

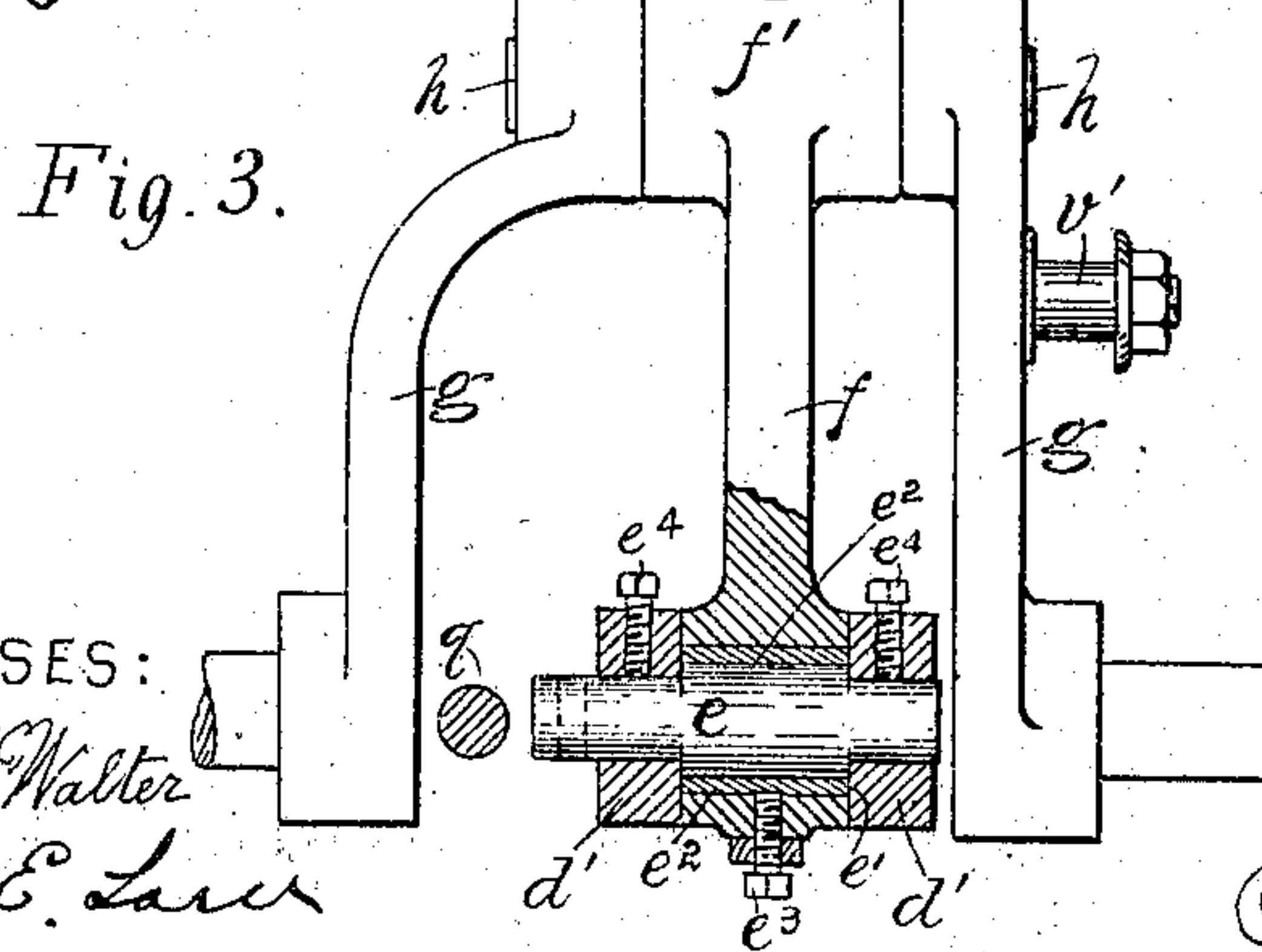
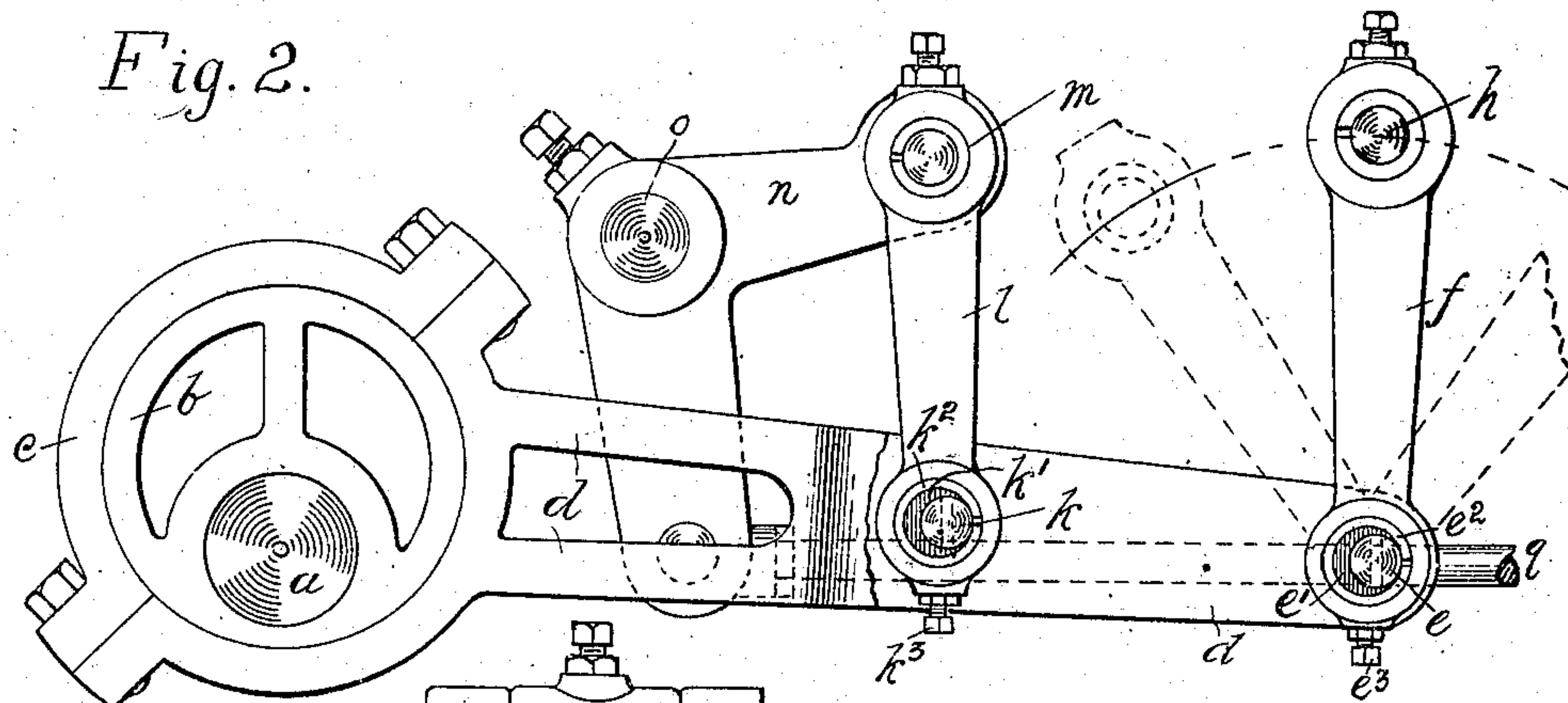
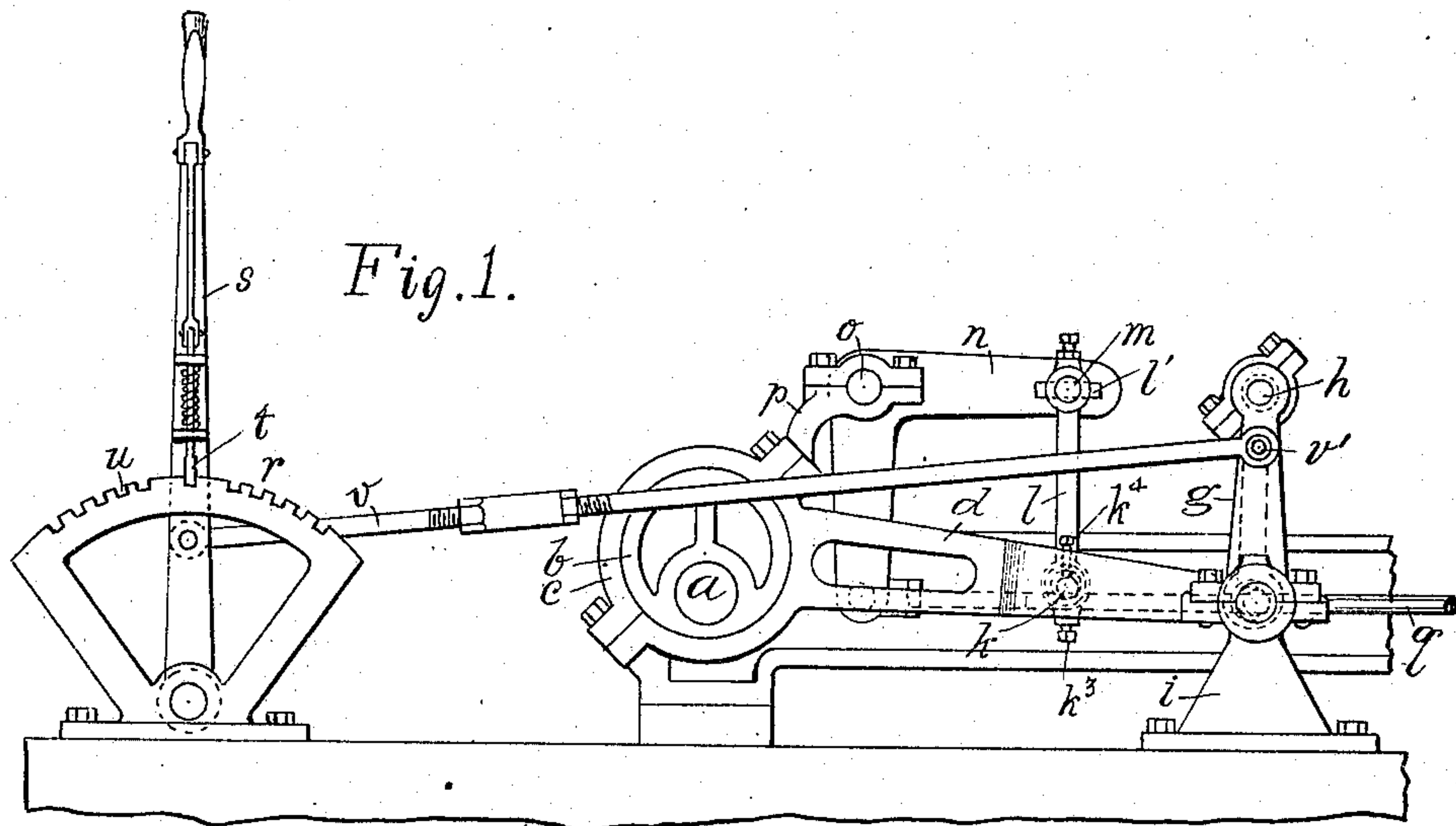
No. 881,286.

PATENTED MAR. 10, 1908.

A. D. BAKER.

VALVE GEAR FOR STEAM ENGINES.

APPLICATION FILED SEPT. 7, 1905.



WITNESSES:

David C. Walter  
Ada E. Lauer

INVENTOR:

Abner D. Baker  
J. M. Hall, His Atty.



# UNITED STATES PATENT OFFICE.

ABNER D. BAKER, OF SWANTON, OHIO.

## VALVE-GEAR FOR STEAM-ENGINES.

No. 881,286.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed September 7, 1905. Serial No. 277,307.

*To all whom it may concern:*

Be it known that I, ABNER D. BAKER, a citizen of the United States, residing at Swanton, in the county of Fulton and State of Ohio, have invented certain new and useful Improvements in Valve-Gears for Steam-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in the valve-gears for steam engines shown and described in United States Letters Patent to me dated March 3, 1903, numbered 721,994, and is designed to furnish means of accurate adjustment by means of which wear may be compensated for and by means of which uniform lead and uniform port openings at each end of the valve-stroke may be obtained when the engine is running in either direction. I attain these objects by means of the devices and arrangement of parts hereinafter described and shown, and illustrated in the accompanying drawings in which—

Figure 1 is a side elevation of a portion of my engine; Fig. 2 a like view, on an enlarged scale, showing a modification of the bell-crank lever and the new adjusting devices hereinafter referred to, and Fig. 3 an end-elevation of the rock-arm hereinafter referred to with the adjustable box hereinafter referred to, shown in section.

Like letters of reference indicate like parts throughout the drawings.

In the drawings, *a* is the crank-shaft of the engine. On this shaft is an eccentric *b*, its strap *c* being connected with one end of an eccentric rod *d*, the other end of the eccentric rod being bifurcated as at *d'*.

*e* is a short shaft or journal-pin upon which the two ends *d'* of the eccentric rod are journaled. On this same pin *e*, between the parts *d'*, is journaled the lower end of a hanger or link *f*. The upper end of this link is journaled, as at *f'*, between the upper ends of two rock-arms *g*, upon a short shaft or journal-pin *h*, secured at its ends in the upper ends of the rock-arms. One of the rock-arms is journaled at its lower end in a pedestal or bracket *i* and the other arm is journaled at its lower end upon the frame of the engine.

*k* is a short shaft or journal-pin the ends of

which are mounted in the two arms of the eccentric-rod.

*l* is a link one end of which is journaled upon and engaged with the pin *k*, the other end being pivotally engaged, as at *m*, with one arm of a bell-crank lever *n*, journaled, as at *o*, upon bracket *p* secured to the frame of the engine. The extremity of the other arm of the bell-crank is pivotally connected with and actuates the engine's valve-rod *q*.

*r* is a quadrant and *s* is a reversing lever, having a pawl *t* adapted to engage the toothed sector *u*. The lever is pivotally connected with one end of rod *v* the other end of the rod being pivotally connected, as at *v'*, with the rock-arm *g*.

The construction of my engine, thus far described, is the same as in the patent above referred to and the operation of this construction, there fully described, need not be here further elaborated.

Upon the middle bearing portion of the shaft or pin *e* is formed, preferably integral therewith, an eccentric gudgeon *e'*. The projecting end of the shaft is provided with means for turning the shaft,—in this instance a transverse hole through the end of the shaft for the reception of an instrument by means of which the shaft with its eccentric may be turned, thus changing the relation of the link or hanger *f* to the eccentric-rod. *e<sup>2</sup>* is a loose split sleeve or bushing which forms a bearing for the eccentric *e'*. The sleeve is held fixed and its wear may be taken up by the set-screw *e<sup>3</sup>*. *e<sup>4</sup>—e<sup>4</sup>* are set-screws which secure the shaft *e* in adjusted position and against axial movement. To permit the axial adjustment of the shaft *e* the set-screws *e<sup>4</sup>* must first be loosened. The adjustment here described is designed to take up wear and to aid in obtaining exactly the proper distance of the bearing from the center of the eccentric and to obtain and maintain a uniform lead. The shaft *k* is in like manner provided with an eccentric gudgeon *k'*, provided with suitable means for turning the shaft, having also a split sleeve or bushing *k<sup>2</sup>* and a set-screw *k<sup>3</sup>*. *k<sup>4</sup>—k<sup>4</sup>* are set-screws for securing the shaft *k* in the desired axial adjustment. By the axial movement of the shaft *k*, with its eccentric, the relation of the lower end of the link *l* to the eccentric-rod may be closely adjusted thus governing exactly the throw of the valve and the port-openings. By means of these two adjustments the port-openings at each



end of the valve-stroke, when the engine is running in either direction, may be made uniform. The upper end of the link *l* is adjustable, as at *l'*, as heretofore, but this adjustment of the upper part throws the lower end of the link out of time and relation, hence the necessity for the adjustment of the position of the lower end of the link in relation to the eccentric-rod.

10 In the construction shown in the patent above referred to it was found that by reason of the bell-crank arms being disposed at a right-angle to each other, when the lead was uniform the port-openings at the ends of the valve-strokes were not uniform. By disposing 15 the bell-crank arms at a greater angle than a right-angle, as illustrated in Fig. 2, this difficulty is overcome, the valve action is more rapid, and with the aid of the adjustments above referred to, the lead and the port-openings may be maintained uniform regardless of the direction in which the engine is running and of the throw of the valve or point of cut-off.

25 Having described my invention, what I claim and desire to secure by Letters Patent is—

1. In a valve-gear for controlling the admission and exhaust valve of a steam engine, 30 an eccentric and eccentric-rod, a valve-rod, connections intermediate the eccentric-rod and the valve-rod, a rock-arm, a link or hanger pivotally connected with the rock-arm, pivotal connections between the link 5 and the eccentric-rod, means in said pivotal connections consisting of an eccentric for the adjustment of the link with the eccentric rod, and means for controlling the position of the rock arm.

40 2. In a valve-gear for steam engines, an eccentric and eccentric-rod, a valve-rod for connection with the valve, a bell-crank connected with the valve-rod, a link pivotally connected at one end with the bell-crank, a 45 pivotal connection between the other end of the link and the eccentric-rod, and means

consisting of an eccentric for the adjustment of said latter pivotal connection.

3. In a valve-gear for steam engines, an eccentric and eccentric-rod, a valve-rod for 50 connection with the valve, a bell-crank one end of which is connected with the valve-rod, a link pivotally connected, at one end, with the other arm of the bell-crank and pivotally connected, at its other end, with the eccen- 55 tric-rod, means for the adjustment of said two pivotal connections of said link, a rock-arm, a link pivoted to the rock-arm and to the eccentric-rod, an eccentric for adjusting the said latter pivot, and means for con- 60 trolling the position of the rock-arm.

4. In a valve-gear for steam engines, an eccentric and eccentric-rod, a valve-rod for connection with the valve, devices for controlling the valve-rod independently of the 65 motion of the engine, pivotal connections in said devices and means for adjusting one or more of said pivotal connections eccentrically, said means of adjustment comprising a shaft adapted for manual rotation and 70 which engages the overlapping ends of two members, an eccentric on said shaft and in engagement with one of such members, and means for securing the shaft against axial movement. 75

5. In a valve-gear for steam engines, an eccentric and eccentric-rod, a valve-rod for connection with the valve, a bell-crank connected with the valve-rod having its two arms relatively disposed at an angle greater 80 than a right angle, a link pivotally connected at one end with the bell-crank, and pivotal connection between the other end of the link and the eccentric-rod, and means consisting of an eccentric for the adjustment of said 85 latter pivotal connection.

In testimony whereof I affix my signature in presence of two witnesses.

ABNER D. BAKER.

Witnesses:

M. C. CAMPBELL,  
FRANK BERKEBILE.