

J. S. Stuart.

Locomotive Engine.

N^o 89,809.

Patented May 4, 1869.

Fig. 2.

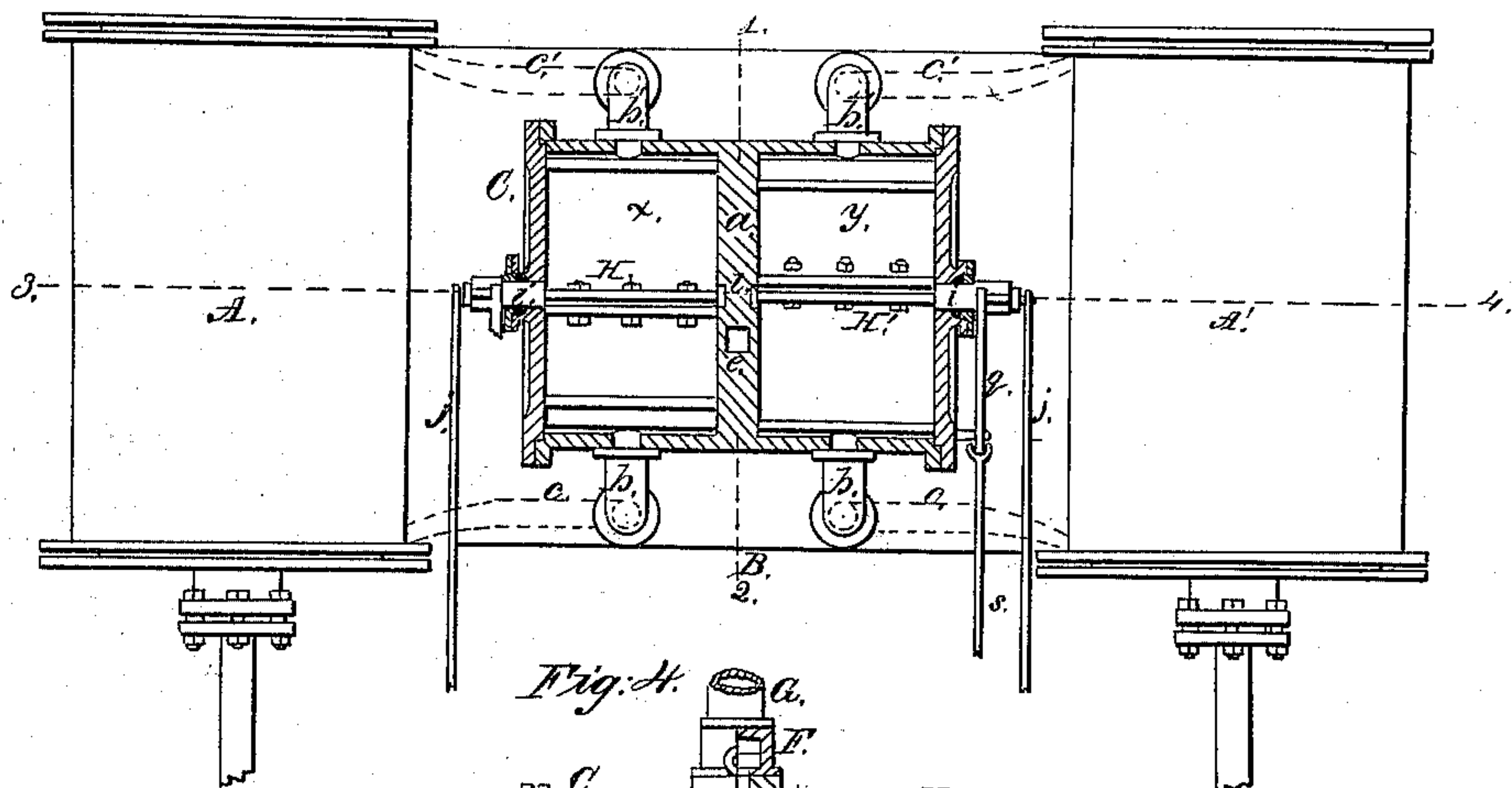


Fig. 4.

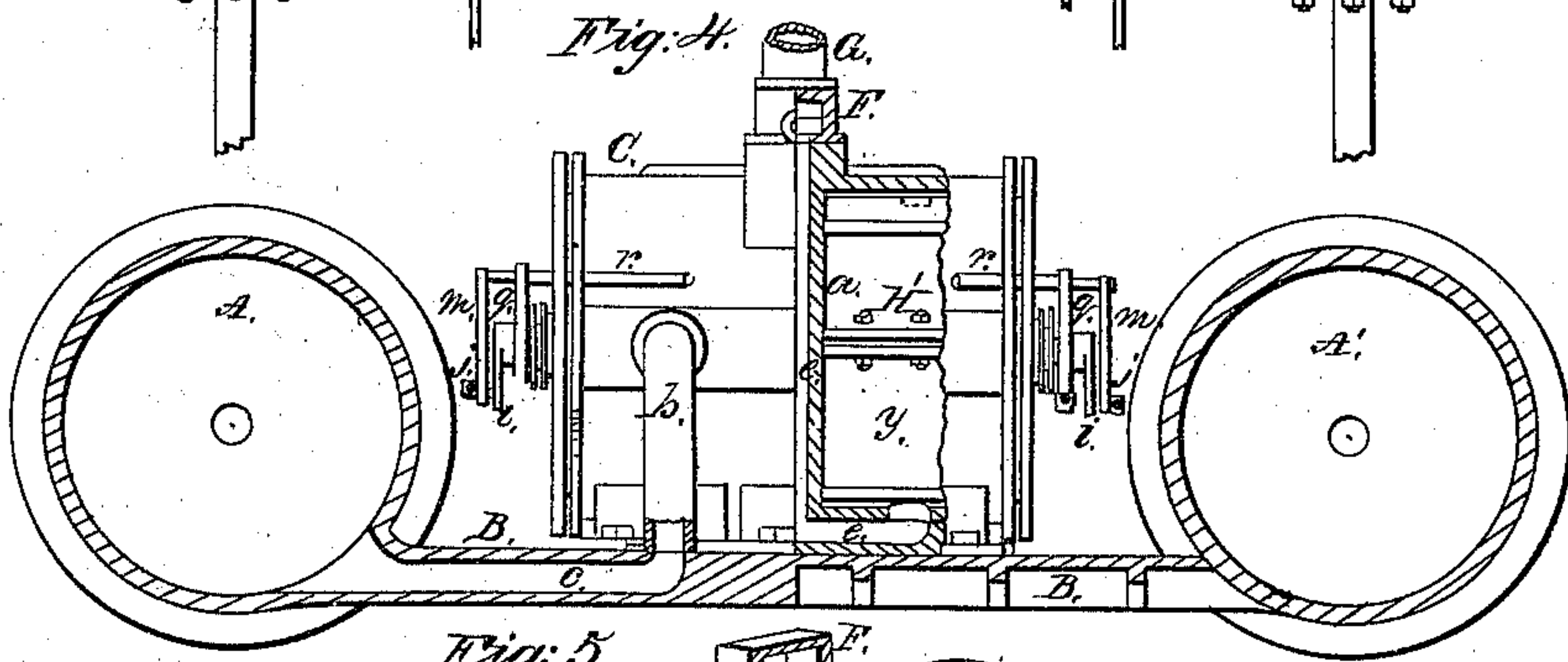


Fig. 5.

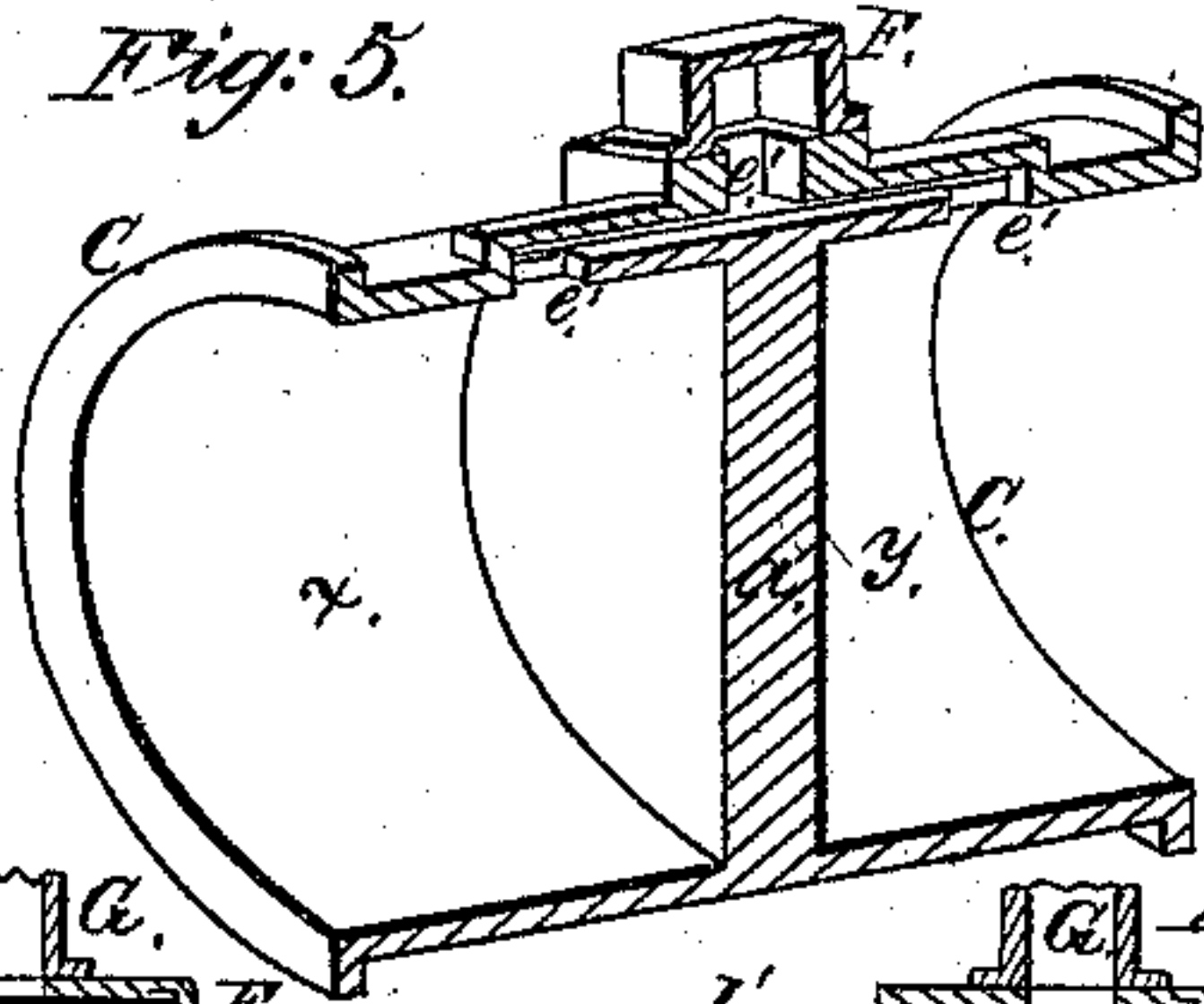


Fig. 1.

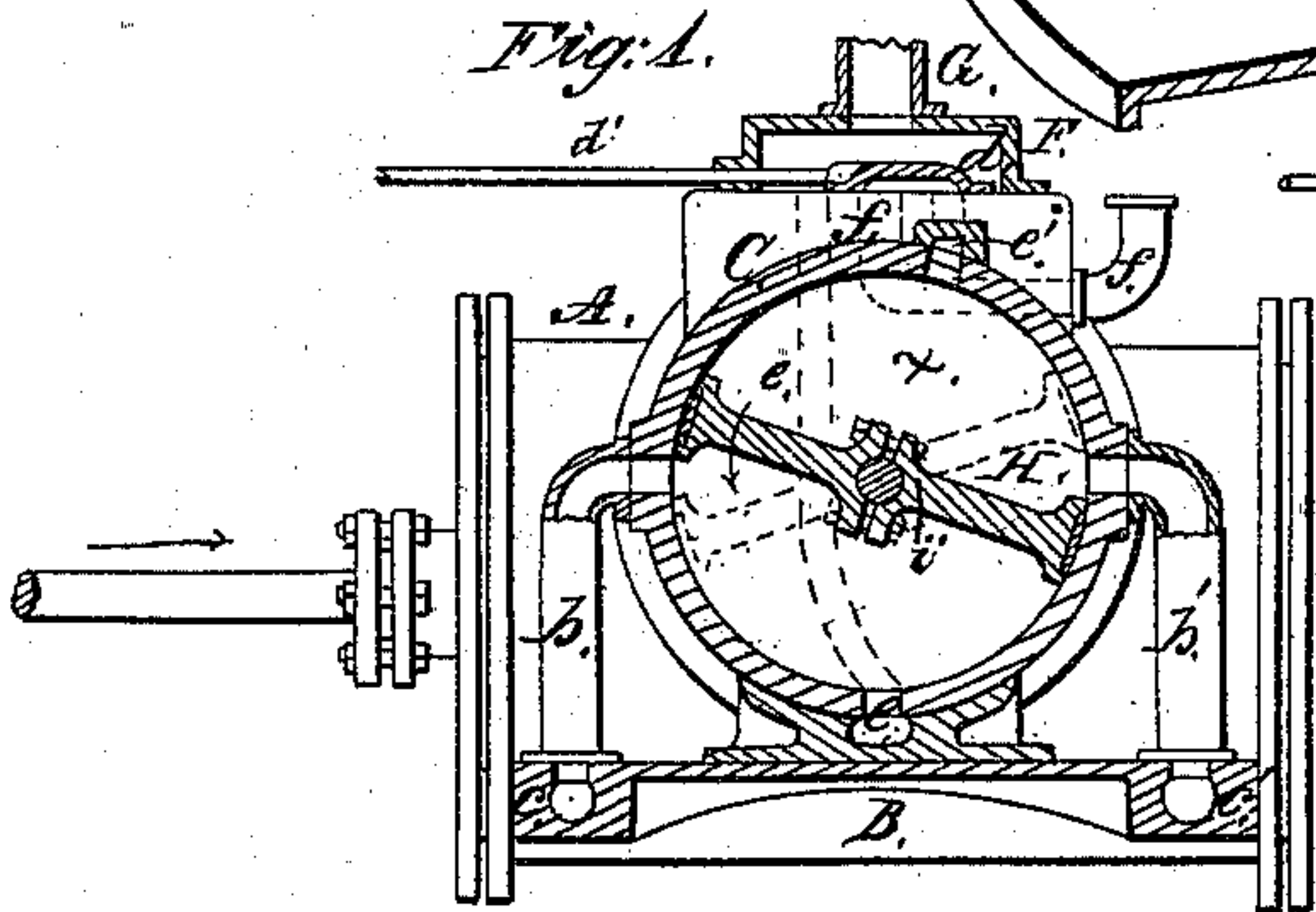


Fig. 3.

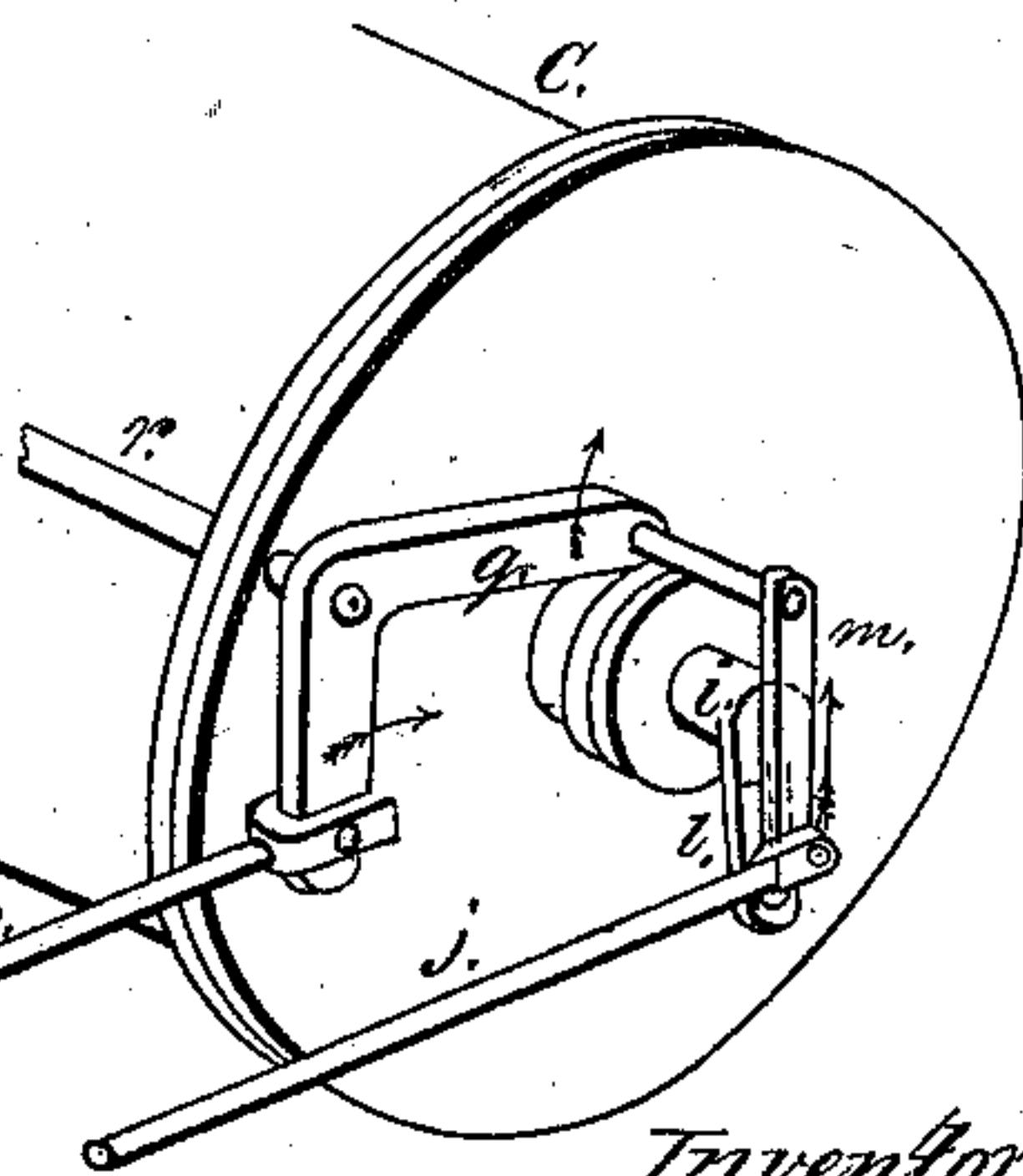
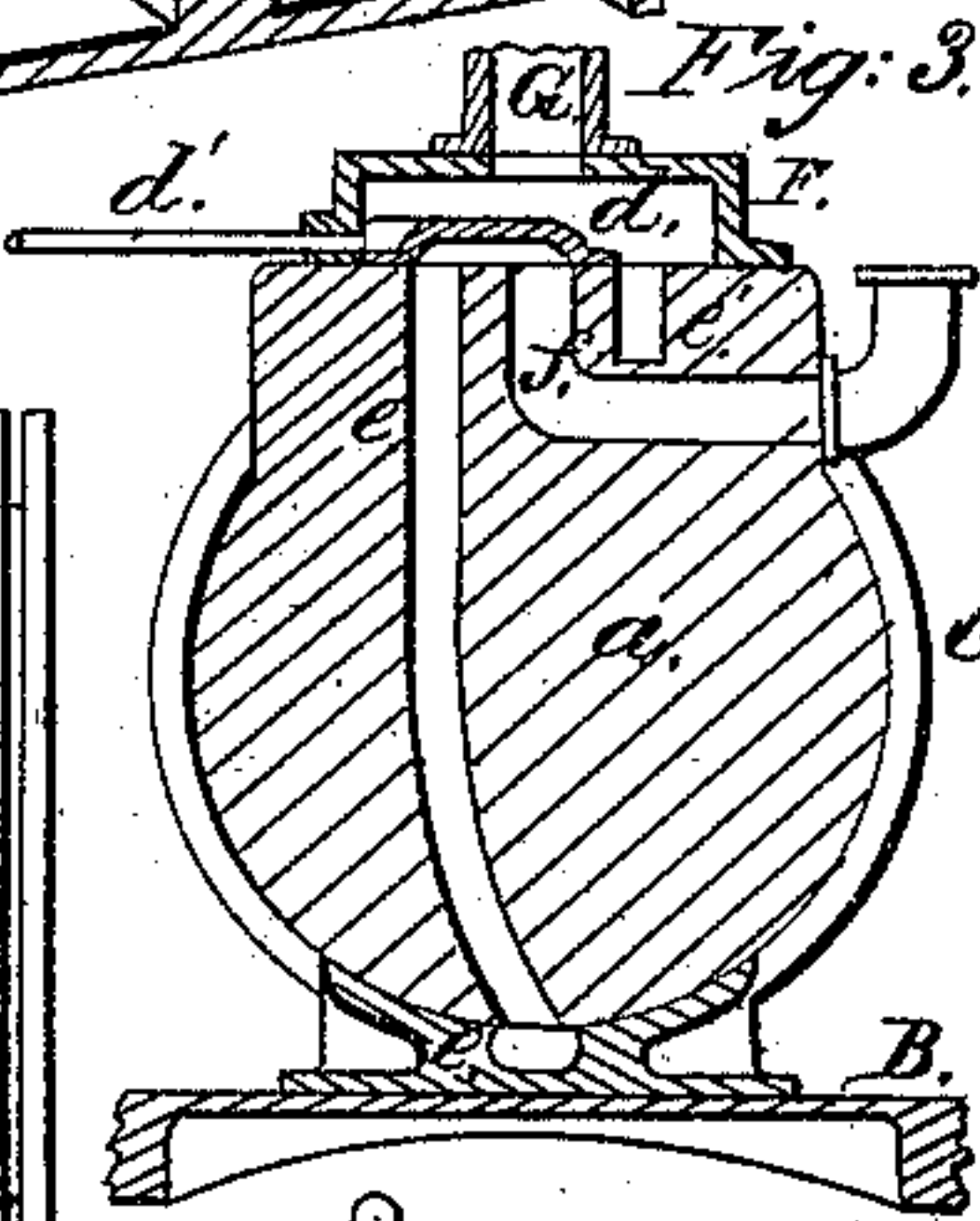
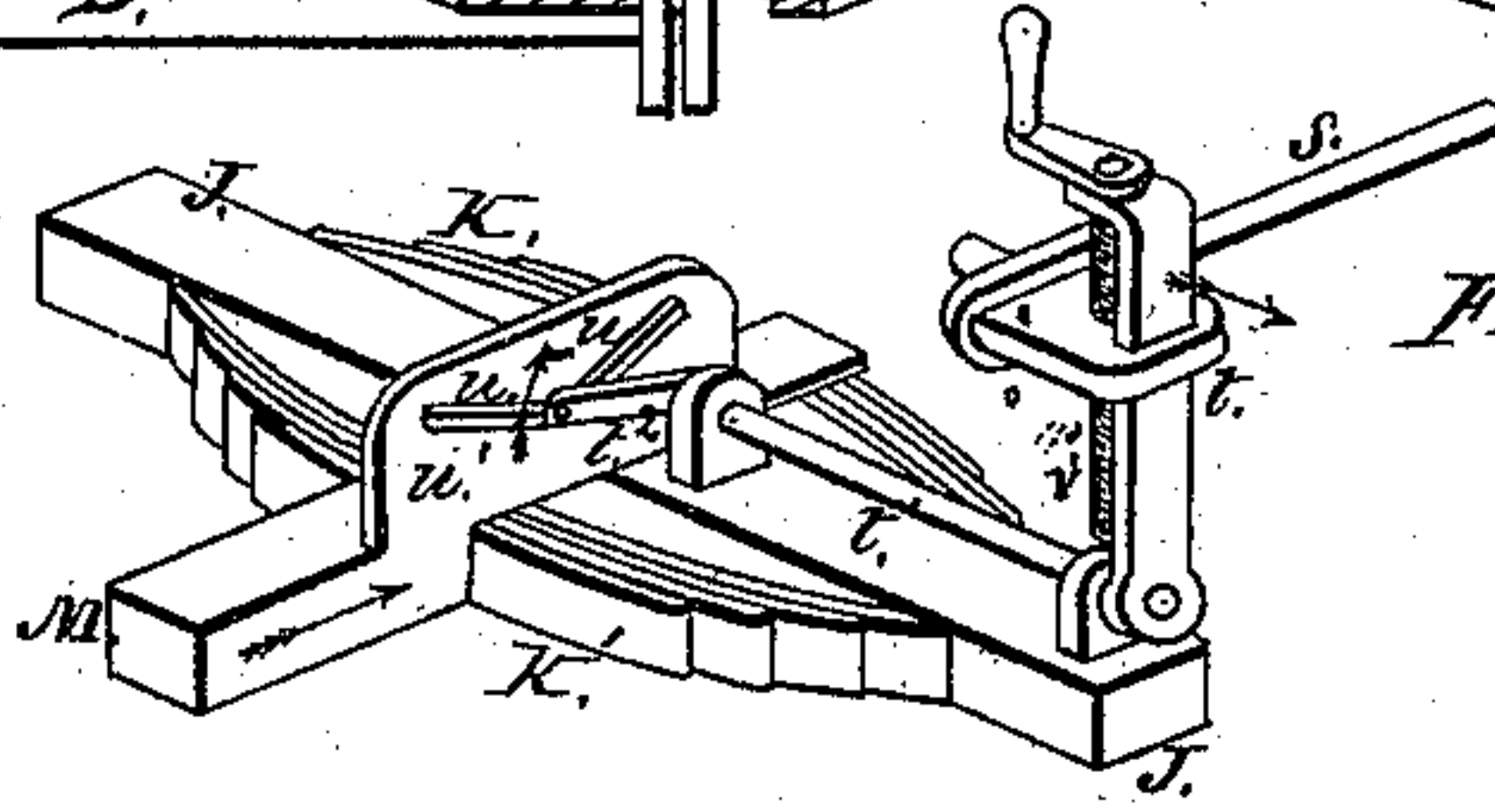


Fig. 6.



Witnesses;

*Wm. A. Stut
Jno B Harding.*

Inventor;

*J. S. Stuart
by his Atty
W. Howson.*

United States Patent Office.

JOHN S. STUART, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 89,809, dated May 4, 1869.

IMPROVEMENT IN LOCOMOTIVE STEAM-ENGINE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN S. STUART, of Philadelphia, Pennsylvania, have invented certain Improvements in Locomotive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists of certain improvements, fully described hereafter, in the construction of locomotive-engines.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing, which form a part of this specification, and in which—

Figure 1, sheet 1, is a longitudinal sectional view of sufficient of a locomotive-engine to illustrate my improvements;

Figure 2, a plan view of the same, with the valve-chest in section;

Figure 3, a longitudinal vertical section on the line 1-2, fig. 2;

Figure 4, a transverse vertical section on the line 3-4, fig. 2;

Figure 5, a sectional perspective view of the valve-chest; and

Figure 6, sheet 2, a perspective view, illustrating a portion of my improvements.

Similar letters refer to similar parts throughout the several views.

A and A' represent the two steam-cylinders, which are of the usual construction, and are secured in their proper positions upon the frame of the locomotive.

Extending between these cylinders, and secured to the same, is a plate, B, upon which is mounted a third cylinder, or valve-chest O, arranged at right angles to the former.

The interior of the valve-chest is divided by a partition, *a*, into two equal compartments, *x* and *y*, the former communicating, by means of two pipes *b b'* and two passages *c c'*, of the plate B, with the opposite ends of the steam-cylinder A, and the latter compartment communicating, by means of similar pipes and passages, with the opposite ends of the steam-cylinder A'. (See figs. 1 and 2.)

At the top of the valve-chest O is a slide-box, F, with the interior of which communicates the steam-supply pipe G, and within this box is arranged a slide valve, *d*, of the usual construction, which is furnished with a rod, *d'*, extending to some point where it can be conveniently operated by the engineer.

It should be understood that this valve *d* is not moved automatically, or at regular intervals, but only when the motion of the engine is to be reversed, as hereafter explained.

The steam-ports *e* and *e'* and exhaust-port *f*, which lead from the slide-box, are all formed in the partition *a*; and each of the steam-ports communicates with both compartments *x* and *y* of the valve-chest, as best observed in figs. 4 and 5.

The valves H and H' within the valve-chest are hung

to independent spindles *i i*, and are arranged to oscillate from about the position shown by full lines in fig. 1 to that indicated by dotted lines, motion being communicated to each of the said valves by a rod, *j*, which is connected to an arm, *l*, at the outer end of the valve-spindle, the said rod being operated in the usual manner, by an eccentric on the driving-axle of the locomotive.

The arms *l* of the valve-spindles are slotted in the direction of their length, as seen in fig. 6, and the pin by which each eccentric rod *j* is attached to its arm *l*, is connected also to a link, *m*, hung to a bell-crank lever, *q*.

It will be understood from the above that when the lever *q* is operated, and the point of connection of the eccentric-rod moved towards or from the centre of the valve-spindle, the stroke of the valve will be correspondingly increased, or diminished, with the same stroke from the eccentric.

The levers *q*, at each end of the valve-chest, are hung to and connected together by a spindle, *r*, in order that they may move simultaneously, and one of the said levers is connected by a rod, *s*, to an arm, *t*, of a spindle, *t'*, which is arranged to turn upon a transverse beam, J, at the rear end of the locomotive, (fig. 6.)

The sections K and K' of a strong elliptic steel spring are secured to the opposite sides of the beam J, these sections being embraced by a strap or continuation of the coupling-bar M, which is arranged at right angles to the said beam J.

A pin, projecting from a second arm, *t''*, of the spindle *t'*, enters a double inclined slot, *u*, which is formed in a vertical projection, *u'*, of the beam M, and a screw, *v*, of the arm *t*, which is arranged in such a position as to be easily manipulated by the engineer, has, by moving the end of the rod *s* towards or from the centre of the spindle *t'*, the effect of shortening or lengthening the said arm *t*.

The train of cars to be drawn or pushed by the locomotive is connected by the coupling-bar M, so that the entire strain is borne by one of the sections of the elliptic spring, causing it to be compressed, and permitting the coupling-bar to yield to a greater or less extent, according to the load. This yielding of the coupling-bar communicates motion, through the medium of the double slot *u*, to the arm *t''* and the devices connected therewith, causing the stroke of the valves H and H' to be lengthened or shortened, and the supply of steam to the cylinder to be increased or diminished accordingly, as will be hereafter explained.

Operation.

Let it be supposed that the several parts are in the position shown in figs. 1 and 2, and that steam is being admitted from the pipe G into the slide-box F. The port *e'* being covered by the valve *d*, steam will pass downward through the port *e*, and thence into both compartments *x* and *y* of the valve-chest at points beneath the valves H and H'.

These valves, it should be understood, are not op-

erated by the steam which is thus admitted into the valve-chest, but are oscillated regularly by means of the eccentric rods *j*, above mentioned, and, although the said valves are arranged to move nearly simultaneously, one of them has slightly the lead of the other.

The steam which is admitted from the port *e* into the compartment *x* of the valve-chest fills that portion of the latter beneath the valve *H*, and passes through the pipe *b* and passage *c*, into one end of the steam-cylinder *A*, urging its piston in the direction of the arrow, fig. 1. At the same time the exhaust steam from the opposite end of the cylinder *A* returns through the passage *c'* and pipe *b'* into that portion of the compartment *x* above the valve, and passes from the latter through the port *e'*, and thence beneath the slide valve *d* into the exhaust-port *f*.

The steam from the same port *e*, which is admitted into the compartment *y* of the valve-chest, is in like manner passed into the cylinder *A'*, and the exhaust steam from the latter carried into the exhaust-port *f*.

While steam is passing through the pipes *b b'* into the cylinders *A* and *A'*, the valves *H* and *H'* begin to move in the direction of the arrow, fig. 1, and cut off this supply of steam at any time desired before the cylinder-pistons have completed their full stroke.

The valves *H* and *H'* continue to turn in the same direction, after cutting off the supply of steam to the pipes *b*, and at the proper moment the entrances to the pipes *b' b'* are opened, the valves still continuing to turn until they reach the position indicated by dotted lines, when their motion is again reversed.

The steam from the port *e* now passes through the pipes *b'* instead of through the pipes *b*, and drives the pistons back to their original positions in the cylinders, the motion of the said pistons being again reversed, and the operation continued so long as the position of the slide-valve *d* remains unchanged.

To reverse the engine, all that is necessary is to move the slide-valve *d* from the position shown in fig. 1 to that illustrated in fig. 3, the live steam then passing through the port *e'*, and entering the compartments *x* and *y* of the valve-chest above the valves, while the exhaust steam is admitted into the valve-chest beneath the valves, and passes off through the port *e*.

The devices illustrated in fig. 6 of the drawing are

intended to proportion the stroke of the valves, and the supply of steam to the cylinders, according to the load to be drawn or pushed by the locomotive, their operation being as follows:

When the load to be drawn or pushed is a light one, the several parts remain in about the position shown in fig. 6; that is, with the arm *t*² at the bottom of the slot *u*; but when the load is increased, and the spring *K* or *K'* compressed sufficiently to permit the inclined slot *u* to move longitudinally, the arm *t*² will be raised, and will move the several parts connected with it in the direction of their respective arrows; the effect of which will be to shorten the valve-arms *l* by moving their eccentric rods towards the centre of the spindles *i*, thus lengthening the stroke of the valves *H* and *H'*, and allowing sufficient time for an increased supply of steam to pass into the cylinders.

The screw *v* of the arm *t* enables the above arrangement to be regulated as required by the engineer.

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

1. A locomotive-engine in which the cylinders are provided with a single valve-chest, *C*, arranged between and communicating with the said cylinders, substantially as herein set forth.

2. The valve-chest *C*, divided by a partition, *a*, into two equal compartments, *x* and *y*, provided with oscillating valves *H* and *H'*, all substantially as specified.

3. The slide-box *F*, with its valve *d*, arranged in respect to the valve-chest *C* and ports *e e'* and *f*, substantially as herein described.

4. The combination of the slotted valve-arms *l* with the eccentric rods *j*, when the latter are connected with devices by means of which the stroke of the valves, and the supply of steam to the cylinders, may be proportioned to the work to be performed by the locomotive, all substantially as herein set forth.

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

JOHN S. STUART.

Witnesses:

JOHN WHITE,
HARRY SMITH.