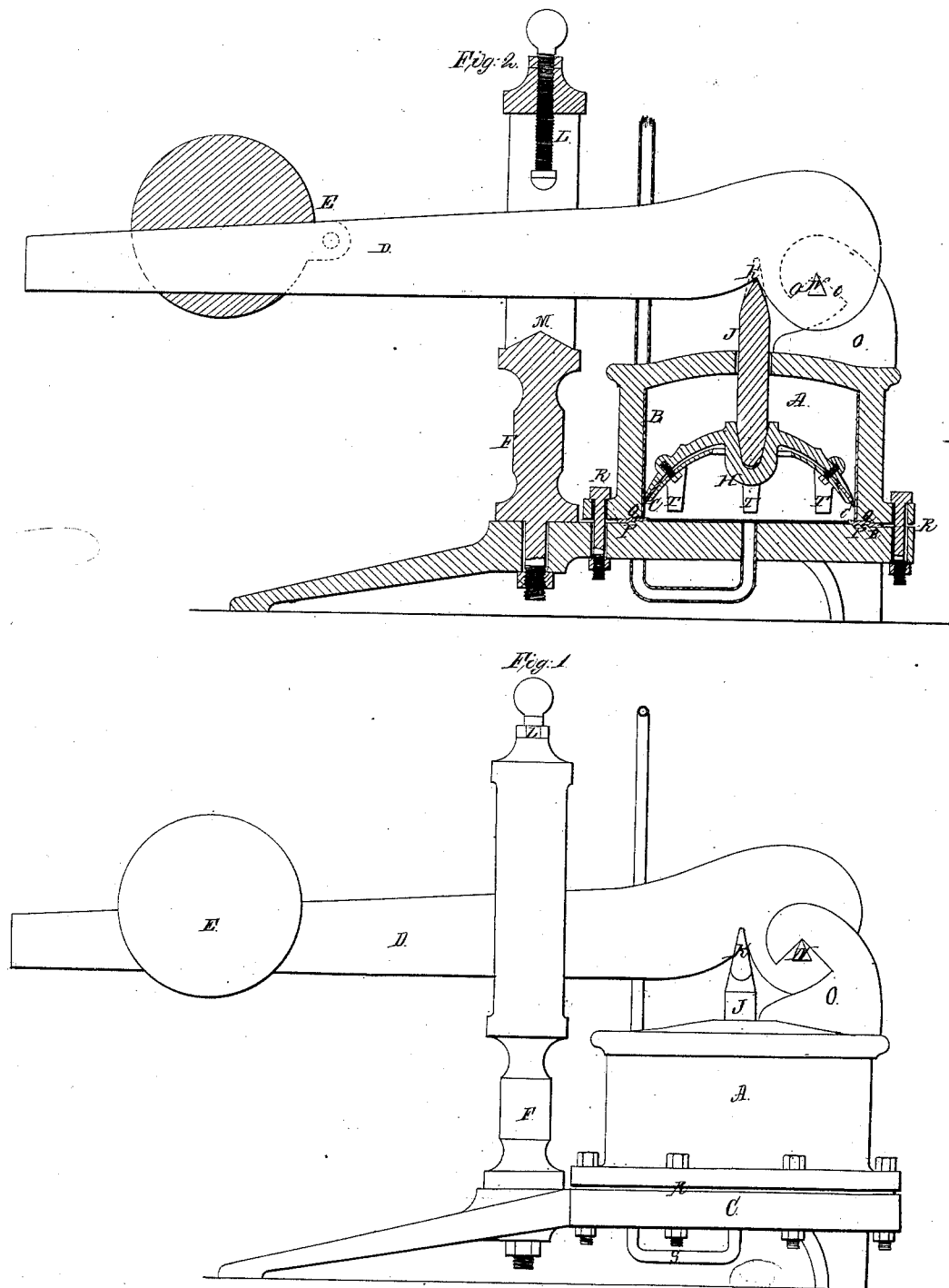


*W. Noyes,*  
*Boiler-Furnace Draft-Regulator.*  
*N<sup>o</sup> 45,429.      Patented Dec. 13, 1864*



# UNITED STATES PATENT OFFICE.

WILLIAM NOYES, OF NEW YORK, N. Y.

## IMPROVEMENT IN DAMPER-REGULATORS.

Specification forming part of Letters Patent No. **45,429**, dated December 13, 1864; antedated December 1, 1864.

*To all whom it may concern:*

Be it known that I, WILLIAM NOYES, of the city of New York, in the county of New York and State of New York, have invented a new and useful mode of making piston damper-regulators, for the purpose of saving the fuel used in the furnace under steam-boilers, by controlling and regulating the draft in the flue or chimney, or by operating upon the damper in the blower-flue, or by shipping and unshipping the belt of the blower, or by opening and closing the ash-pit door, as the case may require, of which the following is a specification.

I am aware that piston damper-regulators using the solid piston were made many years since, and were found objectionable on account of the unavoidable friction attending their operation. I am also aware that the well-known leather cup piston with a brass cylinder has been used and found objectionable for several reasons: First, the leather cup requires frequent oiling, which after a while gums up the leather and cylinder; second, the leather cup will be ruined by letting the steam or even hot water upon it when first letting the pressure in the boiler to the regulator; and, third, the cylinder, being of brass, will soon corrode, which will, together with the gumming of the leather cup, cause so much friction that it is but little, if of any, improvement over the solid piston.

I have endeavored to overcome all the above objections, and, in my estimation have invented many other valuable improvements in the piston damper-regulator, which I have satisfactorily proved by about fifteen months' working of some of my machines.

It will be plainly seen that my elastic vulcanized-rubber packing-ring combines many valuable and indispensable qualities: First, being of an elastic nature, it is rendered self-packing and self-conforming, and can be arranged so as to pack either loose or tight; second, it being vulcanized, it will allow the steam itself being let into the steam-pipe, and so on to the piston, without injury to the packing, as it will condense soon enough in the siphon to prevent any injury; and, third, it never requires any oil, but works better on water, (which is always upon it,) than with any other lubricator. I overcome the objec-

tion of corrosion on the cylinder by lining it with anti-friction and anti-corrosive metal, which, together with the various points claimed, will show that I have a simple, durable, and new mode, as I claim, of making piston damper-regulators; and I do hereby declare that the following is a full and accurate description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Letter A in the sectional drawings, Figure 2, represents the cylinder having a hole in the center of the top large enough to admit of the travel of the piston or fulcrum-pin J to pass through it without touching the sides; also, it has a pair of lugs or ears, O, on the top, and a flange on the bottom, for the purpose of allowing bolts to pass through it in order to secure it to the bed-plate C.

Letter B represents the lining or inner surface of the cylinder A, which I make of Phœnix metal, Babbitt metal, or their equivalents, on account of their anti-friction and anti-corrosive nature.

Letter C represents the bed-plate, to which the cylinder A is bolted, with a gasket, R, between, which forms the steam-joint. It also has a hole near where the cylinder A rests, which receives the standard F', and holes in its extreme ends, in order to secure it firmly when at its place of working.

Letter D represents the lever, with a V or triangular steel pin, N, in the large end, for the purpose of supporting the lever when resting on the fulcrum-pin J'. It also has a hole at its small end, to receive the rod which connects it to the damper-lever.

Letter E represents the adjustable weight, having a slot of sufficient width to receive the lever D with ease. It also has a lug or ear, in which is a screw, to secure it at any desired point upon the lever D.

Letter F represents the standard through which the lever D travels, and is secured to the bed-plate C by a nut from the under side, and has the lever set-screw L on it.

Letter G represents the elastic flexible ring, which I make of vulcanized india-rubber, gutta-percha, or their equivalents. I use it from one-eighth to one quarter of an inch in thickness and from one to one and a half inches wide, but do not confine myself to any

particular thickness or width. I make it about the same diameter as the piston H, but do not confine myself to any definite diameter, and then draw it out over the piston-ring I about three-eighths or a half of an inch, or to such an extent as will just form a tight joint or pack itself against the lining-surface B on the cylinder A, and at the same time not so tight as to cause any objectionable friction as the piston H moves up and down. If the packing-ring C is drawn out too far, being of an elastic nature, the diameter of its edge will be lessened, so that it will not make a tight joint on the cylinder-lining B, and would cause it to leak to such an extent as to render it objectionable; but in the manner which I have described and which I use the piston is self-packing with the aid of the packing or elastic ring C and the piston-ring I, and any body of water poured into the top of the cylinder A without any pressure on the bottom of the piston H would immediately escape between the elastic packing-ring C and the cylinder-lining B, but with a pressure on the bottom of the piston H to any extent which any steam-boiler will stand it is self-packing and almost frictionless, so much so that the regulator when in operation will show the least possible variation of pressure in the boiler, and is as sensitive as the best steam-pressure gage.

Letter H represents the piston, being of a semi-spherical shape. The inner or lower side I make on an angle of about forty degrees, but do not confine myself to any particular angle, the diameter being about one-eighth of an inch less than that of the cylinder-lining B. It has a tapering hole in its top to receive the piston or fulcrum-pin J, and screw-holes on the inner or lower side, running only part of the distance through, to receive the screw-bolts which confine the metallic piston-ring I and the elastic flexible packing-ring C firmly to it.

Letter I represents the piston metallic ring. It is made of a semi-spherical shape, so as to correspond with the inner or lower side of the piston H and of the diameter of the cylinder-lining B, less what the thickness of the elastic packing-ring G takes up or occupies between the piston-ring I and the cylinder-lining B, as it is required not only to secure the elastic packing-ring C to the piston H, but also to keep and hold the elastic ring C to its proper place. Care must be taken not to make the piston-ring too large so as to bind against the elastic ring C, as it would press it unduly against the cylinder-lining B and cause objectionable friction, thereby seriously interfering with the easy and sensitive working of the machine. It is securely bolted, or, rather, screwed, to the piston H, firmly securing the elastic packing-ring C in between the two.

Letter J represents the fulcrum or piston-pin, being made of steel and of sufficiently less in diameter than the hole in the top of the cylinder A, through which it passes, to allow of its free travel up and down without coming in

contact with the sides of the hole, as that would cause unnecessary friction. I avoid the necessity of making a close fit of the pin J in the hole of the cylinder A (in order to make the piston H travel steady up and down and prevent its vibrating) by fitting the lower end of the pin J in the tapering hole in the top or center of the piston H so nicely (the hole being about two inches in depth and a perfect taper, the pin resting on the bottom of the hole, as well as on the sides, can easily be taken out for the purpose of taking the machine apart and putting it together, for which purpose it is made separate from the piston H) that for the purpose required it is equivalent to the two parts being made solid, and answers the purpose perfectly of keeping the piston H from traveling out of line, so as to disarrange the elastic packing-ring G and cause a leak or allowing it to vibrate in the least. In fact, it travels, when arranged as described, as true and accurate as a solid piston. The top part of the pin J is made of a wedge-shape, and the center part, when the fulcrum K rests upon it, is brought to a nice bearing-edge, and upon each side of the bearing edge it has a point or ear running up each side of the fulcrum K on the lever D sufficiently high, in combination with the angular notches *u u*, the lever-pin N, the fulcrum K, and the set-screw L to prevent the pin J from getting out of its place to either side in case the lever D should be raised by hand when there is no pressure under the piston H, and, as a matter of course, the piston and piston-pin would not follow up the lever D, and without the ears or points would be liable to let the fulcrum K be disarranged as the lever D was being let down.

Letter K represents the fulcrum on the lever D, being made of sufficient depth in the lever D to prevent the piston or fulcrum-pin J from getting out of its place by moving it either backward or forward when the lever D is raised by hand, and there is no pressure under the piston H to make the pin J follow up the fulcrum. I also make the fulcrum-notch in the lever D sufficiently angular or inverted-V shape to allow the lever D to travel up and down without letting the anglesides of the top part of the piston-pin J touch the angular sides of the fulcrum-notch, allowing the fulcrum-pin J never to touch the fulcrum-notch, except at the top and proper bearing-point when the machine is at work.

Letter L represents the lever set-screw, being placed on the top of the standard F. It has a jam-nut, to hold it secure at any point you may wish to set it. The object of the set-screw L in combination with the angular notches *U U* in the lugs or cylinder-ears O O, and the deep angular notch in the lever-fulcrum K, together with the points or ears on the top of the piston-pin J, is to prevent the lever D from being disarranged on its several bearing-points (when there is no pressure in the boiler) by its being moved up and down by inexperienced hands, as the pis-

ton H would not follow the lever D up the same as if there were pressure under it.

Letter N represents the lever, triangular, or inverted V steel pin, which passes through the large end of the lever D and rests or bears on the angular notch or inverted V in the ears or lugs of the cylinder A.

Letter O represents the ears or lugs on the cylinder A, being for the purpose of receiving and sustaining the pressure of the lever-pin N.

Letter R represents the gasket, used in between the cylinder A and bed-plate C.

Letter S represents the steam-pipe leading from the boiler to the regulator, being in the form of a siphon, in order to keep water instead of steam on the machine.

Letters T T T represent the piston-rests, being legs cast upon the lower side of the piston-ring I and resting or standing upon the top of the bed-plate C when there is no pressure upon the lower side of the piston H, or when there is no pressure in the boiler, the object of the piston-rests or legs being to prevent the piston H from falling low enough to allow the elastic packing-ring G to rest upon or touch the bed-plate C, as without the rests or legs T T T the elastic packing-ring G would, by the weight of the piston H pressing it down on the bed-plate C, be entirely destroyed of its utility when there was not sufficient pressure on the bottom of the piston H to prevent it from touching or resting on the bed-plate C.

Letters U U represent the angular notches in the lugs or cylinder-ears O, in which are the bearings for the lever-pin N. The angles of the notches, being greater than the angles of the lever-pin N, allows the lever D to make its full travel up and down without permitting the angular sides of the lever-pin N to touch or bear upon the angular sides of the

notches U U, which notches are of sufficient depth in the lugs or ears O on the cylinder A, in combination with the set-screw L on the standard F, the points or ears on the piston-pin J, and the deep angular notch in the fulcrum K, to prevent the lever-pin N from getting out of the notches U U in the lugs O in case the lever D should be raised up by hand when there was no pressure in the boiler.

I have thus described the different parts of the regulator as I make them and their utility, and would say that I have used the cylinder A without the metallic anti-friction lining, substituting an enameled surface in its place; but, owing to the difficulty of getting it put on and its liability to cleaving off by sudden expansion and contraction, together with its oxidizing causing friction, I prefer using the anti-friction, anti-corrosive metal, as described.

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

1. The combination and arrangement of the semi-spherical piston H, the piston ring I, the piston-rests T T T, the tapering hole in the top of the piston H, combined with the anti-friction, anti-corrosive metallic cylinder-lining B, the elastic packing-ring G, and the fulcrum-pin J, or their equivalents, for the purposes set forth and herein described.

2. The combination and arrangement of the angular notches U U in the cylinder-ears O O, the points or ears on the fulcrum-pin J, combined with the lever-pin N, the deep angular notch in the fulcrum K, and the set-screw L, or their equivalents, for the purposes set forth and herein described.

WILLIAM NOYES.

Witnesses:

JAMES F. BRADFORD,  
N. C. P. SPRAGUE.