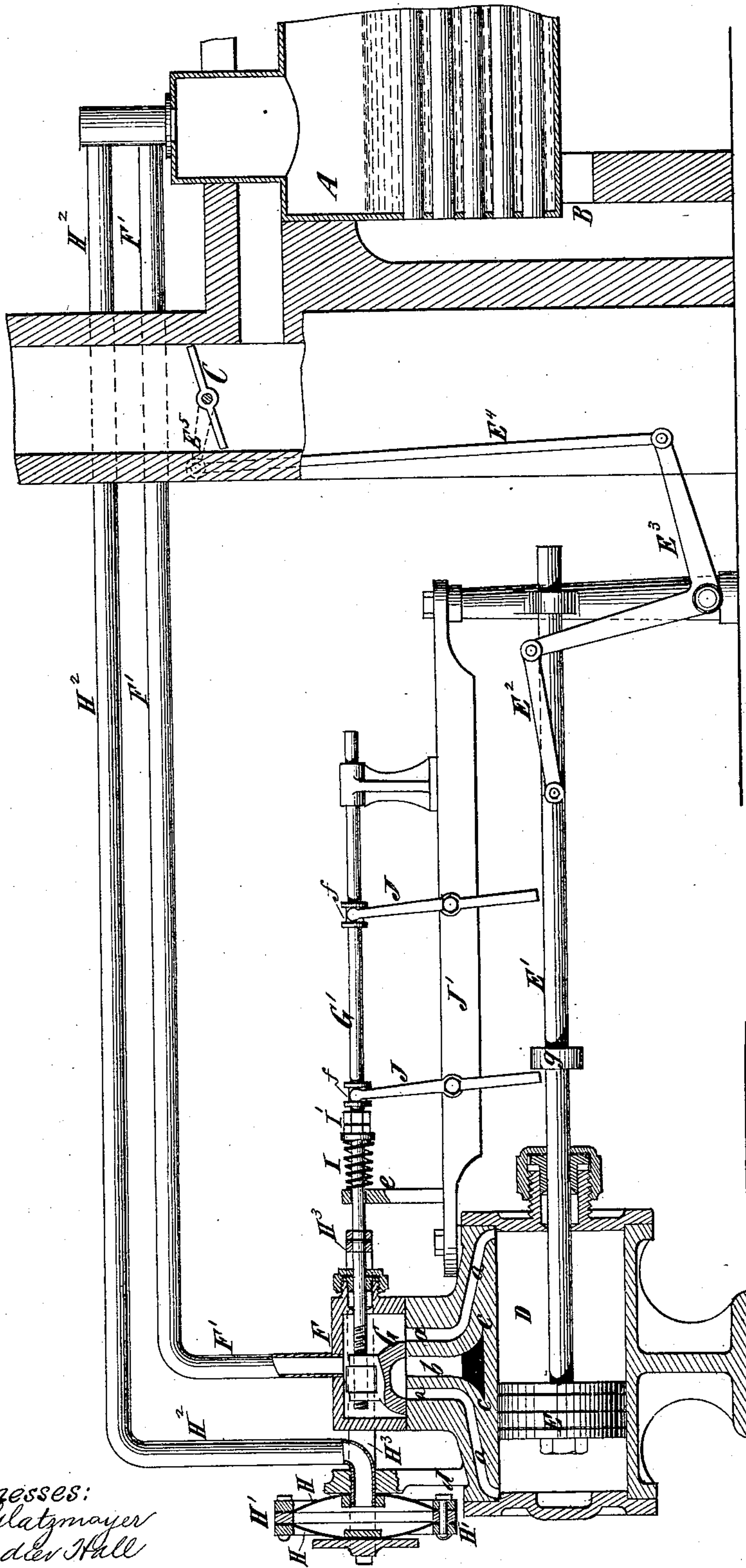


W. E. KELLY.
DAMPER REGULATOR.

No. 247,064.

Patented Sept. 13, 1881.



Witnesses:
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UNITED STATES PATENT OFFICE,

WILLIAM E. KELLY, OF NEW BRUNSWICK, NEW JERSEY.

DAMPER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 247,064, dated September 13, 1881.

Application filed December 26, 1878. Patented in England May 7, 1879.

To all whom it may concern:

Be it known that I, WILLIAM E. KELLY, of New Brunswick, in the county of Middlesex and the State of New Jersey, have invented certain new and useful Improvements in Damper-Regulators, of which the following is a specification.

My invention relates to damper-regulators for furnaces employed in connection with steam boilers or generators, to automatically regulate the draft therein, and hence the condition of the fire.

Damper-regulators heretofore used have been objectionable because the variations in the pressure of steam in the boiler or generator employed to actuate them have acted directly upon a motor connected with the damper, having had to overcome the weight and friction of the dampers before shifting them. Hence the operations of the dampers have not been so reliable or so sensitive as were desirable.

An important object of my invention is to overcome this difficulty and provide for operating dampers with the requisite power, and also to shut off steam from the motor which actuates the damper when it is not in operation.

To this end my invention consists in the combination of a damper, a motor for operating the same provided with a valve for controlling its operation, a supplemental motor for operating said valve in one direction, and a counter-balance or other means, which is preferably adjustable, for operating said valve in the other direction.

The invention also consists in combinations of parts and details of construction, to be hereinafter explained.

The accompanying drawing represents a side view, partly sectional, of a boiler and furnace, and damper for controlling the draft of air to said furnace, and also motors for operating the same, embodying my improvements.

A designates a steam boiler or generator, which may be of any desirable construction. B designates the furnace bridge-wall thereof; and C designates a damper fitted in the smoke stack or flue, and adapted to be vibrated or oscillated in a well-known manner, to control the passage of the products of combustion through the stack, and thus regulate the draft of air through the furnace.

For the purposes of my invention the damper for regulating air before entering the furnace might be used. The main motor whereby this damper is actuated consists of a cylinder, D, of suitable construction, fitted with a piston, E, provided with a piston-rod, E', connected by a link, E², with a bell-crank lever, E³, which is connected by a link, E⁴, with a crank, E⁵, arranged upon the damper-shaft so that the movements of the piston effect the shifting of the damper. This motor is provided with a steam-chest, F, to which steam from the generator or boiler A is supplied through a pipe or passage, F'. Induction and exhaust ports *a b* establish communication between the steam-chest F and the cylinder D, as also between the latter and an exhaust-passage, *c*.

G designates a valve for controlling the admission of steam from the steam-chest F to the cylinder D, and from the latter to the exhaust-passage *c*. This valve is represented as of the kind known as the ordinary "D slide-valve," but may be of any other desirable form. It is represented as being actuated by a supplemental motor operating upon its valve-rod G'. This supplemental motor is represented as consisting of two diaphragms, H, connected together by rings and bolts H', so as to be expanded on the admission of steam between them through a pipe, H², leading from the boiler or generator A. This supplemental motor may be supported from a frame or standard, *d*, extending from the main motor, and connected by a yoke, H³, with the valve-rod G' of the valve G, controlling the operation of the main motor. This rod G' is provided with a counter-balance, which may consist of a weight, or lever and weight combined, but in the present instance is shown as consisting of a spiral spring, I, surrounding said valve-rod G', and fitting between an adjustable collar or nut, I', arranged thereon, and an arm or standard, *e*, extending from the main motor. Preferably this counter-balance will be so constructed that it may be adjusted or set to regulate the action of the motor for any desirable pressure of steam. In the present instance this is accomplished by providing the valve-rod G' with an external screw-thread, and the collar I' with an internal screw-thread, so that the latter may be adjusted longitudinally thereon as a nut, by means of a wrench or other implement. The

counter-balance is adjusted so that only when steam in the boiler exceeds a certain pressure it will expand the supplemental motor H H', overcome the resistance of the said counter-balance, shift the slide-valve, admit a supply of steam to the main cylinder, and cause the shifting of the damper, so that the said counter-balance, on a reduction of pressure, will overcome the resistance offered by the supplemental motor and shift the valve in the opposite direction, steam being thus admitted to the cylinder of the main motor and effecting the shifting of the damper C.

It is obvious that by adjusting the counter-balance so as to increase or decrease the force of the same the action of the damper at any pressure can be attained, and that inasmuch as the increase or decrease in the pressure of the steam has only to shift the valve in a motor for operating the damper, and not to shift the damper itself, as heretofore, very slight increase or decrease in pressure will suffice to effect the shifting of the damper, and hence, that the operation of the damper is more sensitive, and the draft of air to the furnace is very delicately controlled, so as to maintain a much nearer uniform pressure in the boiler or generator than heretofore has been done with an automatic damper.

I do not limit myself to the form of supplemental motor illustrated and described, for I can with good results employ in lieu thereof a cylinder and piston or plunger, or other suitable device or devices.

The means for precluding steam from constantly flowing into the cylinder of the main motor while such motor remains inactive, and there condensing, I have shown as consisting of two tappet-levers, J, pivoted to a frame, J', acting through collars *f* upon the valve-rod G', and actuated by a tappet-collar, *g*, upon the piston-rod E'. This tappet-collar *g*, as the piston E nears the end of its stroke, acts upon one or other of the tappets J, and reverses the valve G sufficiently for it to cover the ports *a b* and preclude the passage of steam through them into the cylinder D. By this feature of my invention the waste of steam incidental to its constant flowing into the motor for operating the damper is obviated, as also the annoyance by the accumulation therein of water produced by the condensation of steam and its leakage from the cylinder.

It will be seen that by my invention I provide for operating a furnace-damper automatically through very slight variations of pressure in a steam boiler or generator, and therefore maintaining therein a very nearly uniform pressure at all times; also, that I provide for effecting the operation of a damper positively and reliably, no matter how large it may be or how great its friction, because I employ variations of pressure in the steam boiler or generator merely for shifting a valve controlling the admission of steam into a powerful motor, whereby the damper is operated; also, that I provide for precluding the flow of steam into the cylinder of the motor for operating the damper during the time such motor remains idle, and thus avoid much waste of steam occurring with the use of ordinary automatic dampers.

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

1. The combination, with a damper and a motor for operating the same, provided with a valve for controlling its operation, of a supplemental motor for operating the said valve in one direction and a counter-balance for operating it in the opposite direction, substantially as and for the purpose specified.

2. The combination, with a damper and motor for operating the same, provided with a valve for controlling its operation, of a supplemental motor for operating the said valve in one direction and an adjustable counter-balance for operating it in the opposite direction, substantially as and for the purpose specified.

3. The combination, with the damper C, of the cylinder D, piston E, steam-chest F, ports *a b c*, valve G, valve-rod G', motor H H', communicating with the steam-generator, and counter-balance I I', connected thereto, substantially as and for the purpose specified.

4. The combination, with a motor consisting of a cylinder, piston, ports, and valve, of a supplemental motor for operating said valve, and means whereby, after the completion of the stroke of the valve, it is shifted over such ports prior to making its return or reverse stroke.

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Witnesses:

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