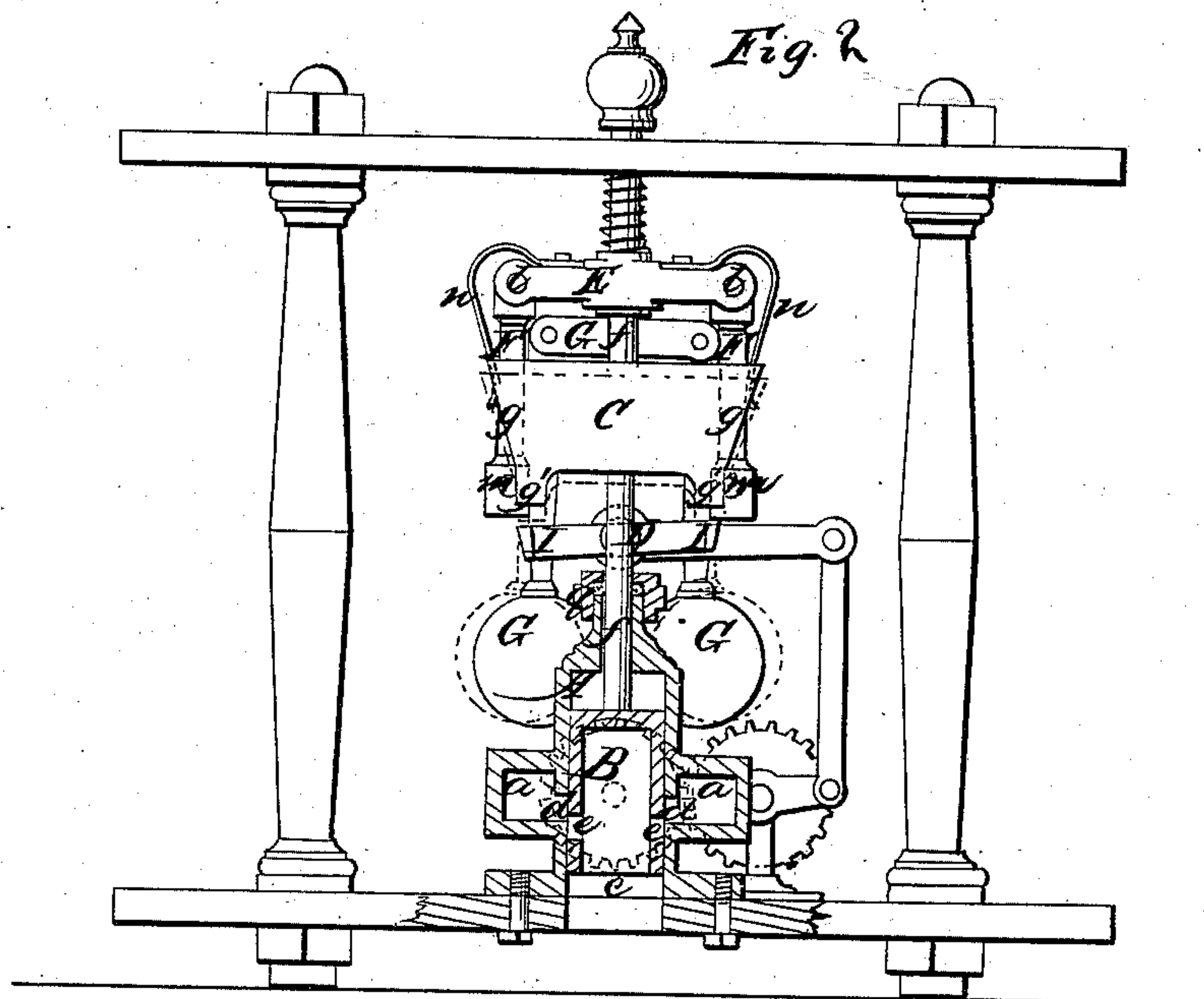
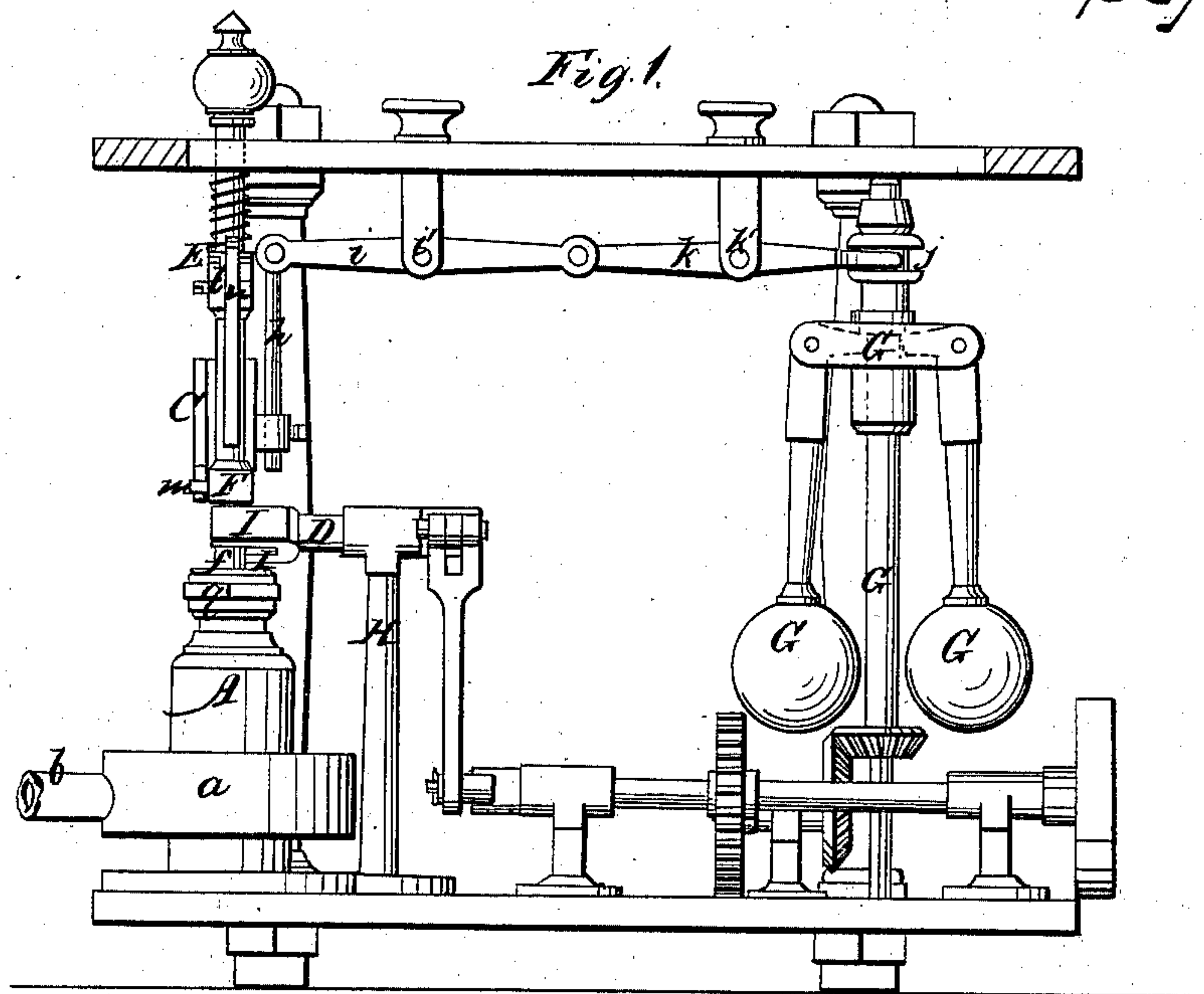


C. H. Reynolds,

Steam Cut-Off.

No. 15,745.

Patented Sep. 16, 1856.



UNITED STATES PATENT OFFICE.

CHAS. H. REYNOLDS, OF LEWISTON, MAINE.

VARIABLE CUT-OFF FOR STEAM-ENGINES.

Specification of Letters Patent No. 15,745, dated September 16, 1856.

To all whom it may concern:

Be it known that I, CHARLES H. REYNOLDS, of Lewiston, in the county of Androscoggin and State of Maine, have invented a new and Improved Variable-Cut-Off Motion for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are elevations at right angles to each other of a governor and cut off with my invention applied, Fig. 2 showing the cut off in section.

Similar letters of reference indicate corresponding parts in both figures.

This invention is applicable directly to the induction valves of a steam engine when separate induction and eduction valves are used for each end of the cylinder or to a separate cut off valve arranged in the induction pipe to act independently of the valve or valves which regulate the induction and eduction of the steam.

It consists in a novel arrangement of mechanism, connecting the valve or valves with the governor for the purpose of varying the closing movement of the valve or valves to regulate the engine.

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

The drawing illustrates the application of my invention to a cut-off which is independent of the induction and eduction valves.

The cut-off represented is of the kind known as the hollow cylinder valve and is a balanced valve, but a puppet valve may be used with precisely the same arrangement of mechanism.

A, is the valve box, which consists of a hollow cylinder with an opening *c*, at the bottom, for the connection of the steam pipe leading to the engine and with a hollow band *a*, surrounding it, and having an inlet *b*, to which is to be connected the pipe coming from the boiler. The hollow band *a*, communicates with the exterior of the box by ports *d, d*, which extend nearly all around it. The interior of the box is bored out truly and the hollow cylindrical valve B, is turned and ground to fit the box. The valve is open at the bottom and has ports *e, e*, in its sides, forming the only way by

which the steam entering the band *a*, can escape from the ports *d, d*, to arrive at the outlet *c*. When the ports *e, e*, are out of communication with the ports *d, d*, the latter are closed and steam can pass to the outlet *c*, and consequently the steam is cut off. The opening of the ports *d, d*, is effected by lifting the valve and the closing of them by dropping it. The valve is lifted by an upright stem *f*, working through a stuffing box *g*, in the top of the box A. The puppet or any other valve, if used, would be lifted by means of a similar stem.

The above described valve forms no part of the invention but is described to illustrate the action of the variable cut-off motion which I will now proceed to describe.

The valve stem *f*, has fitted loosely to it with a sliding socket a flat plate C, whose edges *g, g*, incline toward each other from the top nearly to the bottom as shown in Fig. 1, leaving a small portion *g'*, at the bottom, parallel with the stem. This socket is suspended by a rod *h*, from one end of a lever *i*, which works on a fixed fulcrum *i'*, and connects, at its other end, with one end of another lever *k*, which works on a fixed fulcrum *k'*, and has a fork at its other end entering a groove in the slide *j* of the governor G. The governor represented is the common centrifugal ball governor but a pneumatic or other governor may be used. By the above arrangement of levers, the governor, which, by an increase of velocity, has its slide *j*, drawn down, and by a diminution of velocity, has its slide raised, is made in the former case to depress and in the latter to elevate the plate C, on the valve stem. Above the plate C, the valve stem has a cross head E, rigidly secured to it and at opposite ends of this cross head are suspended by joints *l, l*, two rods F, F, each of which carries a stud *m*, and two springs *n, n*, are attached to the cross head to act upon the rods F, F, in such a manner as to keep the studs *m, m*, in contact with the edges *g, g*, of the plate C, one with one edge and the other with the other one.

Below the rods F, F, are situated two bent arms I, I, which branch in opposite directions from a rock shaft D, arranged in a suitable bearing or bearings in a standard H, said rockshaft receiving through any suitable mechanical means, one rocking movement back and forth for every revo-

lution of the engine, by which means each rod I, is made to lift that rod F, which stands above it and thus the valve stem is lifted twice in every revolution of the engine or once in each stroke of the piston, said lifting movement taking place as or just before the piston arrives at the end of its stroke to bring the ports *e, e*, of the valve opposite the ports *d, d*, and thereby admits steam to the engine. As the valve stem is thus lifted, the studs *m, m*, in moving up the inclined edges of the plate C, are forced apart, thus forcing the rods F, F, apart until they escape from the arms I, I, when the valve being unsupported, falls or is caused to descend either by its own weight or by the action of a spring *p*, applied above the cross head E, thus causing the ports *e, e*, to move below those *d, d*, and cut off the steam. The fall of the valve and the cutting off the steam take place sooner or later during the movement of the piston, according as the plate C, is held in a lower or higher position by the greater or less velocity of the governor, and by that means the governor is caused to regulate the velocity of the engine by its action on the valve. When the valve is down, the studs *m, m*,

rest against the lower and parallel portions *g', g'*, of the edges of the plate C. 30

If the governor be applied directly to the main induction valves without a separate cut-off, each valve stem will require to be fitted with a plate C, resembling one half of the plate C, represented, and with one lifting rod F, applied in connection therewith, in the manner represented, and the two arms I, I, will require to be so arranged relatively to the lifting rods F, F, that one arm will lift one valve and the other the other valve. 35 40

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

The arrangement of the suspended lifting rods F, F, with their studs *m, m*, secured to the valve rod or rods and operated on by the arms I, I, of a rockshaft, and the plate or plates C, with beveled edges *g, g*, sliding on the said valve rod or rods, said plate or plates being operated on by the governor and operating on the lifting rods substantially as herein described. 45 50

CHARLES H. REYNOLDS.

Witnesses:

NELSON B. REYNOLDS,
SAML. STEINMETZ.