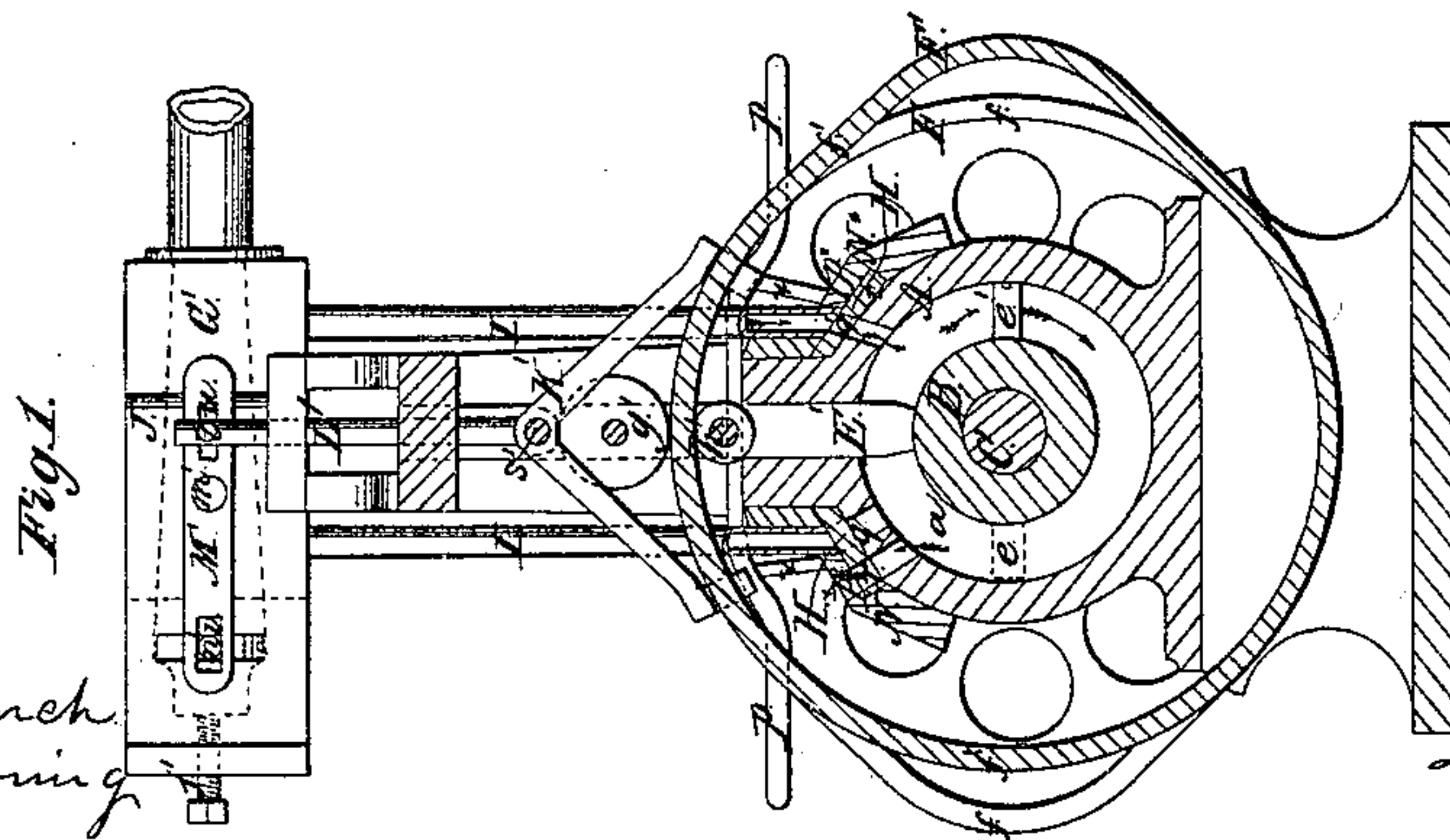
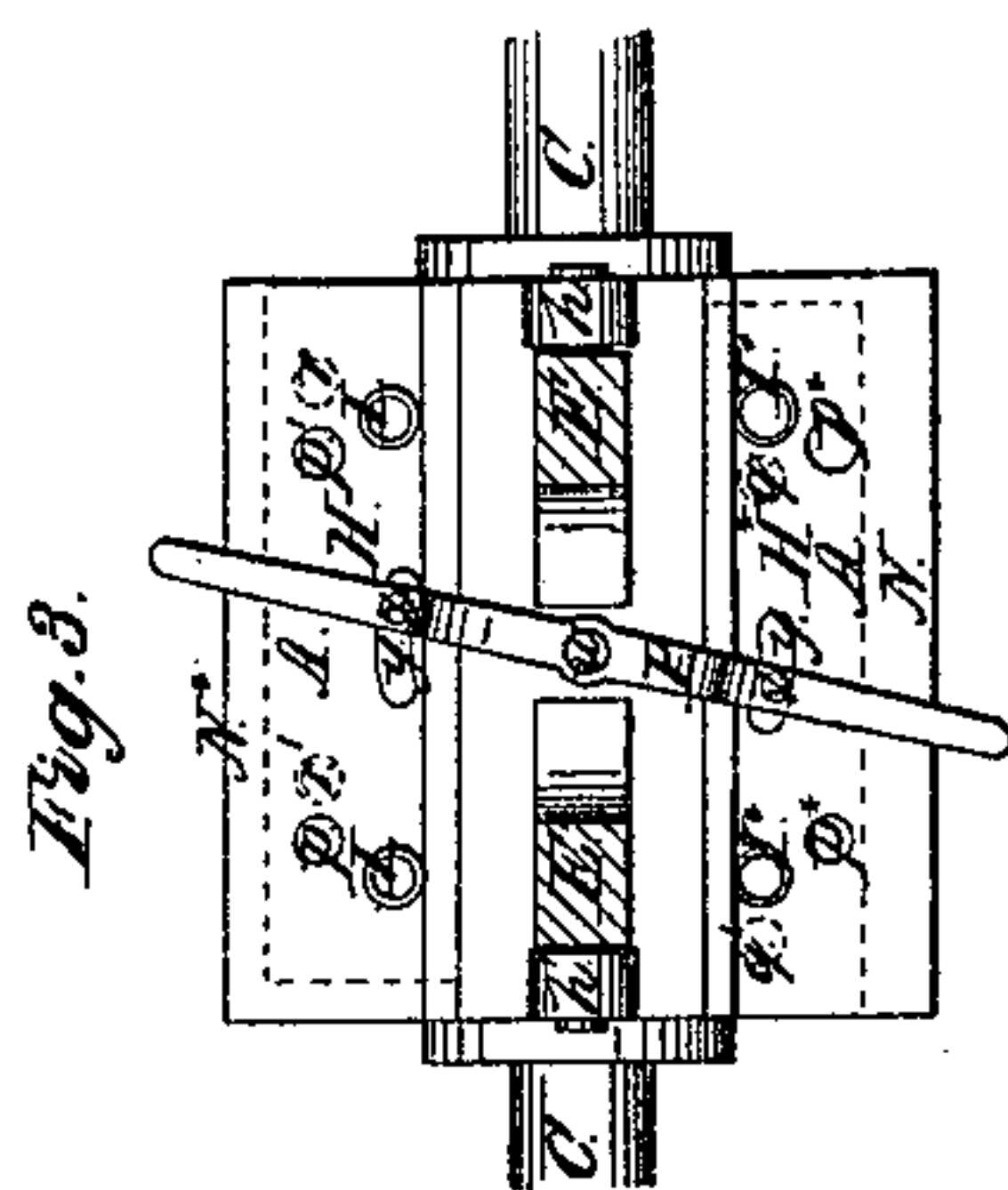
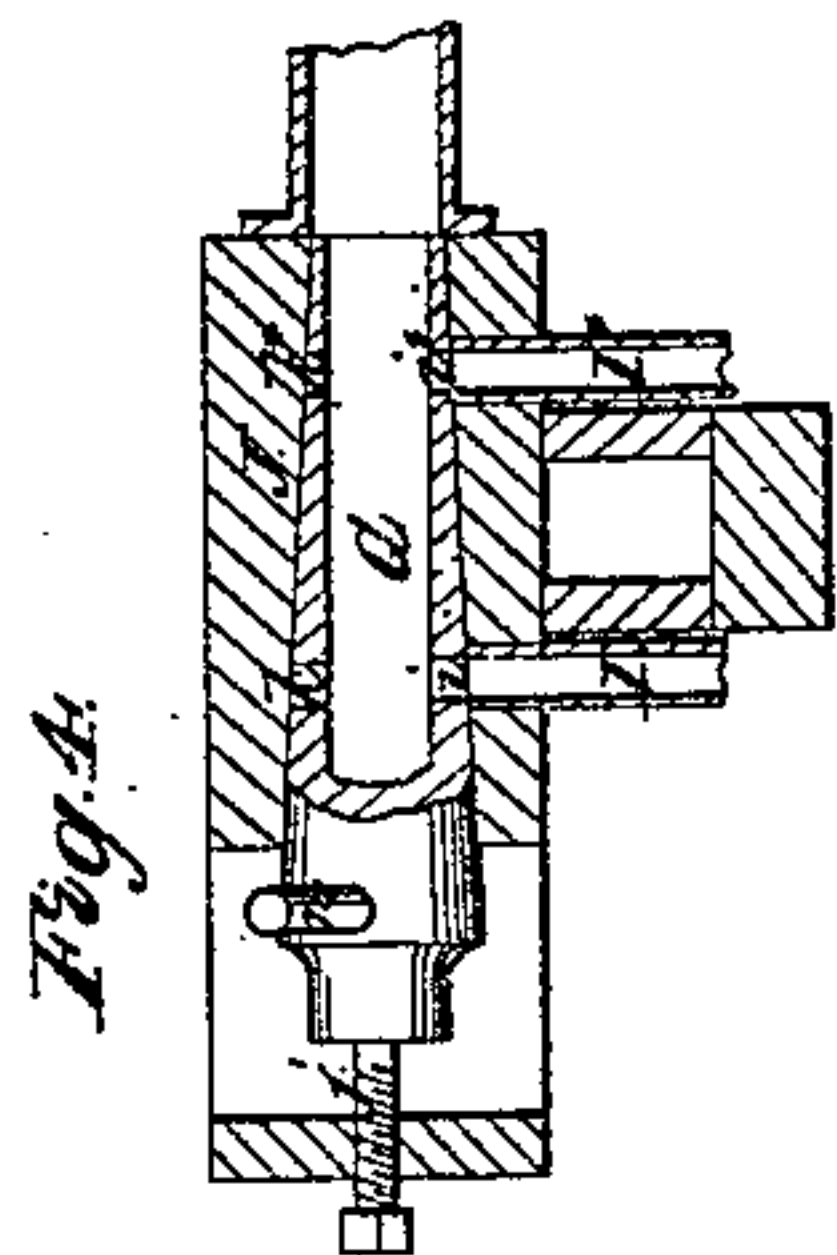
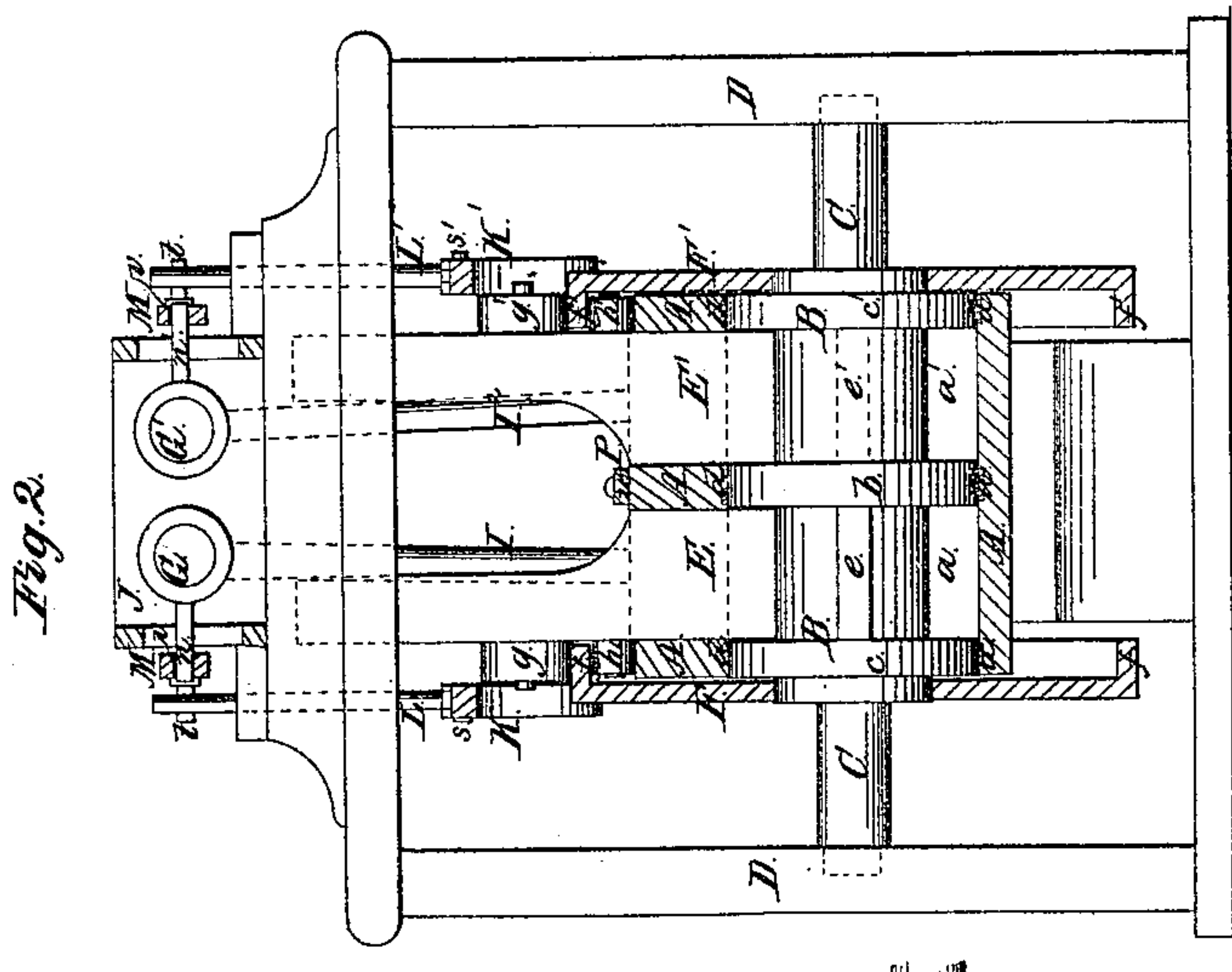


L. JOHNSON  
ROTARY STEAM ENGINE.

No. 26,190.

Patented Nov. 22, 1859.



Witnesses.

Henry A French  
Thomas W Loring

Inventor.

Luther Johnson



# UNITED STATES PATENT OFFICE.

LUTHER JOHNSON, OF GRAND LEDGE, MICHIGAN.

## ROTARY STEAM-ENGINE.

Specification of Letters Patent No. 26,190, dated November 22, 1859.

*To all whom it may concern:*

Be it known that I, LUTHER JOHNSON, of Grand Ledge, in the county of Eaton and State of Michigan, have invented a new and useful Improvement in Rotary Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of an engine with my improvements, taken in a plane parallel with the plane of revolution close to one of the cylinder heads. Fig. 2 is a vertical section of the same in a line parallel with the axis of revolution, showing some of the parts in section. Fig. 3 exhibits a top view of the cylinder, and exhibits the abutments in section. Fig. 4 exhibits a longitudinal view of one of the cut-off valves and the box partly in section.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists, firstly, in the employment, in combination with a sliding abutment, fitted to the outer stationary cylinder of an inner revolving cylinder having a concentric groove or channel closed permanently in one place by a piston extending all across it, substantially as hereinafter described; secondly, in a novel system of cams and connections for operating the sliding abutments and the cut-off valves of a rotary steam engine; and thirdly, in a novel arrangement of reversing valves for changing the direction of the engine.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A is the stationary cylinder, made without any heads.

B, is the rotary cylinder formed with two concentric channels *a*, and *a'*, and having the peripheries of the flanges *b*, *c*, *c'*, which are left between and on the outer sides of the said channels, fitted steam-tight to the outer cylinder in which there are formed grooves to receive packing rings *d*, *d*, *d*, which preserve a steam-tight condition between the inner and outer cylinders. The rotating cylinder B, is furnished with a concentric shaft C, which works in bearings in two standards D, D. Between the flanges *b*, *c*, there is a piston *e*, and between the flanges *b'*, and *c'*, there is another piston *e'*, both radial to the shaft, and each extending

all across and entirely closing its respective channels, and these pistons should be placed where they come in contact with the interior peripheral surface of the stationary cylinder A. The said pistons are arranged on opposite sides of the cylinder, or at 180 degrees to each other.

E, E', are two sliding abutments arranged side by side, and fitted to slide in to, and out from the stationary cylinder A, and suitably packed to fit the sides and bottoms of the channels *a*, *a'*, one to each of the said channels. These abutments are withdrawn from the channels to allow the pistons to pass them, and forced in again after the pistons have passed them, by means of two cams F, F', one for each, said cams having laterally projecting rims *f*, *f'*, which work between pairs of antifriction rollers *g*, *h*, and *g'*, *h'*, which are attached to the abutments, the same cams serving also to operate the cut-off valves G, G', which are arranged in a valve-chest J, above the cylinder. These cams draw out the two abutments alternately at regular intervals.

The cut-off valves G, G', are of the hollow conical plug or cock kind, and one is used for each of the steam channels *a*, *a'*, of the engine. From the seat of each of these valves two steam-pipes I, and I\*, lead to its respective steam channel *a*, or *a'*, for the induction of steam thereinto, one pipe on each side of the abutment, but one or other of the said pipes belonging to each channel is always closed by one of the two reversing slide-valves H, H\*, (Figs. 1 and 3) which will be presently described, and hence steam is only admitted on one side of the abutments. The cut-off valves have each two openings *i*, *i'*, (Fig. 4) one to communicate with each of its respective steam-pipes I, I\*, and the said valves receive steam to their interior either from separate pipes or from a single pipe covering both their open ends. The said valves are adjusted in their seats to work steam-tight, but yet with proper freedom, by means of set-screws *j*, *j*, applied at their closed ends. The pressure of steam against the interior of the closed ends keeps the valves bearing against the set-screws.

In order that the valves may be perfectly balanced, each has two openings *k*, *k'*, provided in it opposite to the openings *i*, *i'*. These cut-off valves are to shut off the steam from their respective channels before and



during the drawing out and replacing of the abutments, and they are operated by the cams F, F', through the agency of two yokes K, K', two rods L, L', and two levers M, M', the said yokes having their extremities grooved to fit the laterally projecting rims  $f, f'$ , of the cams on opposite sides of where the said rims are received between their respective rollers  $g, h$ , or  $g', h'$ , and being connected by joint pins  $s, s'$ , with the lower ends of the rods L, L', and the said rods working vertically through guides in the framing and connecting by slot and pin connections  $t$ , with the levers M, M', and the said levers working on fixed fulcra  $m, m'$ , secured in opposite sides of the steam chest and connecting by slots  $v, v'$ , with arms  $n, n'$ , with which their respective valves are furnished, one yoke, rod and lever being used for each valve.

The reversing slide-valves H, H\*, are arranged to slide longitudinally to the cylinder in suitable cavities provided to receive them outside of the cylinder, and are covered by bonnets N, N\*, to which the induction pipes I, I, and I\*, I\*, are connected and to which the eduction pipes also are intended to be connected. The eduction pipes are not, however, shown in the drawing, but only the openings  $p, p^*$ , where they are applied. The slide valves H, H\*, have each four openings  $q, q', r, r'$ , viz: two  $q, q'$ , for the induction of steam, and two  $r, r'$ , for eduction, the said openings being so arranged relatively to each other that by a longitudinal movement of either valve its two induction openings may be brought opposite to its respective pipes I, I, or I\*, I\*, and its eduction openings at the same time opposite to its respective eduction pipes or orifices  $p, p$ , or  $p^*, p^*$ . Each of the said valves is furnished with a pin  $x$ , which works through a slot  $y$ , in its respective bonnet, and serves to connect it with a hand-lever P, which is arranged to work on a fixed fulcrum  $w$ , on the top of the cylinder, and the said valves are so arranged relatively to each other in their connection with this lever that when the orifices  $q, q$ , of one of said valves are opposite the induction pipes on one side of the abutment, the orifices  $r, r$ , of the other one are opposite the eduction openings  $p, p$ , or  $p^*, p^*$ , on the

other side of the abutments, or vice versa, so that when steam is being admitted to the two channels  $a, a$ , on one side of the abutments it is exhausting from them on the opposite side of the abutments. By the shifting of the lever P, the two valves are operated simultaneously to reverse the condition of the openings of the valves and thus reverse the direction of the operation of the engine, whose inner cylinder is caused to rotate in the direction of the black arrow shown in Fig. 1, when steam is admitted by the pipes I\*, I\*, and allowed to exhaust by the openings  $p, p$ , as indicated by the red arrows in the same figure, and to rotate in the opposite direction when steam is admitted by the pipes I, I, and allowed to exhaust through  $p^*, p^*$ .

I do not claim broadly forming three sides of the steam way of a rotary engine by making a groove or channel in the revolving inner cylinder. Neither do I claim separately either the operation of the abutments or of the cut-off valves of rotary engines by means of cams applied outside of the cylinder; but

What I claim as my invention, and desire to secure by Letters Patent, is:—

1. The employment in combination with a sliding abutment, fitted to the outer stationary cylinder of an inner revolving cylinder having a concentric groove or channel closed permanently in one place by a piston extending all across it substantially as herein described.

2. Operating the abutments E E', and the cut-off valves G G', by means of the same cams F F', through the agency of rollers  $g, h, g', h'$ , or their equivalents applied to the abutments and yokes K, K', rods L, L', and levers M, M', and arms  $n, n'$ , applied to the cut-off valves, the whole arranged and operating substantially as herein described.

3. The two sliding reversing valves applied in combination with the two sets of steam pipes in relation to the abutments, and operated simultaneously by a single lever substantially as herein described.

LUTHER JOHNSON.

Witnesses:

THOMAS W. LORING,  
ISAAC R. WALDO.