

J. P. Ross,
Steam-Engine Valve-Gear.
N^o 33,368. *Patented Sep. 24, 1861.*

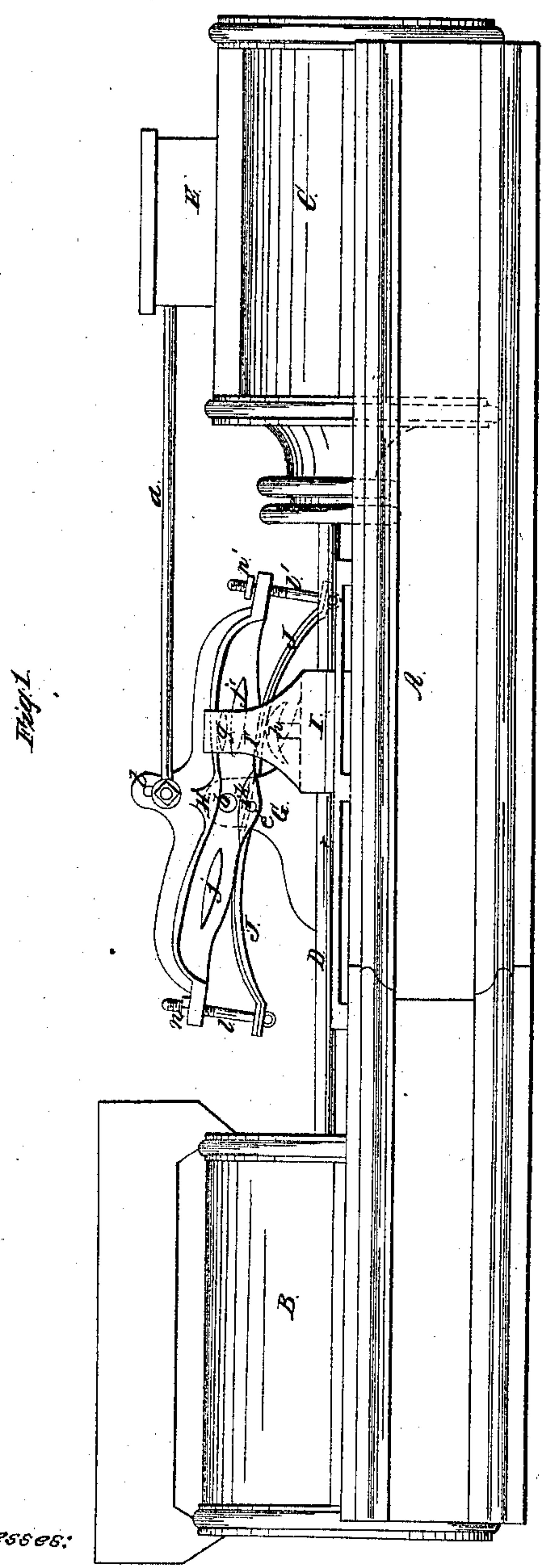


Fig. 1.

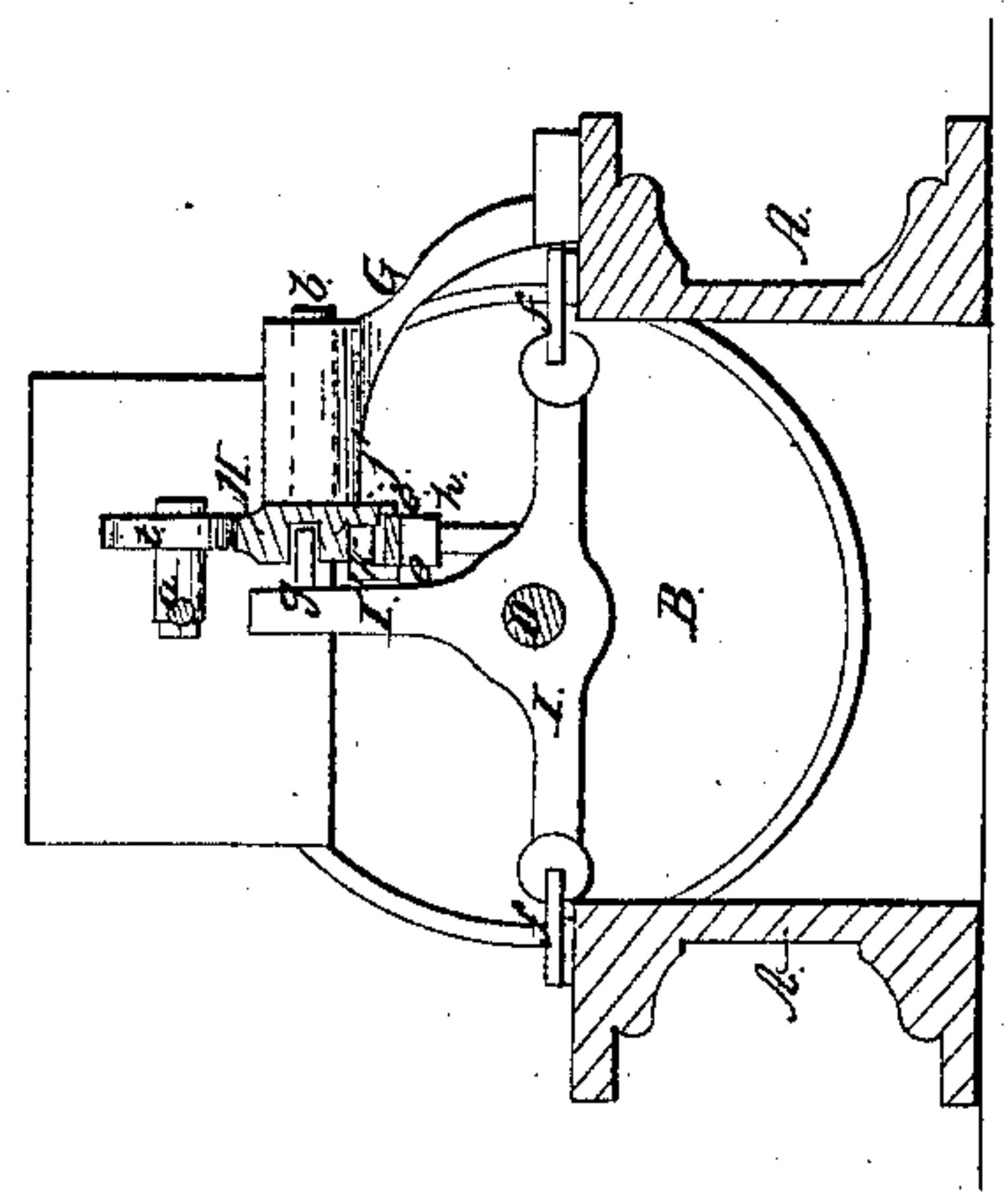


Fig. 2.

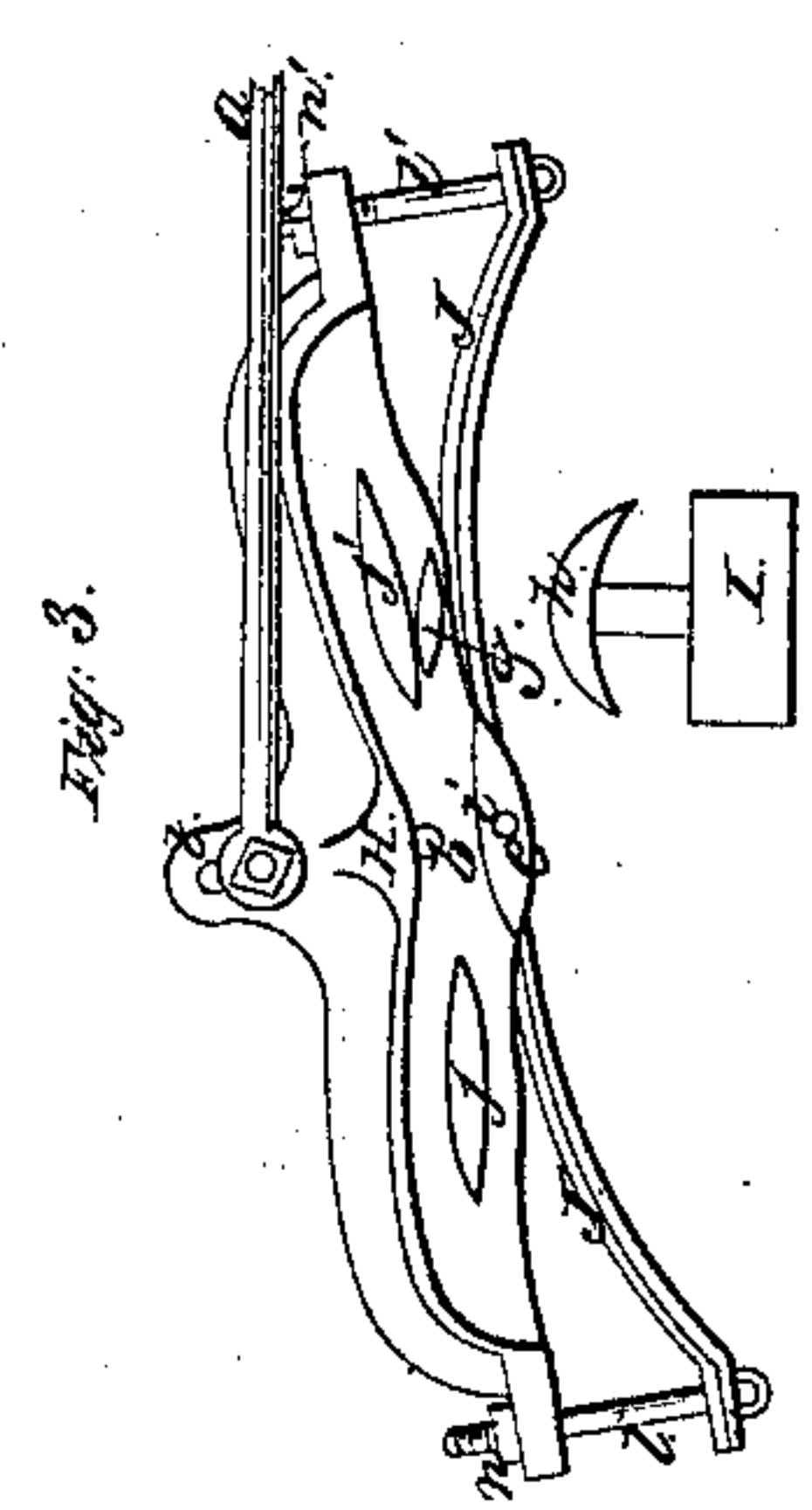


Fig. 3.

Witnesses:
R. S. Spencer
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Inventor:
Julia A. Ross executrix
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UNITED STATES PATENT OFFICE.

JULIA A. ROSS, OF LEWISBURG, PENNSYLVANIA, ADMINISTRATRIX OF
JAMES P. ROSS, DECEASED.

IMPROVED VALVE-GEAR FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 33,368, dated September 24, 1861.

To all whom it may concern:

Be it known that JAMES P. ROSS, late of Lewisburg, in the county of Union and State of Pennsylvania, now deceased, did invent a new and useful Improvement in the Valve-Gear of Direct-Action Steam-Engines, and that I, JULIA A. ROSS, of the same place, am the administratrix of the said JAMES P. ROSS; and I do hereby declare that the following is a full, clear, and exact description of the said invention, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of a blowing-engine with the invention applied. Fig. 2 is a transverse vertical section of the same. Fig. 3 is a side view of the principal parts of the valve-gear detached from the engine.

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

This invention consists in the employment, in combination with an oscillating yoke of similar character to that described in the specifications of Patents Nos. 14,145 and 16,809, granted to James P. Ross, of a spring or springs attached to the yoke for the purpose of performing the duty performed by the counterpoise-levers described in the first-mentioned specification and as the elastic lever described in the last-mentioned specification. This spring performs its duty in a more effective and certain manner than the said counterpoise levers and weights or the elastic lever, besides simplifying the construction of the valve-gear.

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

A is the bed-plate of the engine.

B is the blowing-cylinder, and C the steam-cylinder, arranged in line with each other at opposite ends of the bed-plate.

D is the piston-rod connecting the steam-piston and blowing-piston.

E is the valve-chest containing the slide or other valve for the induction and eduction of steam, and *a* is the valve-stem.

G is a standard erected upon one side of the bed-plate A, about midway between the two cylinders, for the support of the oscillating yoke H, which is secured at the middle of its length to a short horizontal axle or rock-

shaft *b*, that is fitted to a bearing in the upper part of the said standard, said axle or rock-shaft occupying a position transverse to the piston-rod. The yoke H is precisely like that described in the specifications of Letters Patent Nos. 14,145 and 16,809—that is to say, it has on the face next the piston-rod three projecting cams *j*, *j'*, and *k*, has an upwardly-projecting arm *t* for the connection of the valve-stem, and has holes in the ends for the reception of rods *l l'*.

J is the spring whose combination with the yoke G constitutes the subject-matter of this invention. This spring is nearly of the form of an arc or semi-ellipse and of about the same length as the yoke. It is attached firmly to the bottom of the yoke, with its concave side downward, the attachment being at the middle of the length of both spring and yoke. The ends of the said spring are connected with the rods *l l'*, which pass through the holes in the ends of the yoke, and the upper parts of these rods have screw-threads cut upon them for the reception of nuts *n n'* above the yoke, said nuts serving to adjust the stiffness of the spring, which is increased by drawing up the ends toward the yoke, and vice versa.

The attachment of the spring to the yoke at the middle of their lengths may be made by any secure means, as by screwing it to the bottom of the yoke. The mode of attachment represented is by fitting the spring between two cheek-pieces *e e*, projecting below the bottom of the yoke, and inserting a pin *i* through the said cheek-pieces and through the spring, which makes a rigid connection, as one or other end of the spring is at all times held in fixed relation to the yoke by the elasticity of the spring acting in one direction and by the rod *l* or *l'* acting in the opposite direction. The spring may be considered as two springs, for the portion on one side of the middle of the length of the lever is made independent of the other portion, and two separate springs, each corresponding with one-half of the single spring, might be substituted for such spring, in which case, however, the ends connected with the middle of the yoke will require some very secure and rigid attachment.

I is a cross-head secured firmly to the pis-

ton-rod and working in suitable guides $f f$, said cross-head having an upright arm I' and having projecting from that side of the said arm next the yoke G a traveler g , corresponding with the traveler described in Letters Patent No. 16,809. Under the spring J there is secured to the cross-head a wiper h , for which a friction-roller might be substituted, said wiper being directly below the traveler g .

The yoke derives the necessary oscillating movement for operating the valve partly from the action of the traveler g upon the cams j and j' and partly from the action of the wiper h upon the spring J in a manner very similar to that described in Letters Patent No. 16,809, the spring J operating very much like the elastic lever described in those Letters Patent, though differently applied.

The operation may be described as follows: The wiper by its action on the spring J during the latter portion of each stroke of the pistons gives the closing movement to the valve and gives the movement necessary to obtain a lead to admit steam in time for the commencement of the next stroke, and the traveler by its action on the cam j or j' during the first portion of each stroke completes the opening of the valve. The upper sides of the cams $j j'$ serve the double purpose of controlling the closing movement of the valve, produced by the action of the wiper on the spring, and of causing the straining of the spring by the wiper to make it give the yoke a sudden movement for obtaining the lead as the stroke is terminated. Suppose, for example, the valve-gear to be in the position represented in Fig. 1, such position corresponding with about three-quarters stroke of the piston to the right. The wiper h is now acting upon the spring to raise the right-hand end of the yoke and give the valve the movement for closing the steam-port communicating with the left-hand end of the cylinder, such movement being controlled by the upper side of the cam j' , resting against the traveler g . The wiper in this action forces up the spring faster than the traveler permits the yoke to rise, and so strains the half of the spring under the right-hand half of the yoke, such straining being permitted by the rod l' moving upward through the hole provided for it

in the yoke. When the traveler passes the right-hand extremity of the cam j' , it (the traveler) no longer controls the yoke, and the elasticity of the spring, being brought into uncontrolled action on the yoke, causes the left-hand end of the latter to be depressed and the right-hand end to be raised very suddenly as far as the nut n' permits, and this sudden movement is what throws the valve far enough to commence the opening of the port to admit steam to the right-hand end of the cylinder. The movement of the piston toward the left-hand end of the cylinder then commences, and the traveler moving in the same direction passes under the cam j' , as shown in Fig. 3, and moves up the right-hand end of the yoke, and so completes the opening of the valve-ports during the first part of the said movement of the piston. Shortly after half-stroke the wiper h comes into action on the spring J in a manner to throw up the left-hand end of the yoke as fast as permitted by the action of the traveler on the upper side of the cam j , and so gives the closing movement to the valve, in the meantime straining the part of the spring under the left-hand half of the yoke, and as soon as the traveler passes the outer end of the said cam the movement of the yoke is suddenly accelerated by the spring, as before described with reference to the traveler passing the outer end of the cam j' , and this movement produced by the spring commences the opening of the port to admit steam to the left-hand end of the cylinder. The movement of the piston to the right then again commences, and the traveler in passing under the cam j completes the opening movement of the valve.

What I claim as the invention of JAMES P. ROSS, deceased, and desire to secure by Letters Patent, is—

The employment, in connection with the oscillating yoke H , of a spring or springs J , attached to the yoke and operating in combination therewith and with the wiper h or its equivalent and the traveler g , as herein set forth.

JULIA A. ROSS,

Administratrix of James P. Ross.

Witnesses:

CURTIS MCNEAL,
F. A. DONACHY.