

P. A. & I. S. KNAPP.
Cut-Off for Steam-Engine.

No. 215,369.

Patented May 13, 1879.

Fig: 1.

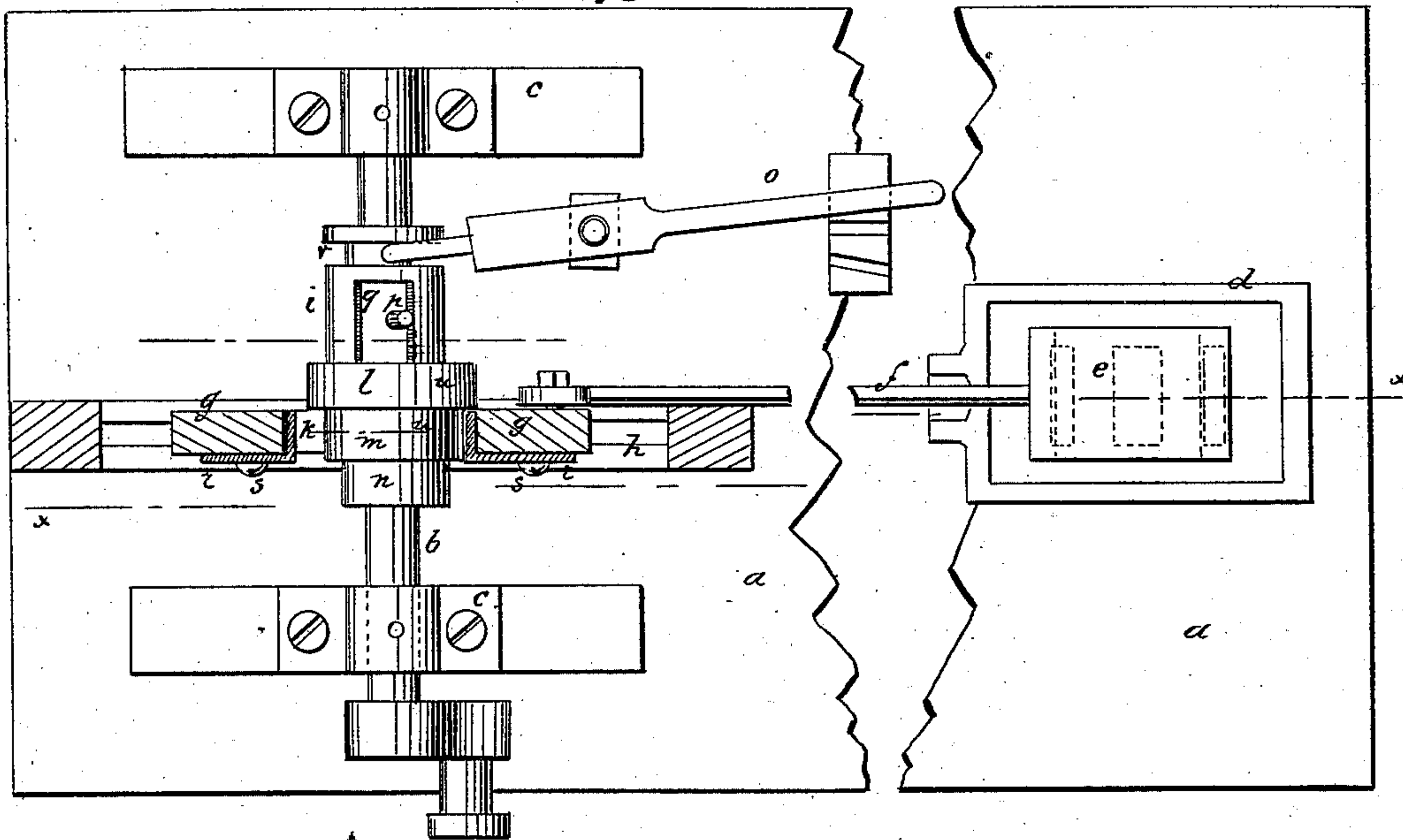


Fig: 3.

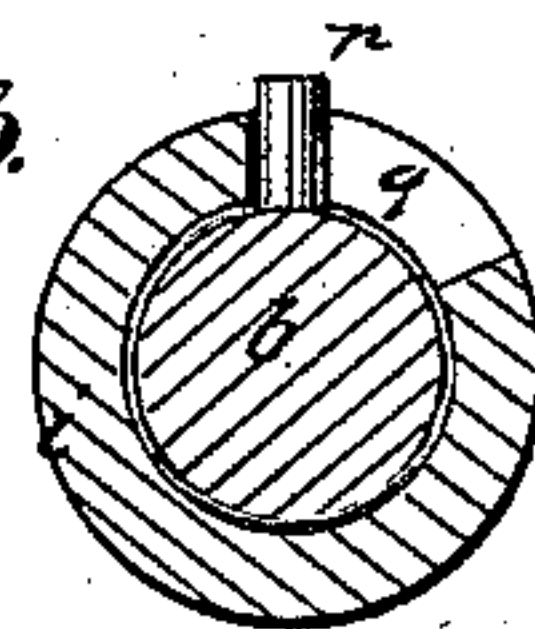
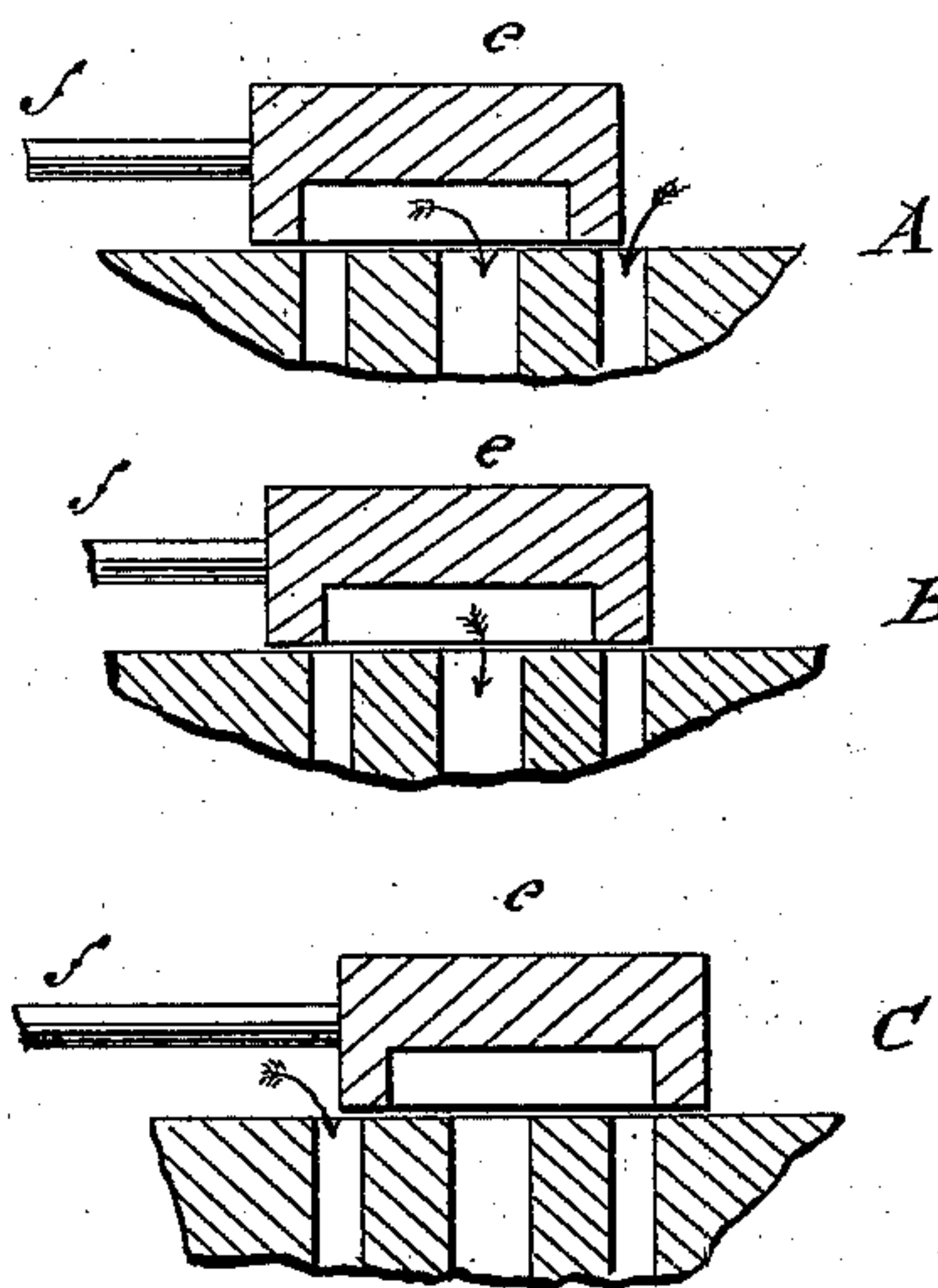
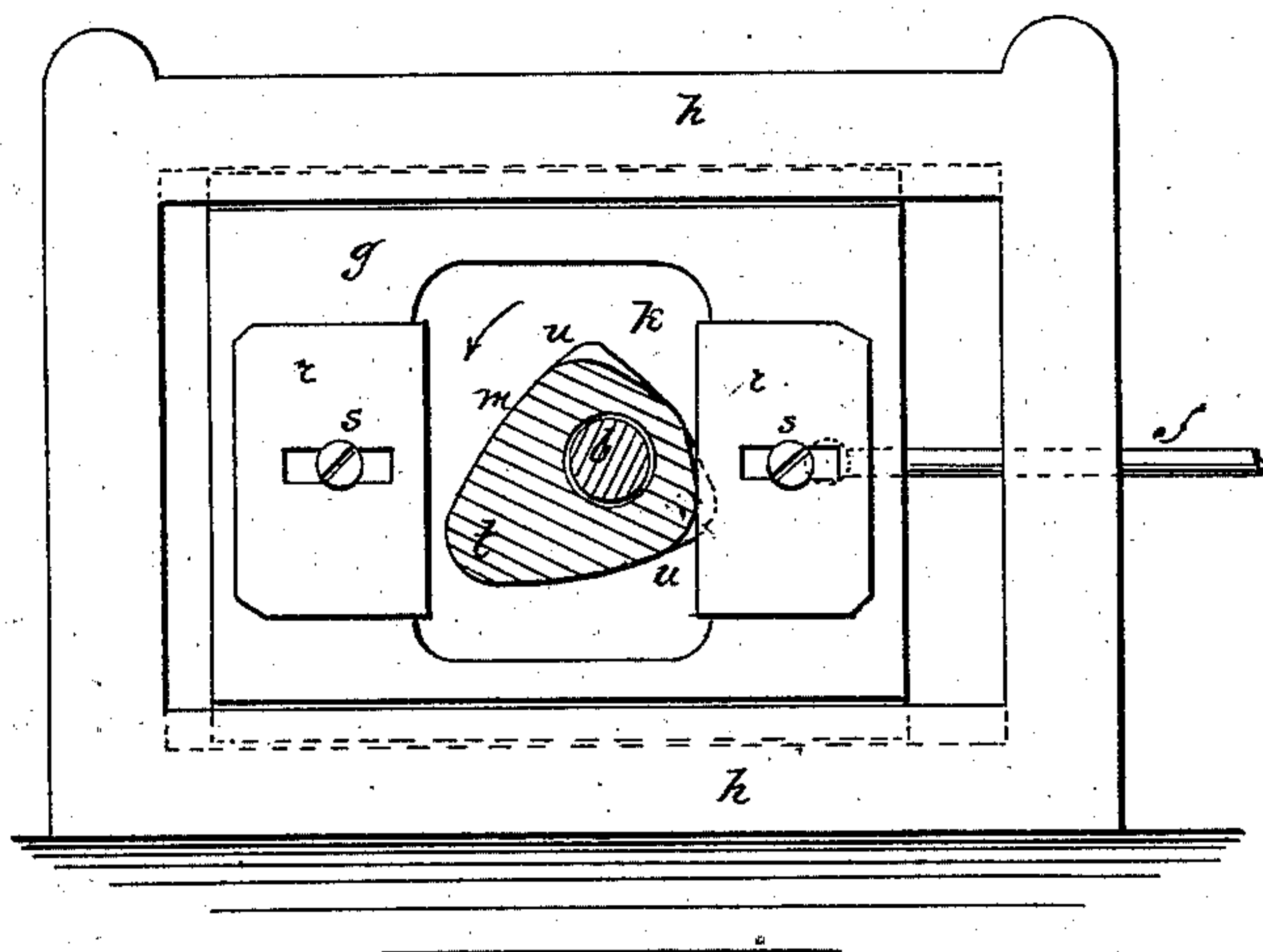


Fig: 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

PHILO A. KNAPP AND IRA S. KNAPP, OF DANBURY, CONNECTICUT.

IMPROVEMENT IN CUT-OFFS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **215,369**, dated May 13, 1879; application filed January 8, 1879.

To all whom it may concern:

Be it known that we, PHILO A. KNAPP and IRA S. KNAPP, of Danbury, in the county of Fairfield and State of Connecticut, have invented a new and Improved Cut-Off for Steam-Engines, of which the following is a specification.

The object of our invention is to construct a cut-off by which the valve may be caused to close the live-steam port at one-third, half, or two-thirds of the stroke, while the exhaust-port remains open to the end of the stroke.

Referring to the accompanying drawings, Figure 1 is a sectional plan view of a steam-engine valve and its operating mechanism constructed in accordance with our invention. Fig. 2 is a side view of the same. Fig. 3 is a cross-section of the crank-shaft and sleeve that carries the cams.

Similar letters of reference indicate corresponding parts.

The bed-plate of an engine is represented at *a*, *b* being the crank-shaft in bearings *c*; *d*, the valve chest and seat, and *e* the valve, which is of ordinary construction.

The valve-stem *f* is connected to a plate or slide, *g*, that is apertured at *k* for the passage of shaft *b*, and fitted to slide in ways *h* to move the valve *e*, as hereinafter described.

Upon the shaft *b* is a loose sleeve, *i*, one end of which is in the aperture *k* of the slide *g*, and carries the cams *l m n*. Any one of these cams may be brought in line with slide *g* by moving lever *o*, the forked end of which engages with an annular groove, *v*, in sleeve *i*, so that the sleeve will slide on shaft *b* as the lever is moved.

Upon shaft *b* is a pin, *p*, which projects through a slot, *q*, in sleeve *i*, and serves as the means for turning the sleeve with the shaft. The slot *q* is long enough to permit shifting of the cams.

The slide *g* is moved by contact of the cams with the sides of opening *k*, and the contact-surfaces of the slide are covered by plates *r*, which may be adjusted on screws *s*, to compensate for wear.

Each cam is formed with a toe, *t*, of corresponding shape and length, that acts at the end of the stroke to close one exhaust and open the other, and at the same time to admit steam to the cylinder.

The steam is cut off by the portion *u u* of the cam, and the point at which the steam is

cut off depends upon the size of the points *u*, which varies with each cam.

Referring to Fig. 2, let it be supposed that shaft *b* is turning in the direction of the arrow and the cams set for cutting off at half-stroke. When the crank reaches the dead-point the toe *t* will have moved slide *g*, and the valve *e* will be as shown at A—the exhaust open and the steam entering the cylinder. At half-stroke the portion *u* of the cam will move the slide and cut off the steam, but will not move the valve far enough to close the exhaust previously opened. This position is represented at B. When the opposite end of the stroke is reached the toe *t* will act upon the slide *g* again, and the valve *e* be shifted to the position as at C, which is the reverse of A.

The toe *t* is free from any contact with the slide when the portion *u* is acting, and it will be seen that the point of cutting off is regulated by the enlargement *u* of the cam.

There are two enlargements *u*, which permit the same action when the engine is reversed. In such reversal of the motion the pin *p*, that moves cam-sleeve *i*, shifts to the other side of slot *q* before any motion of the cam takes place, thereby bringing the parts to the proper relative position.

By the above-described cut-off mechanism the steam will act expansively to the end of the stroke, and the steam can be used to greater advantage than heretofore.

We are aware that it is not new to use a sliding sleeve, a yoke-slide, a cut-off cam, or adjustable wearing-plates; but

What we do claim as new and of our invention is—

1. The combination of a cut-off cam, of the shape shown, and arranged in a yoke-slide, *g*, a rotary shaft having the pin *p*, and a sleeve having the slot *q*, all arranged to operate as and for the purpose described.

2. The unequal cams *l m n*, made of the form described, attached to a slotted sliding sleeve, *i q*, and adjustable on a shaft having pin *p* with respect to the slide *g*, as and for the purpose specified.

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Witnesses:

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