R. G. Eunson,

Compressing Air.

No. 2,786. Patented Sep. 23, 1842.

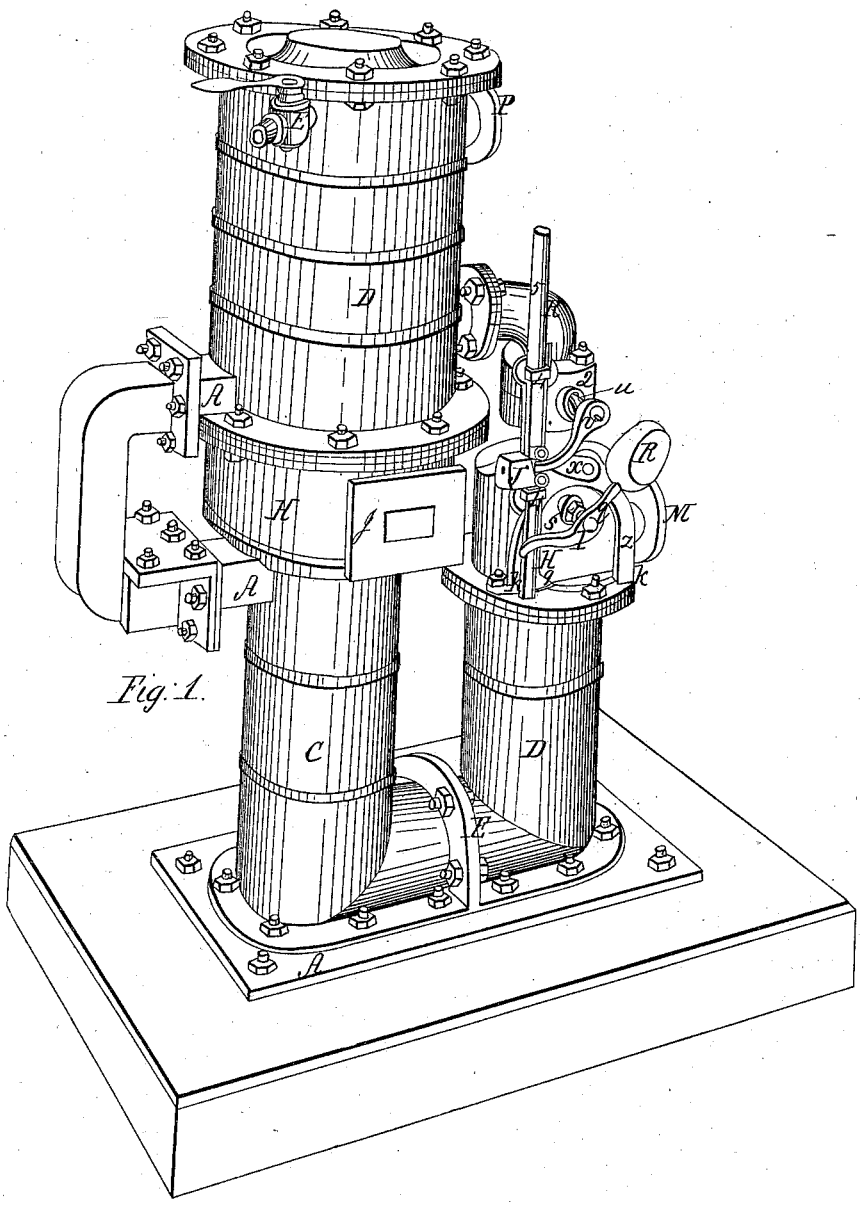

Fig: 1.

UNITED STATES PATENT OFFICE.

ROBERT G. EUNSON, OF NEW YORK, N. Y.

MODE OF DISCHARGING WATER AND AIR FROM THE CONDENSERS OF STEAM-ENGINES.

Specification of Letters Patent No. 2,786, dated September 23, 1842.

To all whom it may concern:

Be it known that I, ROBERT G. EUNSON, of the city of New York, in the county and State of New York, have invented a new and useful Hydrostatic Pump for Pumping the Water and Air from the Condenser of Steam-Engines; 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 annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view; Fig. 2, a longitudinal elevation; Fig. 3, a transverse elevation; Fig. 4, a longitudinal section; Fig. 5, a transverse section; Figs. 6 and 7 details.

Upon a solid foundation, and as near to the steam cylinder as practicable I place the bedplate A Figs. 1, 2, 3 and 4 fastening the same with screwed bolts, in which plate is the cove B Fig. 4. Upon this plate I place the barrels C and D of the pump and joint and fasten them to it by the flanges with screw bolts, and also to each other by the flanges with screw bolts as at E Figs. 1, 2, 3 and 4; making the communication F Fig. 4 of the barrel C with the barrel D of the same diameter as C and D, the upper end of the barrel C is enlarged so as to admit the valve seat *g*, Fig. 4, and leave the opening as large as the barrel, across the valve seat is guiding bar *h*, through which passes the guiding rod of the lifting valve G, Fig. 4, which valve opens into the receiver H, which is placed upon and bolted to the barrel C by the flanges 2, Fig. 4, in the receiver is the waste pipe I, Figs. 1, 2, 3, placed sufficiently high to allow the valve *g* to be always covered with water; on the receiver and bolted to it by the flanges is the condenser D which is of the common form and construction and furnished as is usual with injection pipe shut by injection cock E, Figs. 1, 2, 3, steam pipe P, foot pipe A shut by foot valve B, Fig. 4 (and also a strainer of sheet iron perforated full of holes and placed just below the injection cock see 10, Fig. 4, and also a side pipe or small steam pipe from the boiler used for admitting steam into the condenser previous to starting the engine commonly called blowing out the condenser, side pipe not represented in drawings) the condenser may be placed in any convenient place so that the bottom of it is not below the level of where the foot pipe A enters the barrel C which should be as near the top as possible. On the top of the barrel D and fastened to it by flanges and bolts, is the top piece C, communicating with the steam cylinder by its lower exhaust pipe, being jointed and bolted to the pipe M, so as to admit the steam from below the piston into the barrel D (while the steam from above the piston passes directly into the condenser by the steam pipe P which is jointed and bolted to the exhaust pipe at the upper end of the steam cylinder the cylinder is in this case supposed to be perpendicular,) and also with the condenser by the pipe N, fastened to N is the throttle valve seat Q, and connects it with the condenser by the elbow pipe R, in the seat Q is the throttle valve O, of the usual construction opened and shut by the spindle *t*, Figs. 4 and 5, passing through the stuffing box *u*, Fig. 5, and packed in usual manner. Through the top piece C, and stuffing boxes S, S, Fig. 5, passes the shaft L, which consists of two parts, the one fitting over the other as a sleeve and extending half way between the bearings *a*, *a*, Fig. 5, on these shafts are fitted and keyed respectively the hubs *b*, and *c*, Figs. 4, 5, of the levers forming the upper part of the expanding chain *e*, *e* and *d*, *d*, and suspended in the barrel D, this chain consists of two grand parts see Fig. 5 fastened to each other at *e*, *e* by a pin or stud fast into one and turning into the other the respective levers of each part are fastened to each other by a pin or stud as above at *d*, *d*, to the lower extremity of this chain is suspended the float G, Figs. 4, 5, which is of cast iron and hollow, consisting of two parts, the top jointed with some nonconducting substance (so as to retain the heat received from the steam) and bolted on to the lower part, as this float rises in D, the joints *d*, *d*, Fig. 4, recede from each other, and the joints *e*, *e*, approach, turning the levers *b*, *c*, consequently the shafts L, reversely.

To the top piece C, Fig. 2, is bolted at *k*, *k*, the cast iron frame Z, to which is fastened at *y*, Figs. 1, 2, 3, upon a pin or stud on which it moves the lever *x*, on the ex-

tremity of which is the slide 3, Fig. 7, with friction rollers, to the frame Z is fixed the keepers 4, 4, within these slides the rod 5, to which is fastened the spring F, Fig. 6, alongside of which also within the keepers slides the slide H, Fig. 6, also 1, 2.

The lever *v* is keyed on to the spindle *t*, Fig. 5, of the throttle valve O in such a manner that the valve is open when the lever is in the position seen in Figs. 1, 2, 3, and shut when in the position in Fig. 7, for lines of lever *v* see, Fig. 7, the arm of *v* being placed between the rollers of slide 3 Fig. 7, as seen in Fig. 1, 2, the lever *x*, moving upon the face of the rod 5, spring F, and slide H, Figs. 1, 2, 6, the rod 5, being worked by a cam from the engine, and having sufficient range downward to carry the catch 7, Fig. 6, of the spring F, below the under edge of the lever *x*, as in Fig. 2, and upward to carry the catch 6 of the spring F under the upper keeper 4, Fig. 2, which forces the catches 6 and 7, of the spring F backward to the face of the rod 5, when the lever *x* which had been engaged by 7, F, Fig. 6, and carried upward with it, is disengaged, and the catch 8 of slide H resting upon the top of lever *x* has been carried up with it, and the slide 3, Fig. 7, having reached that part of the lever *v* which is an arc of a circle whose center is in *y* consequently concentric with the motion of lever *x*, the weight of J, upon the end of *v* in Figs. 1, 2, presses upon the roller of slide 3, lever *x* and pin *y*, and the valve remains shut until further acted upon. The levers *q q* bearing the counterpoises R, R, being keyed on the two parts of the shaft L respectively so that a line passing through R, and L, Fig. 2 should be parallel with a line drawn through L, and *d* of lever *b* of chain in Fig. 4, consequently R, R, counterbalance the float G, so as to keep one fourth of it above water, the float is made $\frac{1}{2}$ inch or more less in dia. than the barrel D so as to rise and fall with the water therein without friction, the arm I of the lever *q* descends as the float descends and in its descent comes in contact with the catch I of the slide H carrying with it the lever *x* and *x* the lever *v* opening the throttle valve just as the float has reached its downward limit.

Operation: The lower part of the pump being filled with water so that the top of the float rises to the level of the flanges of D, steam is let into the condenser by the side pipe, and immediately occupies the upper stratum forcing the air down through the foot pipe and foot valve into the upper part of the barrel C, and thence through the large lifting valve into the receiver, which being done, the steam is shut off and the injection cock E opened the water rushes into the condenser, is immediately broken up by the strainer and falls through the condenser like a shower bath, the steam is instantly condensed and vacuum produced. The water now descends by its own weight into the barrel C through the foot pipe and valve. The steam being admitted into the cylinder below the piston which rises, but a little before it reaches the top the rod 5 being drawn upward and the catch 7 F, Fig. 6, having engaged the lever *x* carries it upward and the slide 3, Fig. 7, as in 2d sliding upon lever *v* from J toward *v*, Fig. 2, continues to raise it until it reaches that part of *v* which is concentric with its motion when the throttle valve is shut and kept shut and the catch 6 F, Fig. 6, having passed under keeper 4 F is pressed in and *x* disengaged. The exhaust from the cylinder below the piston passes into the barrel D by the pipe M and presses with its whole force upon the float and water in D which having nothing to prevent its escape through the valve G into the receiver but the atmospheric pressure its return into the condenser through A being prevented by the foot valve B, the pressure of the steam being greater than the atmospheric pressure and weight of the water in C added, the water in D and consequently float descends and the water in C rises and lifting the valve G first forces out the air upon its surface and then the water that has accumulated during the operation. The water then flows away by the waste pipe J leaving enough however to cover the valve G and render it impossible for any air to leak into the barrel C, the float having descended to its limit, the arm I of the lever *q* has come in contact with the catch I of slide H and pressed it downward carrying with it the lever *x* and consequently *v* has opened the throttle valve, and the whole exhaust both from the cylinder and barrel D has rushed into the condenser. The equilibrium being thus restored between the barrels C and D the water in D rises and in C sinks to a common level filling the upper part of C with air from the condenser by the foot pipe A the steam from above the piston passes directly into the condenser by the pipe P, and is instantly condensed and so the operation proceeds.

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

The above mode of pumping the water and air from the condenser of steam engines, viz, by using the pressure of steam in place of the piston, in manner described *i. e.* by a pump consisting of two barrels of unequal height, the water in the lower being pressed upon by the steam, either by the exhaust from the cylinder, or by steam direct from the boiler in combination with the float, chain, shafts counterpoises valves,

&c., in manner described or any other substantially the same; and also the cutoff, viz., opening and shutting the throttle valve so as to prevent jarring by means of the curved lever v being acted upon by the lever x and slide and the lever x acted upon by the rod, spring catches, and slide in manner described or any other substantially the same, either as applied to my pump or for the common purposes of a cutoff.

ROBERT G. EUNSON.

Witnesses:

NATHL P. LABARTE,

JOSEPH PINE.