A. Gregory,

Governor.

No. 8,345. Patented Sep. 9, 1851.

Fig. 1.

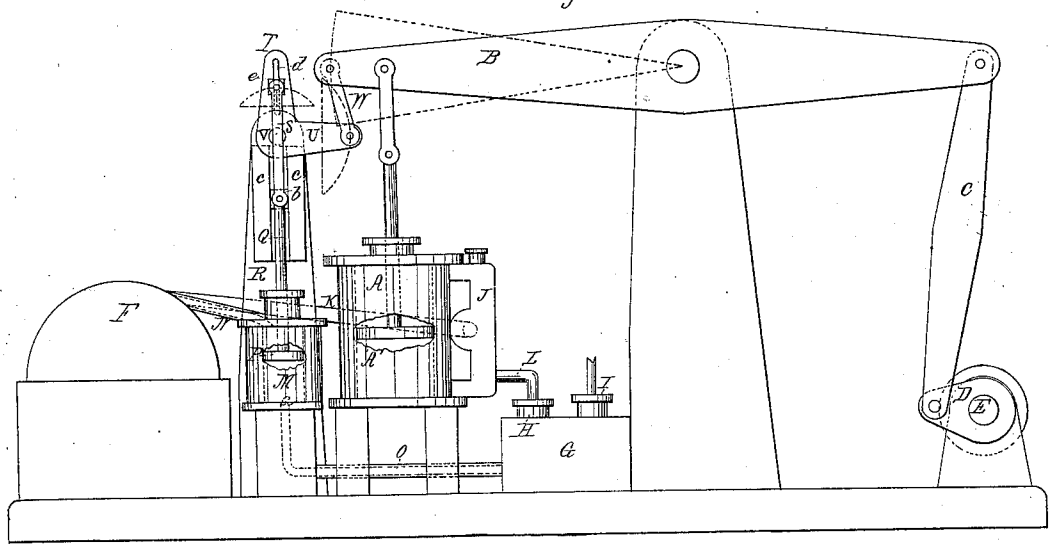
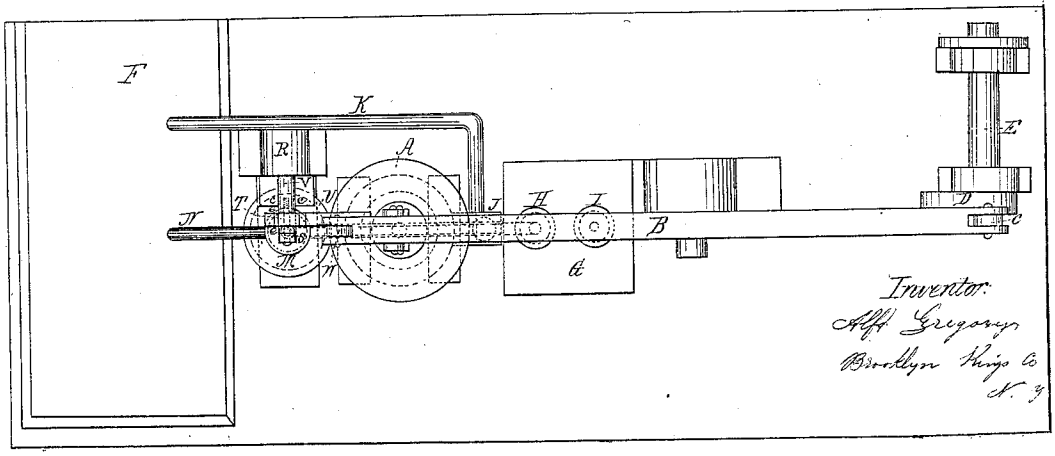


Fig. 2.



Inventor:
Alfd Gregory
Brooklyn Kings Co
N. Y.

UNITED STATES PATENT OFFICE.

ALFRED GREGORY, OF BROOKLYN, NEW YORK.

EQUALIZER OR POWER-REGULATOR.

Specification of Letters Patent No. 8,345, dated September 9, 1851.

To all whom it may concern:

Be it known that I, ALFRED GREGORY, of Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements on the Apparatus known as an "Equalizer" for Steam and other Engines, which improved apparatus I denominate a "Power-Regulator;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a side view of a beam condensing engine with the power regulator attached, (the cylinders being represented broken to show the position of the pistons). Fig. 2, is a plan of the same. The same letters of reference point out similar parts in both figures.

The nature of my invention consists in causing the steam, gas, or other propelling medium, contained in the boiler or reservoir, which supplies the engine, to operate (in lieu of air under ordinary atmospheric pressure as heretofore) upon the piston of the "equalizer" the said piston being connected with the engine or other mover and operating therewith in a similar manner as with former "equalizers" or in any other appropriate way.

To enable others skilled in the art to make and use my invention I will proceed to describe its construction and operation. Before however commencing so to do, and with reference to the arrangement selected for illustration, it may be advisable to state, that my improved apparatus is here intended to have for its object or performance, the reduction of irregularity in force of an engine, when steam worked expansively is used, it being however also applicable to other prime, subsidiary or counter movers, deriving their effect from similar or other elastic force or pressure for the production of the same or similar results; and further, any suitable arrangement of parts may be adopted according to will or the description of engine or other mover, my improved apparatus is intended to be attached to, such arrangement or application producing no essential difference in the effect and being substantially the same as the following example selected for illustration, in which my improved "equalizer" or what I denominate a power regulator is shown connected with an ordinary beam condensing steam engine, of which A is the cylinder, A^1 the engine piston giving motion to the beam B, C the connecting rod, D the crank and E the driving shaft.

F is the steam boiler for supplying the engine, G the cold well containing the condenser H and air pump I.

J is the valve box which may carry any suitable slide valve within it, or any other appropriate form of valve may be used and fixed or variable "cut-off" employed.

K is the pipe conveying the steam from the boiler to the engine and L is the escape pipe connected with the condenser.

M is the regulator (or "equalizer") cylinder, of any convenient depth, N a pipe establishing a communication between the steam capacity of the boiler and cylinder M at its top; O a pipe establishing a communication by passage *a* Fig. 1, between the condenser and cylinder M at its bottom, which relative position of the pipes N, O, however, for a modified arrangement of working, may be reversed or otherwise varied, and the steam pipe N, only, if desired, be used.

P is the regulator piston within the cylinder M, it is shown to receive its reciprocating motion of two strokes for one of the engine in the following manner.

Q is the rod of the piston P, guided in a perpendicular direction by a block *b* working in between guide pieces *c*, *c*, attached to the standard R.

S is a connecting rod for operating the piston P; the rod S is worked from an arm T, which together with another arm U, constitutes a bell crank, that is made to vibrate on a shaft V through means of a rod W attached to the end of the engine-beam; the point of attachment of the rod S on the arm T may be varied through provision made by a slot *d*, the rod S being secured to the arm T by friction nuts *e*, *e*, and bolt passing through the slot *d*, so that by varying the point of attachment of the rod S on the arm T a greater or less length of stroke is given to the piston P for the purpose of making more or less powerful, as required, the effect of the regulator or equalizer; any other mechanical arrangement however, for driving or working the piston P may be adopted. The piston P, it will be seen, by reference to the arcs described (shown in Fig. 1) of the arms T

and U, receives, in an easy manner, the necessary movement of two strokes for one of the engine piston.

In the operation of my improved apparatus, supposing steam to be cut off early in the engine stroke, then the attendant variableness of propelling power as caused by the expansion of the steam, is, by the adoption of an "equalizer," as described, rendered less important, and a similar effect, approximating toward an equality of driving force, produced, as is the case with other equalizers where a vacuum has been employed, but by connecting the equalizer with the boiler, not only is the equalizer rendered, for a given compactness, more powerful, by reason of, say steam at high pressure, operating upon it, but also a self adjusting effect given it, which causes it to maintain a fixed relative force whatever may be the fluctuation of the propelling medium driving the engine, by reason of the piston P and engine piston both being operated upon by the same propelling medium derived from the same boiler or reservoir; which improvement I claim to be new, and to possess great advantage, for, where the apparatus is connected with a condensing engine as represented, and the vacuum of the condenser brought also to bear upon the opposite face of the piston P as shown, (which latter arrangement, of vacuum alone, without the assistance of the steam or propelling medium is not new) then, by the combination of forces as described, a fixed relative effect is given to the "equalizer" whatever may be the fluctuation in the boiler or condenser; or, if the apparatus be attached to a noncondensing engine, then the steam alone operating upon one face of the piston P while its opposite face is exposed to the atmosphere, causes also a fixed relative effect of "equalizer" with the engine to be maintained, as is the case in the previous instance described, no matter what fluctuation of propelling medium may occur, which advantage is for the most part the aim of my invention, and invests the equalizer with a more perfect selfadjusting proportionate effect than has hitherto been gained by the sole employment of a separate force to that which drives the engine.

The action otherwise of my apparatus, it will be seen differs not materially, from that of other equalizers, it acting alternately as a drag and auxiliary during a performance of the engine piston's stroke either way, for the establishment of an equalization of force or effect approximating thereto; which action it is unnecessary further to describe, and also equally unnecessary to specify the many instances of the applicability of such improved apparatus; but having thus fully set forth that which forms my invention, I will proceed distinctly to state, that I do not claim the mere employment, as an "equalizer" or regulator, of a piston operated by, and acting against pressure, alternately, each stroke, the said piston having two strokes for one of the engine or other mover it works in connection with, as such has already been done, nor do I, claim, separately, exposing the equalizer piston to the vacuum of the condenser. But—

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

The use of steam, or other gas, to operate upon the piston of the power regulator or "equalizer," the said steam or gas being derived from the same reservoir that supplies the engine.

ALFRED GREGORY.

Witnesses:
HENRY T. BROWN,
A. R. HAIGHT.