

No. 762,646.

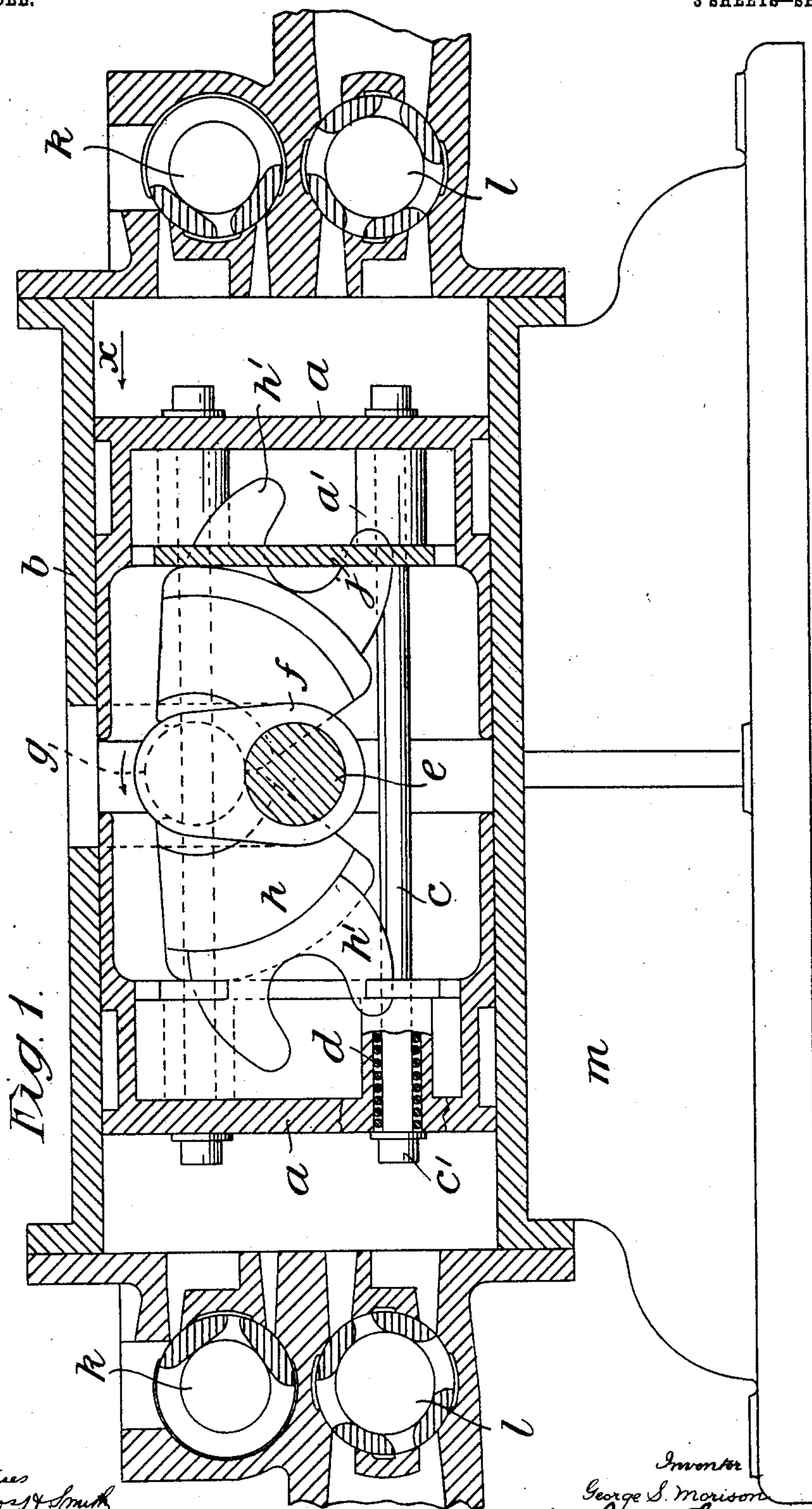
PATENTED JUNE 14, 1904.

G. S. MORISON.
STEAM ENGINE.

APPLICATION FILED MAY 13, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
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J. Staib

Inventor
George S. Morison
per Harold Ensell

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3 SHEETS—SHEET 2.

Fig. 4.

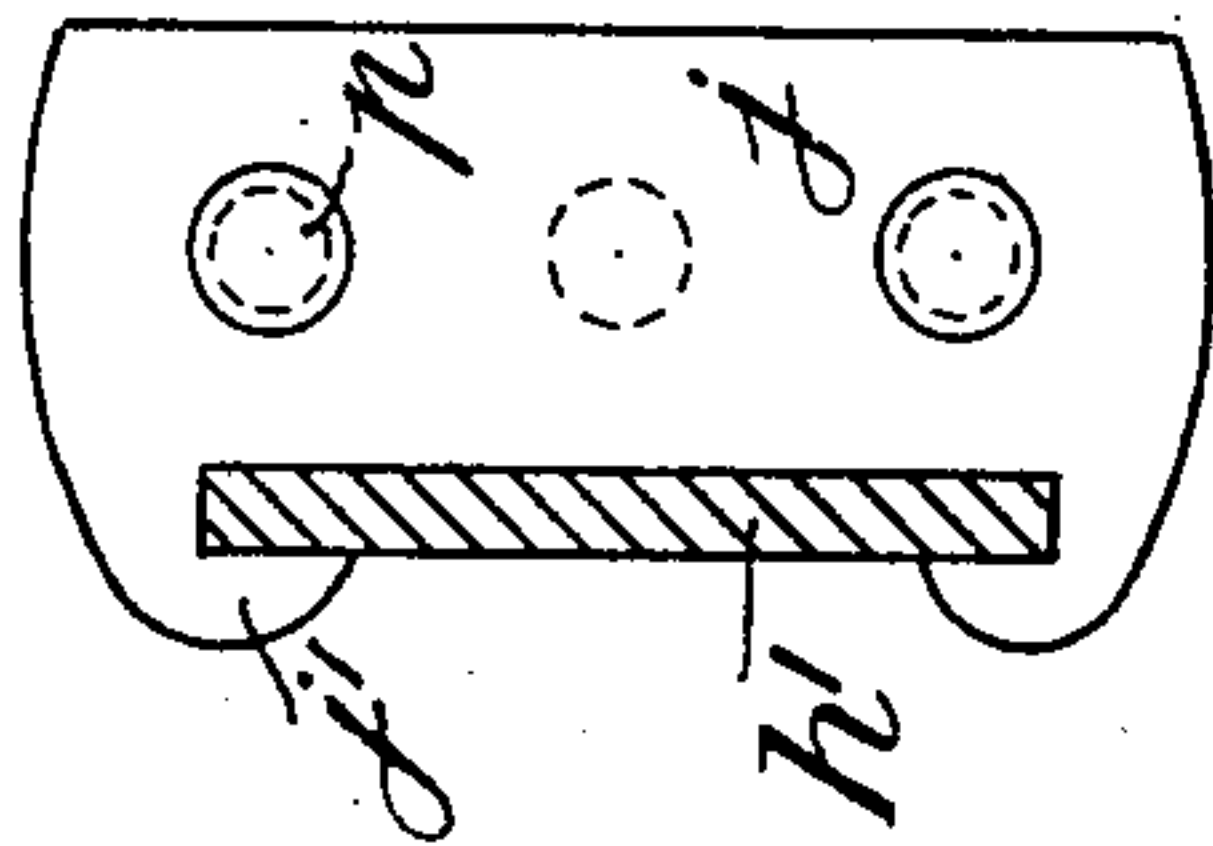
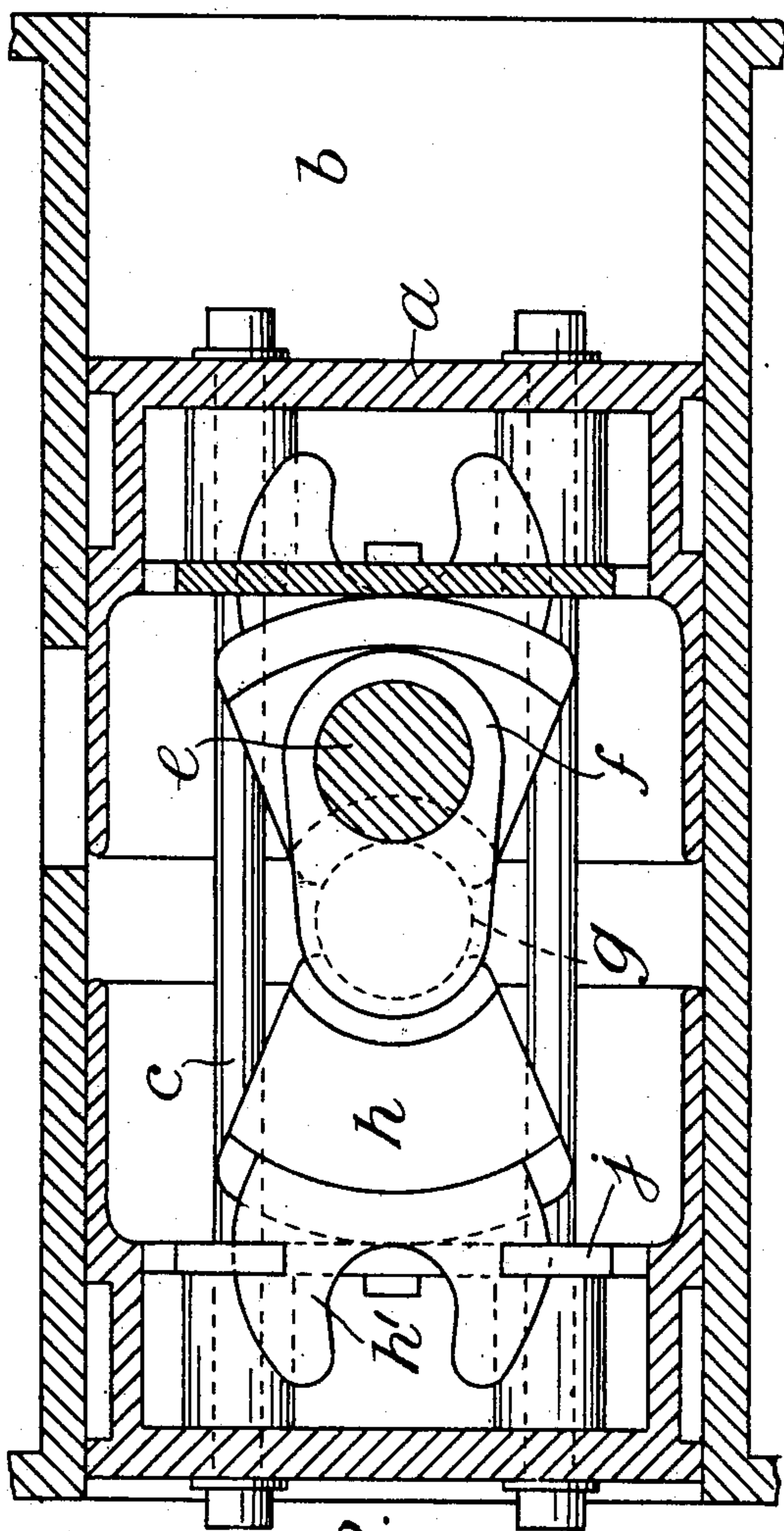
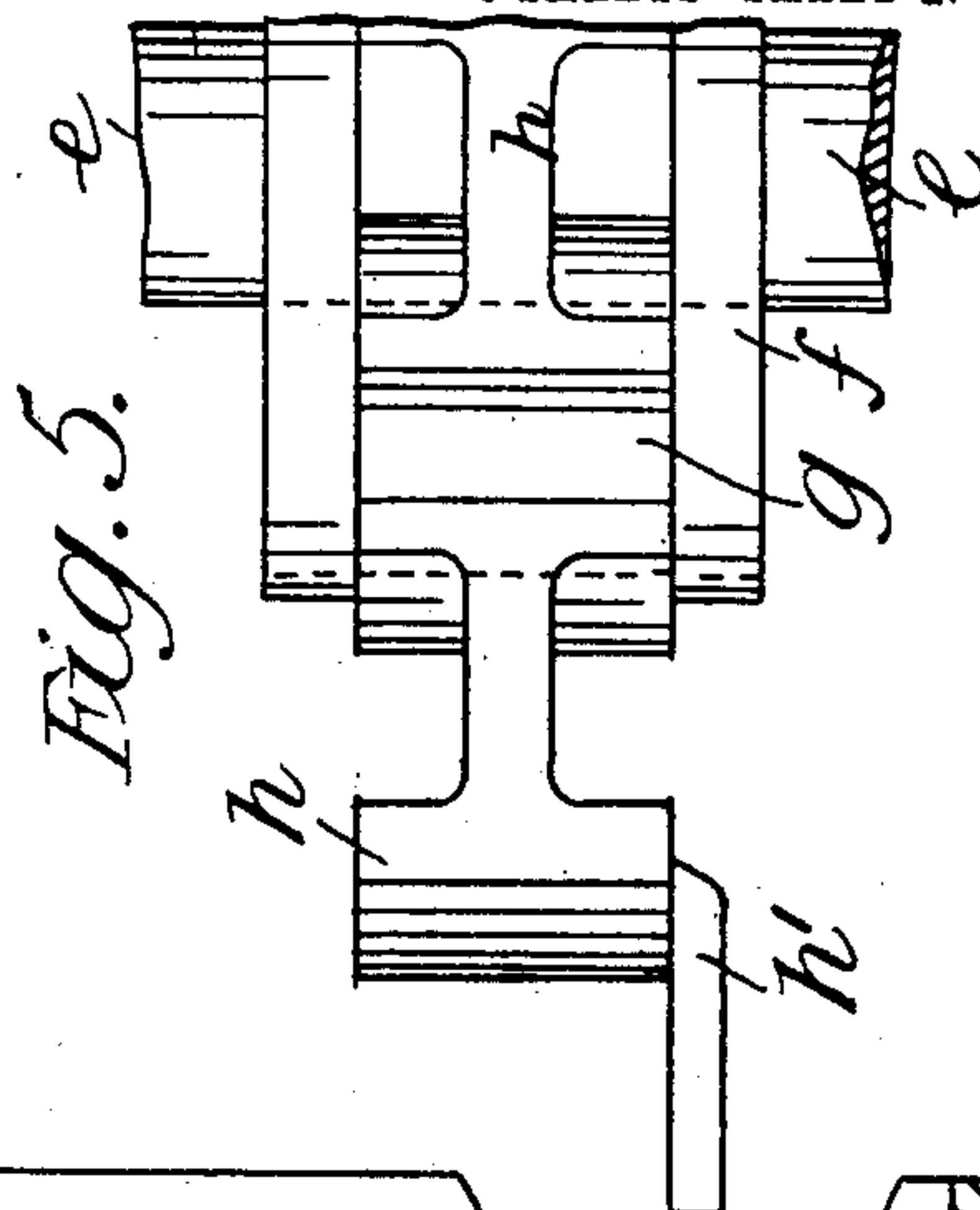


Fig. 5.



Witness
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J. Staib

Fig. 2.

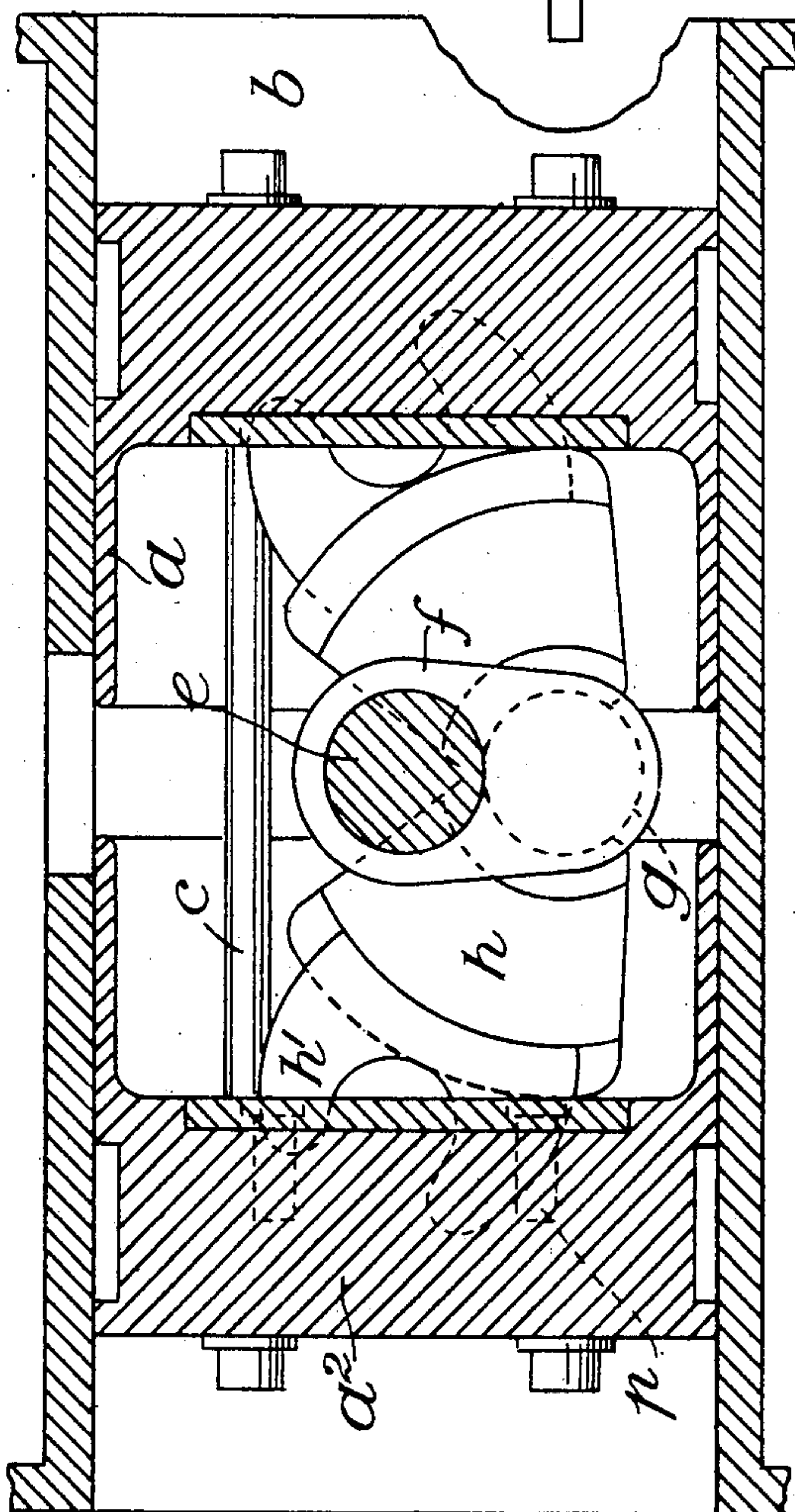


Fig. 3.

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att

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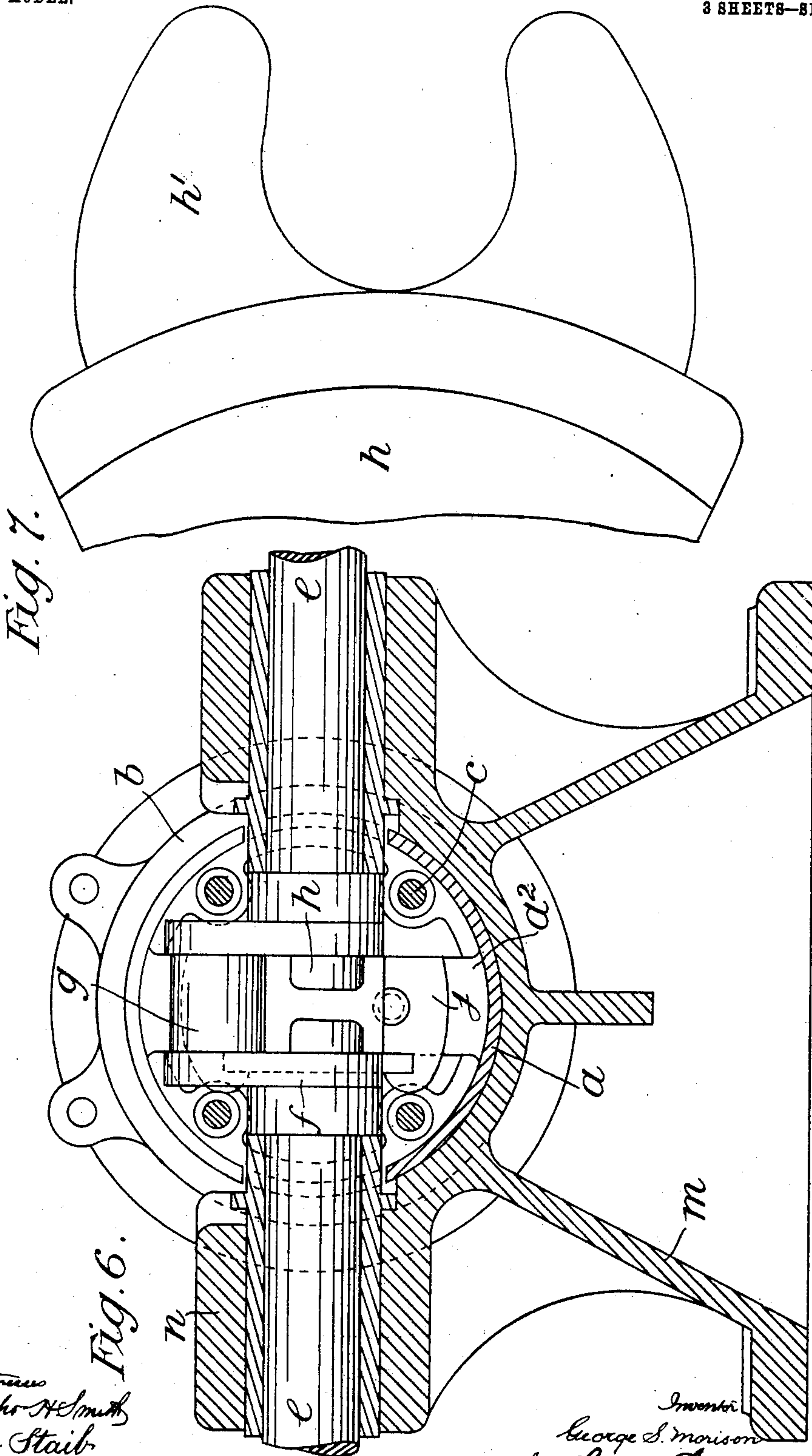
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

GEORGE SMITH MORISON, OF BENDIGO, VICTORIA, AUSTRALIA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 762,646, dated June 14, 1904.

Application filed May 13, 1903. Serial No. 156,930. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SMITH MORISON, a subject of the King of Great Britain, residing at White Hills road, Bendigo, in the State of Victoria, Australia, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

The object of my invention is to provide improvements in steam-engines whereby the construction of the engine is simplified to a great extent and the friction is reduced to a minimum, the piston-rods, with their glands and packings, and the connecting-rods and cross-heads being dispensed with. The crank-shaft is actuated directly from sectors in contact with connected pistons in a cylinder.

The invention is specially applicable where quick stroke—i. e., fast revolution of the shaft—is required.

Referring now to the accompanying sheet of drawings, Figure 1 shows longitudinal section through the cylinder of an engine that is provided with my improvements. Fig. 2 shows corresponding view, but with parts in altered position. Fig. 3 shows parts in further altered position. Fig. 4 shows face of friction guide-plate attached to piston. Fig. 5 shows plan looking onto crank and sectors within the cylinder. Fig. 6 shows a central cross-section through the cylinder, and Fig. 7 shows a detail drawn to an enlarged scale.

In the figures parts are removed in some cases to better illustrate the invention.

I employ two piston-heads *a*, that are set in a cylinder *b*. The two piston-heads are connected together by bolts *c*. Such bolts pass through the pistons and have heads *c'* stopping against same. The pistons have guide-ways *a'*, containing spiral springs *d*, that encircle the piston-bolts *c*. These springs act to press the pistons toward the center of the cylinder. Within the cylinder and crossing the central longitudinal line of same is set on suitable bearings the main or crank shaft *e*, carrying crank-arms *f*, with crank-pin *g*, and the main shaft *e* may carry a fly-wheel. The crank-pin *g* carries two sectors *h*. These bear upon it so as to turn freely and independently

of each other. These sectors extend in opposite directions and have their arcs bearing each upon the inside face of a piston, being thus supported between crank-pin and piston-face. A friction or bearing plate *j* is planted on the inside face of each of the piston-heads for the sectors to bear upon. Each piston has a solid central portion *a''*, to which the plate *j* is secured by countersunk screws *p*. These plates have portions *j'*, that extend beyond the solid center of the pistons, and have recesses that form guideways for plates *h'*, that are attached to the sectors *h* and prevent side movement or any slipping of same. The outer curve of the plate *h'* is of cycloidal form to work in the guideway. The plates *j* and the arcs of the sectors may alternatively be roughened or provided with teeth to prevent slipping.

At *k* and *l* I have shown two sets of valves employed as steam inlet and exhaust valves in any desired manner or relation. I have not shown these valves in detail nor have I shown devices for supporting the same, as these parts and the manner in which they are set or their operation bear no necessary relation to my invention, and I do not limit myself in any of these particulars.

In operation, assuming the parts to be in the position shown in Fig. 1 and the pistons moving in the direction of arrow *x*, the pistons will act upon the sectors, and these will in turn act upon the crank-pin, causing crank to turn until it reaches the position shown in Fig. 2, when the sectors will be in their central position (in horizontal line) and the pistons will have arrived at the end of their stroke. Steam being now admitted to this end of cylinder will further actuate the pistons, sectors, and crank to move same again into the central position, the sectors at this time having reached the position shown at Fig. 3, and on the continuance of the backward motion of the pistons the parts will again arrive at the relative position shown on Fig. 2, but with the crank reversed and the pistons at opposite end of cylinder. Steam now entering the cylinder at this end will move the parts again into the position shown, Fig. 1. In this manner a rapid motion will be imparted to the crank, so as to revolve the shaft *e*, and in this

action the sectors will oscillate rapidly on the crank-pin, acting in the manner described to give motion to the crank, and in their motion the cycloidal plates h' will turn in their guide-frames j , so as to prevent any slipping or side movement of the sectors in their action.

I have above described the invention as applied to a steam-engine, but it may, with obvious modifications, be applied to a gas or oil engine or a pneumatic or hydraulic engine or pump.

In the above-described construction of engine a direct action of the pistons through the sectors on the crank-pin at all parts of the travel is obtained—that is to say, the line of force acting through the pistons and sectors upon the crank-pin will be a direct and horizontal line throughout all stages of the travel of the crank. The present indirect action in the common form of engine where the connecting-rod works obliquely is thus avoided.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a steam-engine, the combination with a cylinder, a main transverse shaft, and a crank on said shaft centrally within said cylinder, of pistons within said cylinder at either side of the crank, means for connecting the pistons together, means tending to press the pistons toward the center of the cylinder, sectors bearing at one end on the pin of said crank, a bearing-plate for said sectors in each piston-head and spaced apart from the end thereof and having guideways therein, and means in connection with the said sectors and moving in

said guideways to insure a direct movement of the sectors.

2. In a steam-engine, the combination with the cylinder, a main transverse shaft, and a crank on said shaft centrally within the cylinder, of pistons within said cylinder at either side of the crank, piston-bolts connecting the said pistons, means tending to press the said pistons toward the center of said cylinder, sectors bearing at one end on the pin of said crank, a bearing-plate for said sectors in each piston-head and spaced apart from the end thereof and having guideways therein, and cycloidal plates connected with said sectors and moving in said guideways to insure a direct movement of the sectors.

3. In a steam-engine, the combination with a cylinder, a main transverse shaft and a crank on said shaft centrally within the cylinder, of pistons within said cylinder at either side of the crank, piston-bolts for connecting the said pistons together, guideways in the heads of the said pistons, spiral springs surrounding the said piston-bolts in said guideways, sectors bearing at one end on the pin of said crank, a bearing-plate in each piston-head for said sectors and having guideways therein, and cycloidal plates connected to said sectors and moving in the last aforesaid guideways to insure a direct movement of said sectors.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE SMITH MORISON.

Witnesses:

C. W. WADE,

A. HARKER.