

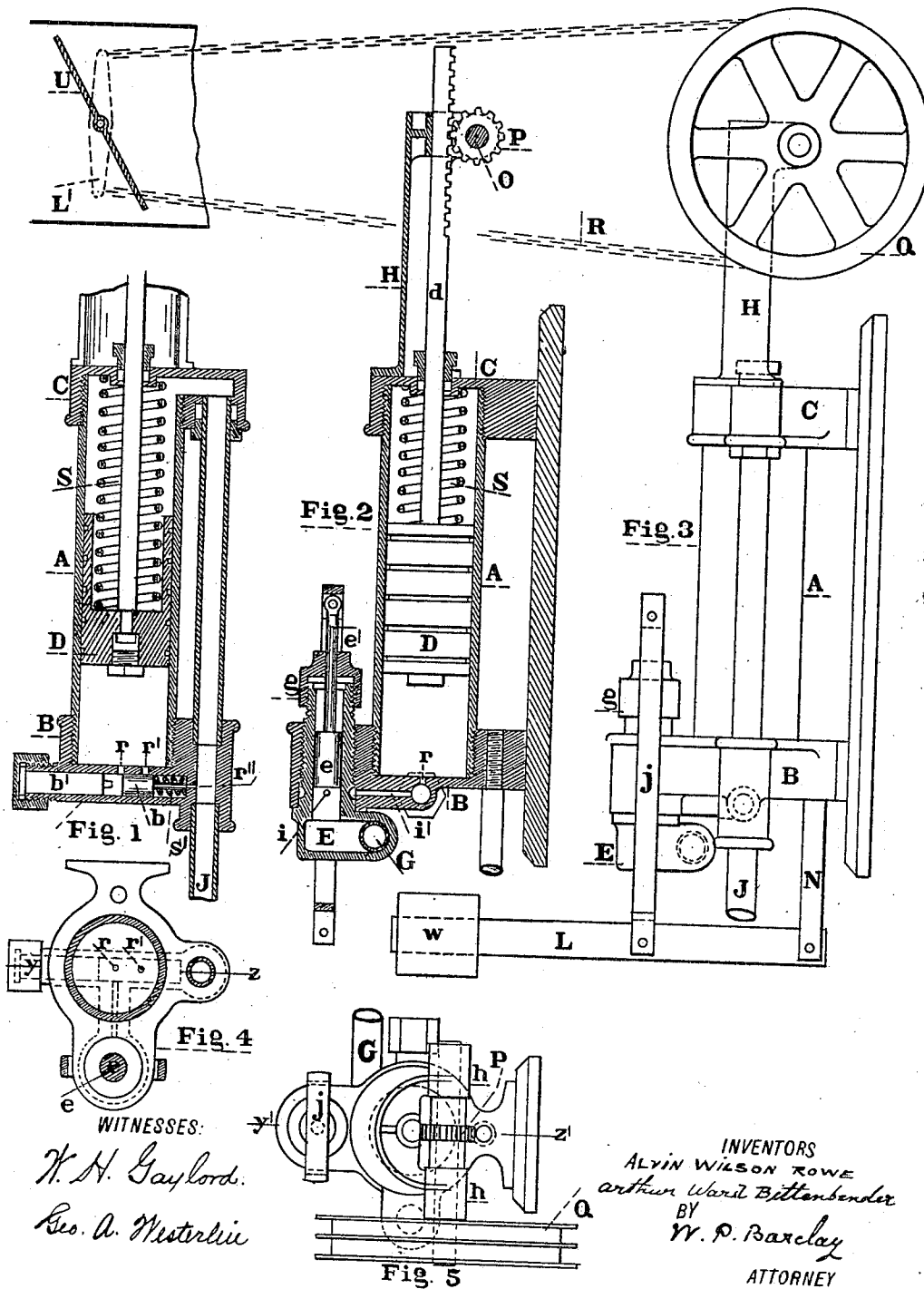
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PATENTED SEPT. 4, 1906.

A. W. ROWE & A. W. BITTENBENDER.

DAMPER REGULATOR.

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UNITED STATES PATENT OFFICE.

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ILLINOIS.

DAMPER-REGULATOR.

No. 830,178.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, ALVIN WILSON ROWE and ARTHUR WARD BITTENBENDER, of the city of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Damper-Regulators; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and the letters of reference marked thereon, which form part of the specification.

This invention relates to new and useful improvements in damper-regulators for use in connection with steam-boilers having a damper situated in the smoke-stack or in proximity to the furnace of a steam-boiler for regulating the air-draft or smoke-current from the boiler-furnace, whereby the steam within a steam-boiler to which said damper-regulator is attached will be held at a constant or nearly constant pressure and the production of steam regulated according to the requirements and the work put upon the engine subsidiary to the steam-boiler with the said damper-regulator.

Referring to the annexed drawings, which form part of this specification, Figure 1 shows a sectional elevation of the cylinder and other parts of the damper-regulator, taken through the line *y z* of Fig. 4. Fig. 2 shows a sectional elevation of the cylinder and other parts, taken through the line *y' z'* of Fig. 5. Fig. 3 shows an exterior side view of the damper-regulator connected with a pivoted damper situated in the smoke-stack for conveying the waste gas and smoke from the furnace of the steam-boiler. Fig. 4 shows a plan view of the lower head. Fig. 5 shows a plan view as viewed from above.

Similar letters refer to similar parts throughout the several views.

The cylinder A is provided with heads B C, firmly secured to the cylinder, and a piston D, that is acted upon by a spiral spring S, bearing upon the upper face of the piston and against the upper head C. The lower head B is provided with a cylindrical chamber for a piston-valve *b*, that is reduced at one end to a size to close a small port *r''* between the chamber for said valve and the exhaust-pipe J, communicating freely with the atmosphere.

Situated in the chamber of the valve *b* is a small spiral spring *s'*, that acts to force the valve *b* back to the stop *b'* whenever the resistance or pressure upon the opposite end of the valve *b* is of less resistance than the resisting force of the spiral spring *s'*. The chamber in which the valve *b* is situated communicates with the interior of the cylinder A by way of the ports *r r'* in the head B, the port *r* being the steam-port to the cylinder A and the port *r'* the exhaust from the cylinder. The head B is further provided with a removable valve-casing E, furnished with a piston-valve *e*, having a piston-stem *e'* that takes through a gland *g* at the upper end of casing E. The lower end of the said casing E communicates by a pipe G with the steam-space of the steam-boiler. The chamber for the piston-valve *e* communicates with the interior of the cylinder A by way of the small port *i*, an aperture *i'*, and the inlet-port *r*, the said passage-ways forming the inlet or steam side to the cylinder A. The casing E has a groove cut exteriorly around it and on a level with the small port *i*, that the steam taking through the said port will not be cut off in case that the port *i* and the aperture *i'* were not in line with each other. The stem of the valve *e* is pivoted to a yoke *j*, that has its lower end pivoted to a lever L, fulcrumed at one end to a stud N, secured to the lower head B. The lever L is furnished with a weight *w*, that is adjusted to meet any desired pressure of steam required to be carried by the boiler with which the damper-regulator is connected.

The upper head C of the cylinder A supports a bracket H, that is firmly secured to the same, and from the upper end of the said bracket is pivoted a spindle O, that takes into small pillows *h h* upon the said bracket. The spindle O is provided with a toothed wheel P, that meshes with a rack formed upon the side of the piston-rod *d*, and at one end of the said spindle a grooved pulley Q is secured for a cable or rope R to take over and connect with a lever L' of the pivoted damper U, situated in the smoke-stack of a steam-boiler.

Having described the several parts of our invention, the operation of the same is as follows: Steam is supplied direct from the steam-boiler through the pipe G into the chamber E and under the valve *e*, which controls the small port *i*, situated in the casing E, and

when the valve *e* is above the said port *i* the steam is free to enter the aperture *i'*, and when the valves *e* and *b* occupy the positions within their chambers as shown by Figs. 1 and 2 the steam from the boiler has free access to the cylinder A to act upon the under side of the piston D, and in doing so causes the piston D to rise and compress the spiral spring S, acting against the piston D, and as the piston and its rod *d* are caused to ascend the gear-wheel P, meshing with the teeth formed upon the piston-rod *d*, is caused to move slowly around with its spindle O and turn the pulley Q to act upon the rope or cable R, connected with the lever L', so that the damper U in the smoke-stack is gradually closed, corresponding to the upward movement of the piston D in the cylinder A. The valve *e* controlling the admission of steam through the port *i* and at the same time being acted upon by two forces (the pressure of the steam underneath the said valve and the pressure of the weight *w*, acting from above the said valve through the connecting-lever L and yoke *j* to the stem *e'* of the valve *e*) controls the admission of the steam to the cylinder A, so that the piston D is forced upward, and through the intermediate parts in connection therewith the damper U is gradually closed, for as the steam-pressure increases the tension of the spiral spring S above the piston D as the piston moves up also increases and prevents a too sudden closing of the damper U in the smoke-stack, so that the furnace-draft will be regulated gradually, and when the steam-pressure of the boiler falls below the resisting force acting above and upon the valve *e* through the pressure of the weight *w* the said valve gradually moves down and closes the port *i* and shuts off further egress of steam from the boiler to the cylinder A,

when the steam within the cylinder A gradually loses its elastic force by condensation and through the action of the spiral spring *s'* overcoming the pressure of the steam within the cylinder A, due to its partial condensation, the valve *b* is forced back against the stop *b'*, and the exhaust-ports *r'* *r''* are then free and open to the atmosphere, and the steam within the cylinder A is free to exhaust, and at the same time the spiral spring S, acting upon the piston D, has gradually forced the piston D down, and through the intermediate parts in connection therewith the damper U is given a reverse motion by the action of the piston-rod *d* meshing with the gear-wheel P to affect the pulley Q, so that the cable or rope R will gradually pull or operate the lever L' of the damper U, so that it will be gradually opened, so as to gradually increase the draft from the boiler-furnace, so that the steam-pressure of the boiler will not be allowed to fall beneath a regulated amount of pressure.

Having described fully our invention, we claim—

In a damper-regulator, comprising a cylinder A, provided with heads B, C, a reciprocating piston D and a spiral spring S; the head B being provided with a spring-actuated valve *b*, controlling the ports *r*, *r'*, *r''*; in combination with a valve-chest E, provided with a valve *e*, controlling a port *i*, and provided with a stem *e'*, pivoted to a yoke *j*, connecting with a weighted lever L, all constructed and arranged for operation substantially as herein shown and described.

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Witnesses:

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