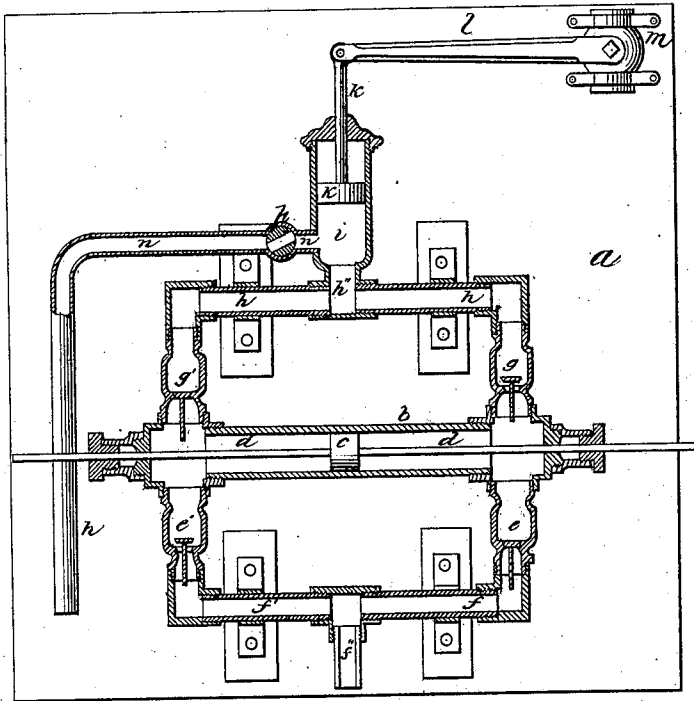


J. H. & C. E. Randall,

Governor.

N^o 82,874.

Patented Oct. 6, 1868.



Witnesses

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JOHN H. RANDALL AND CHARLES E. RANDALL, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 82,874, dated October 6, 1868.

IMPROVEMENT IN STEAM-ENGINE GOVERNORS.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that we, JOHN H. RANDALL and CHARLES E. RANDALL, both of Boston, in the county of Suffolk, and State of Massachusetts, have invented a new and improved "Hydraulic Regulator for Steam-Engines, Water-Wheels, &c.," of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, making a part of this specification, and representing a vertical longitudinal section of the regulator.

The object of our invention is to produce a simple, inexpensive, and efficient regulator for steam-engines, water-wheels, &c., but which is more particularly adapted for marine engines.

Another object is to simplify the transmission of motion, so as to operate the regulator directly from the main moving parts of the engine, without interposition of pulleys, belts, gears, and shaftings.

And our invention consists in the employment of fluids for operating the throttle-valve, cut-off, or shut, and for regulating the speed of engines or other motors by means of raising the fluid from a tank by a double-acting force-pump, and connecting the delivery-pipe with a second cylinder, which is provided with a piston and piston-rod, the latter being attached to the lever of a throttle-valve.

A waste-pipe is attached to the second cylinder, at a point below the lowest position of the piston, for the purpose of discharging the fluid, through a cock, back into the tank or reservoir.

My invention consists, further, in the arrangement of a cock with the waste-pipe, at such point between the cylinder and the tank, for the purpose of increasing or decreasing the flow of the fluid through the same; the cock being provided with a handle, to be operated according to the option of the attendant.

Referring to the drawings, *a* represents a plate or part of the frame of the engine, to which is attached the pump-cylinder *b*, which is provided with the piston *c* and piston-rod *d d*, extending through the heads of the cylinder, and which may be attached, by an arm, directly to the piston-rod of a steam-engine, and thus give the piston of the pump the full stroke of the engine, or it may be attached to an eccentric on the main shaft, and then give the piston any desired length of stroke.

To the lower portion of the pump-cylinder *b*, and near its heads, are attached the receiving-valves *e e'* and pipes *f f'*. The end *f''* extends into a tank or reservoir filled with fluid.

At the upper portion of the pump-cylinder *b*, and opposite to the receiving-valves *e e'*, are placed the delivery-valves *g g'*, connecting, by means of the delivery-pipes *h h' h''*, the cylinder *b* with the second cylinder *i*, which latter is provided with the piston *k* and piston-rod *k'*, and communicates motion, by means of lever *l*, to the throttle-valve *m*.

To the lower portion of the cylinder *i* is attached the waste-pipe *n*, with the cock *p*, and which conducts the fluid back into the tank.

The operation of this regulator is as follows:

The action of the pump, when the engine is in motion, forces the fluid constantly up into the second cylinder *i*, and also into the waste-pipe *n*, which latter is provided with the cock *p*. The latter is opened so far only as to allow a quantity of fluid to pass through, and which has been previously raised by the pump at a certain speed of the engine, but as soon as this speed increases, more fluid will be forced into the cylinder *i* than can readily escape through the cock *p*, and consequently the piston *k* in said cylinder will be raised, operating on the lever *l*, and closing the throttle-valve, until the speed of the engine is thus reduced to the desired velocity.

To increase the speed of the engine, it is simply required to turn the cock *p*, so as to increase the opening through it, and thus facilitate the flow of the fluid, and *vice versa*.

Thus it will be seen that any sudden change in the speed, as on marine engines, produces immediately the required setting of the throttle-valve or cut-off, without danger of slipping belts or breaking cogs.

The fluid used may be water, alcohol, oils, air, mercury, or any other suitable substance, as the fluid is used over and over again.

To secure an even and exact working of the regulator, the parts should be so arranged as to raise equal

quantities through the receiving and delivery-valves respectively, and, when thus properly proportioned, the piston *k* will be at rest until a change in speed of the engine occurs.

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

1. The combination of the double-acting force-pump with the pipe *h''*, cylinder *i*, and with the throttle-valve *m* and waste-pipe *n*, as herein specified.

2. The arrangement of the cock *p* with the waste-pipe *h*, cylinder *i*, pipe *h''*, and double-acting force-pump, substantially as herein set forth.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

J. H. RANDALL.

C. E. RANDALL.

Witnesses:

J. H. COPPERHAGEN,

J. H. ADAMS.