

Mackintosh & Wadsworth,

Rotary Steam Valve.

No 21,235.

Patented Aug. 17, 1858.

Fig. 2

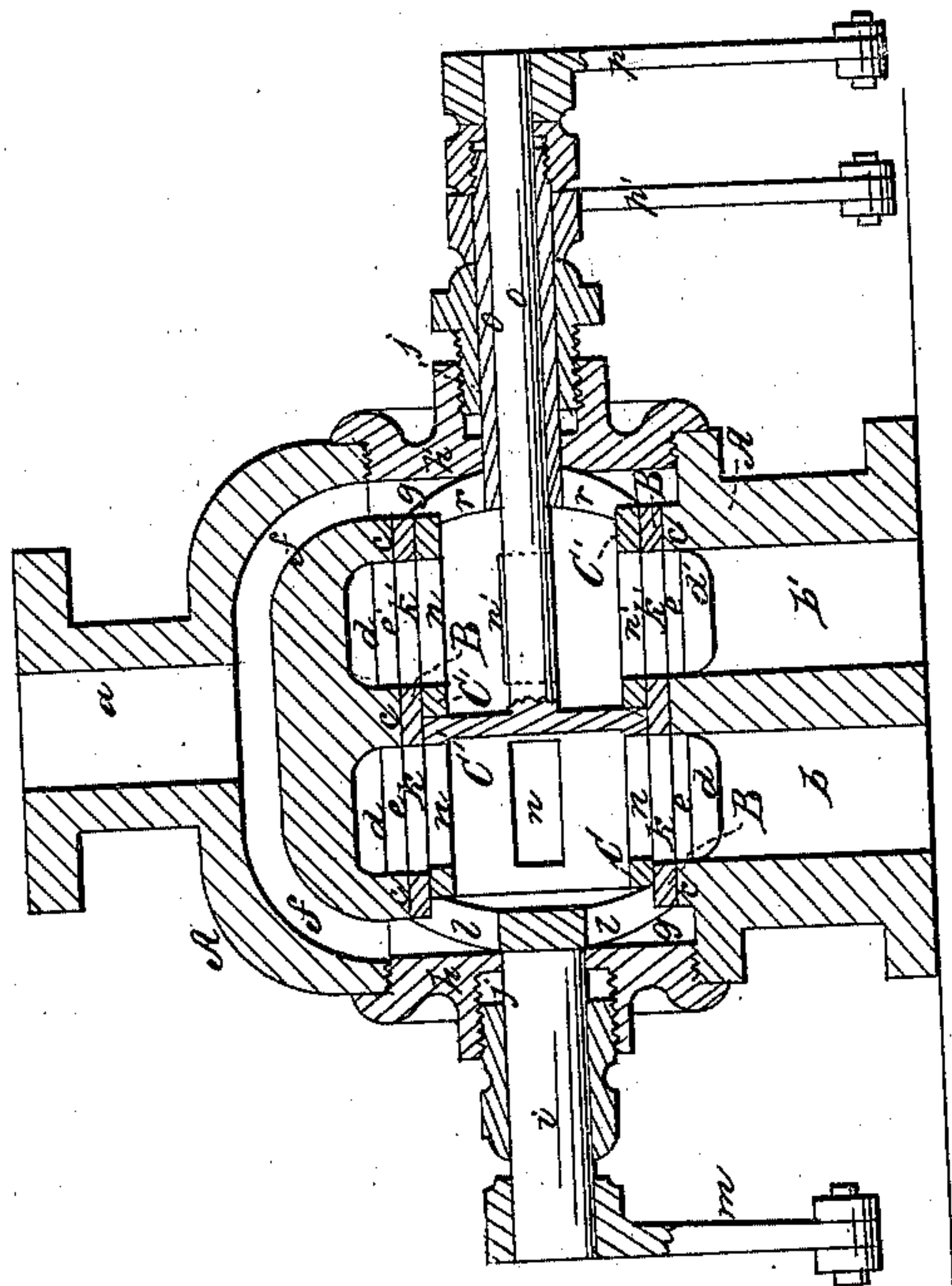
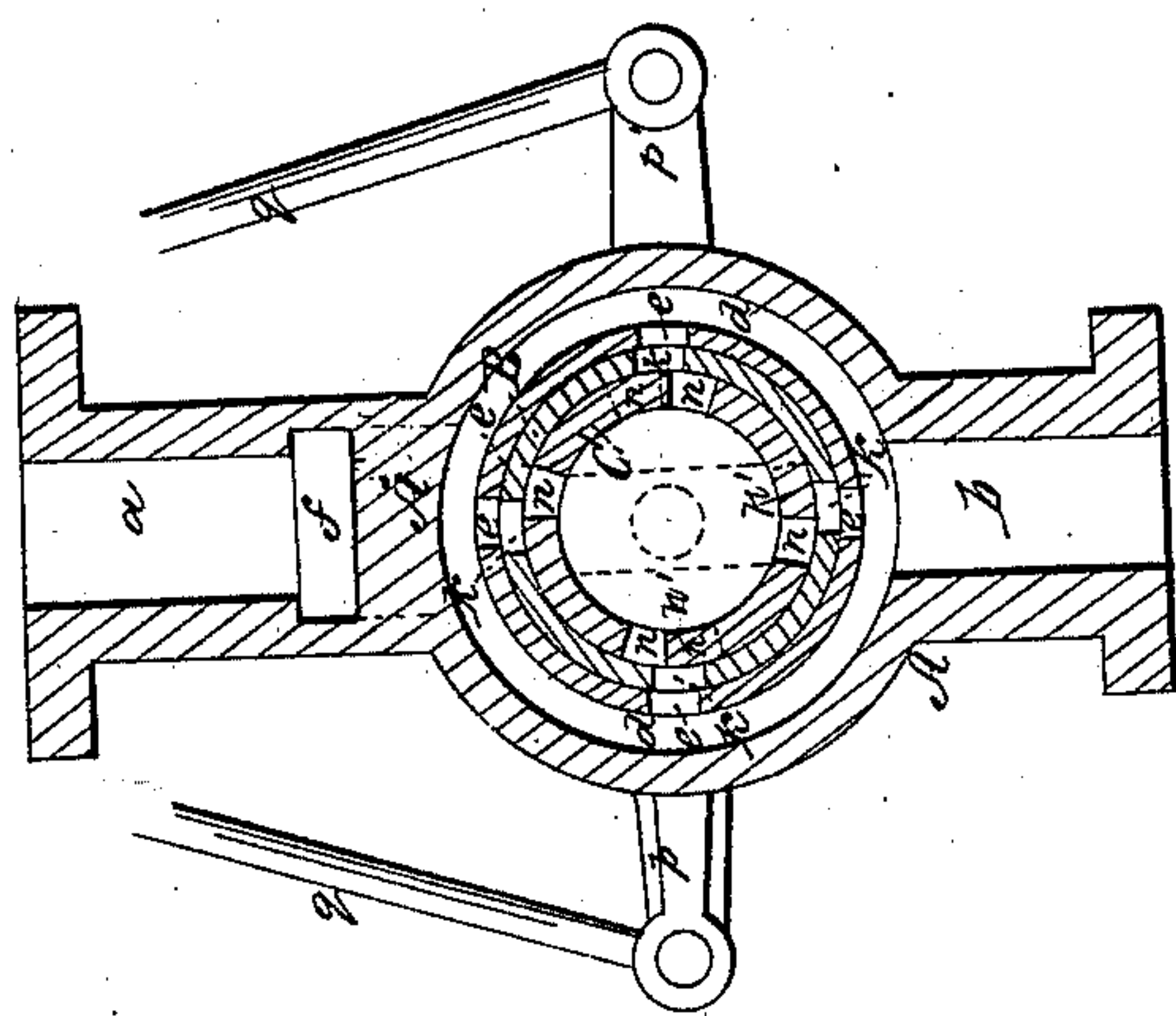


Fig. 1



UNITED STATES PATENT OFFICE.

W. S. MACKINTOSH AND S. WADSWORTH, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO
CRIDGE, WADSWORTH & CO., OF SAME PLACE.

STEAM-VALVE.

Specification of Letters Patent No. 21,235, dated August 17, 1858.

To all whom it may concern:

Be it known that we, W. S. MACKINTOSH and SAMUEL WADSWORTH, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Combined Cut-Off and Governor Valves for Steam-Engines; and we 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 sections at right angles to each other of a valve-box with cut-off and governor valves arranged according to our invention.

Similar letters of reference indicate corresponding parts in both figures.

This invention consists in a novel arrangement of hollow rolling balanced or partially balanced valves, which affords great convenience for adjustment to cut off the steam at such point in the stroke of the engine as may be desired under the average or usual load of the engine and the average or usual pressure of steam, but which is capable of being controlled by a governor in such a manner as to vary the point of cut-off to meet variations in the steam pressure or load on the engine, and thereby regulate the velocity of the engine.

To enable others to make and use our invention, we will proceed to describe its construction and operation.

A, is the valve-box, having an inlet *a*, to which is connected the steam pipe, and two outlets *b*, *b'*, leading to opposite ends of the steam cylinder.

c, *c*, is the valve seat which may be of cylindrical or slightly conical form to receive the hollow valve B, whose exterior is of corresponding form, but its interior always of cylindrical form. Around the outside of the seat *c*, *c*, there are two annular passages *d*, *d'*, one communicating with each of the outlet passages *b*, *b'*; said annular passages communicating with the valve seat through straight ports *e*, *e*, *e'*, *e'*, of which there may be several at equal distances apart; the ports *e*, *e*, being in line with *e'*, *e'*. From the inlet *a*, there are two passages *f*, *f*, which lead to spaces *g*, *g*, between the movable heads *h*, *h'*, of the valve box and the open ends of the valve seat. The valve B, has two sets of straight ports *k*, *k*, and

k', *k'*, corresponding in number, size, and arrangement with the two sets of ports *e*, *e*, and *e'*, *e'*, in the valve seat. The stem *i*, of said valve passes through a stuffing box *j*, in the movable head *h*, of the valve box, said stem being attached to the valve by arms *l*, *l*, which allow the steam to enter freely the interior of the valve, both ends of which are open. The stem *i*, is furnished outside the box with an arm *m*, which is connected with an eccentric on the main shaft of the engine, or its equivalent.

C, C', are two hollow cylindrical valves fitted to the interior of the valve B; the former C being provided with a series of ports *n*, *n*, corresponding in number, size, and arrangement with *k*, *k*, in the valve B, and *e*, *e*, in the valve seat *c*, *c*, and the latter C', being provided with a similar series of ports *n'*, *n'*, corresponding with *k'*, *k'*, and *e'*, *e'*. The valve C' is open at both ends and furnished with a tubular stem *o'*, which is connected with it by rigid arms *r*, *r*, and which works through a stuffing-box *j'*, in the movable head *h'*, of the valve-box. The other valve C is open at its outer end only, and its inner end which is next to C', is closed to separate its interior from the interior of C', and the stem *o*, of valve C passes through the tubular stem *o'*, of the valve C'. The valve stems *o*, and *o'*, are provided respectively outside the valve box with arms *p* and *p'*, by which they are connected with a governor; said valves C, C', having the ports of one so arranged relatively to those of the other, that the ports of both will be at the same time opposite to their respective ports *e*, *e*, *e'*, *e'*, in the seat; but the arms *p*, and *p'*, being arranged in opposite directions, so that the movements of said valves produced by the governor will be in opposite directions.

This arrangement of combined cut-off and governor valves may be employed with an ordinary slide valve or any other valve or system of valves for the induction and eduction of steam.

Its operation is as follows:—The steam entering the valve box at *a*, passes along the passages *f*, *f*, into the spaces *g*, *g*, and thence to the interior of the valves C, C', whence it passes through the ports *n*, *k*, *e*, and *n'*, *k'*, *e'*, into the annular passages *d*, *d'*, and thence into the passages *b*, *b'*, leading to the ends of the steam cylinder. The

valves, if cylindrical, are balanced on all sides, except that there will be a pressure of steam on their stems. The motion derived by the valve B, or its equivalent must
5 be equal to twice the width of the ports k, k' , or e, e' , so that, as or before the movement of the valve in either direction is completed, a full width of opening of the ports e, e , and e', e' , is produced. The point of
10 cutting-off is determined by the position of the valves C, C'. If the said valves are in such position that their ports n, n , and n', n' , are directly opposite the ports e, e, e', e' , there will be no cutting-off; but by
15 moving said valves more or less from that position, the valve B will be caused to cut off the steam earlier or later in the stroke of the piston, till by moving them to bring their ports entirely out of range with the
20 ports e, e, e', e' , the steam will be entirely shut off from the engine; hence it is obvious that the cut-off may take place at any

point between the commencement and termination of the stroke. The drawing, Fig. 1, represents the valves C, C', in position to
25 cause the steam to be cut off just beyond half-stroke. By shortening or lengthening the rods q, q' , which connect the arms p, p' , with the governor, by suitable means provided for that purpose, the cut-off can be
30 varied without interfering with the operation of the governor.

What we claim as our invention, and desire to secure by Letters Patent, is:—

The within described arrangement of the
35 three hollow valves B, C, C', with their stems and ports and the passages in the valve-box; the whole operating substantially in the manner set forth.

WILLIAM S. MACKINTOSH.

SAMUEL WADSWORTH.

Witnesses:

AUG. HARTJE,

HENRY AURHUTZ.