 is a cross-section through a portion on a larger scale, showing by lines the manner in which the steam is reflected or deflected by the metal which forms the exterior surface of the port.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A A are the piston-valves working in corresponding cylindrical valve-seats and connected by a valve stem, E. The metal of the cylinder and valve-chest is marked M, an additional mark, M', being applied to designate that portion of the valve-chest farthest from the cylinder. The ports are marked  $m$ . It is usual to make these ports nearly concentric to the valve-chest, thus presenting the inner surfaces, so as to reflect the steam backward upon itself and greatly retard its flow. The steam issuing into the port radially all around, it follows that at the back it issues in a direction opposite to that in which it must go to reach the cylinder. If, as usual, the back of the port is a surface concentric with the valve, or nearly so, the steam is reflected straight back where it came from. The port is thus choked, so that considerable of this part of a piston-valve is of but little use for the admission and discharge of the steam. My form, on the contrary, causes the steam to be reflected, so as not to choke the issuing steam in the least. This reflection is shown at three points, 1 2 3. The angle of reflection is equal to the angle of incidence. The line of incidence is the radial line. The line of reflection is determined in this way: the angle included between these two lines is bisected by a line perpendicular to the surface at that point. This form of the ports adds materially to the efficiency of the piston-valve.

Although I have described the invention as applied to steam-engines, it will be understood

that it may apply to engines worked by air or other gases or fluids.

I claim as my invention—

In an engine having a piston valve or valves  
5 and a corresponding cylindrical valve-seat,  
the ports *m*, formed, as shown, so as to present the angle of a wedge toward the valve,  
and adapted to divide the current of steam  
while keeping the whole circumference of the  
10 valve unobstructed, as herein specified.

In testimony whereof I have hereunto set my hand, at Schenectady, this 3d day of October, 1887, in the presence of two subscribing witnesses.

CHAS. T. PORTER.

Witnesses:

SAMUEL INSULL,  
B. M. TATE.