(No Model.)

W. D. DICKEY.

Damper Regulator for Furnaces.

No. 234,970. Patented Nov. 30, 1880.

Fig 2

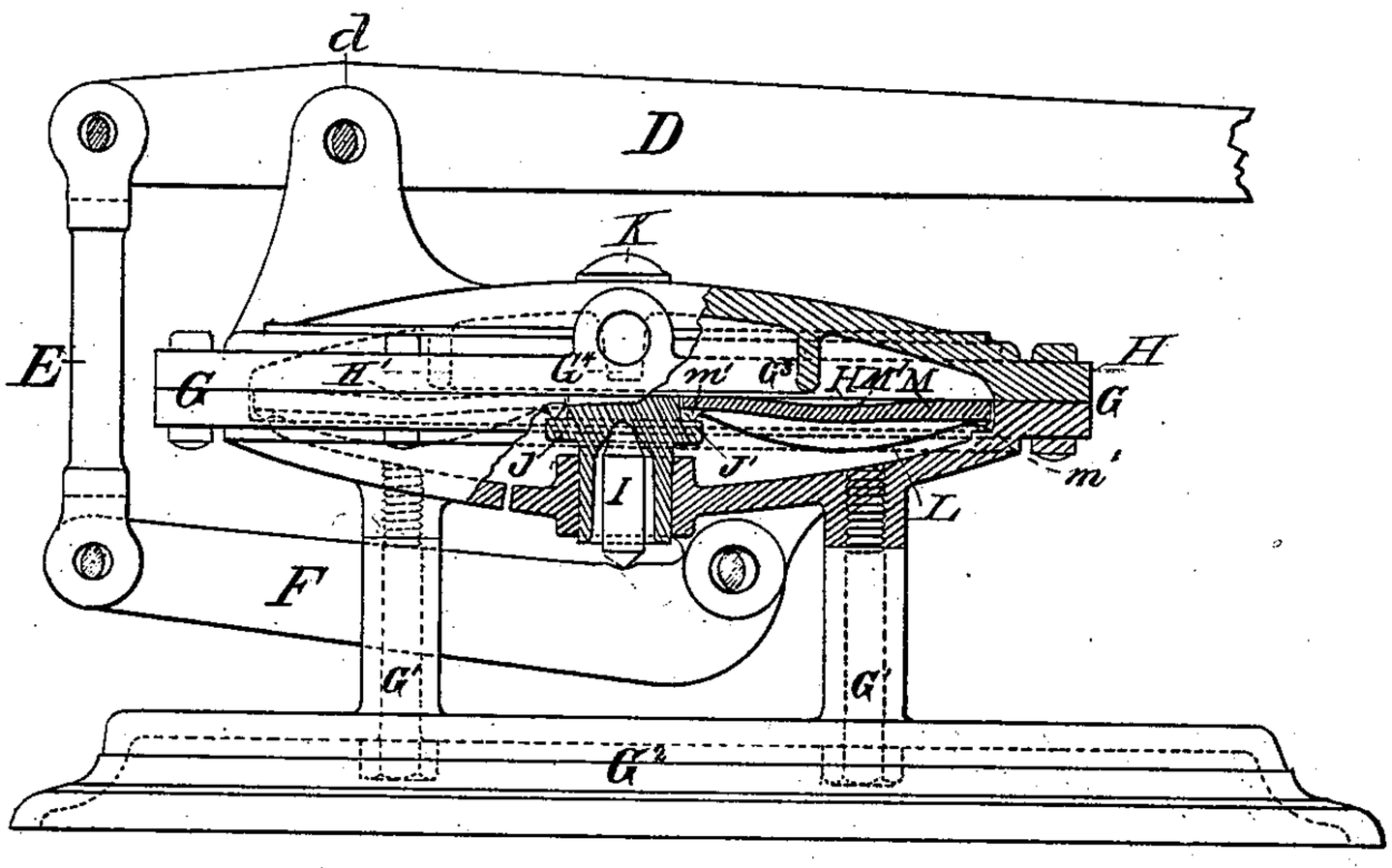


Fig 3

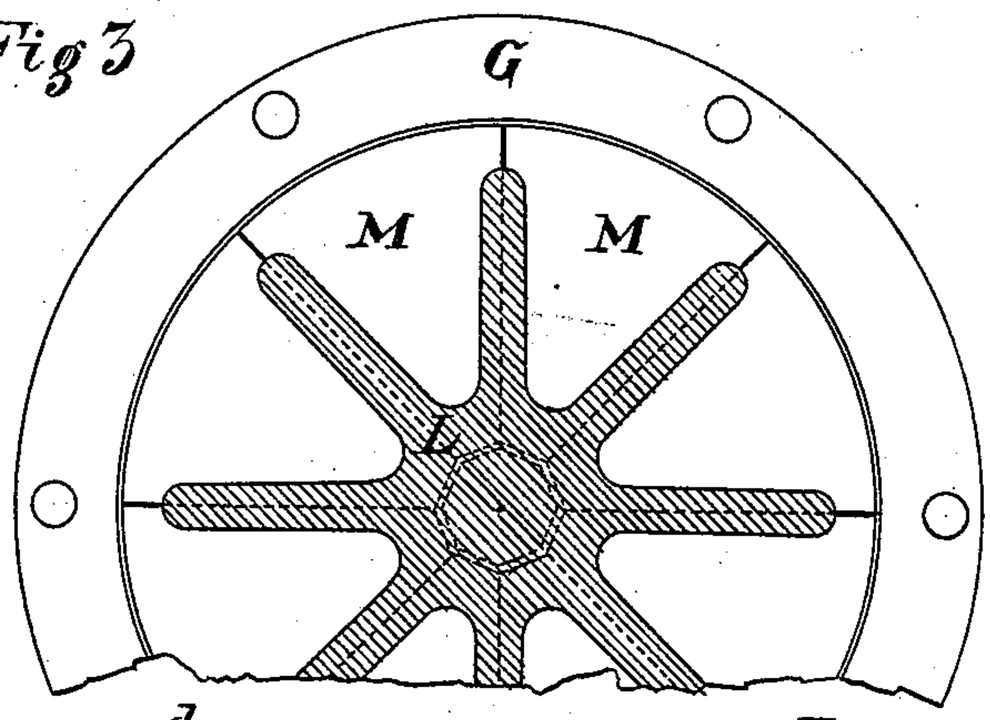
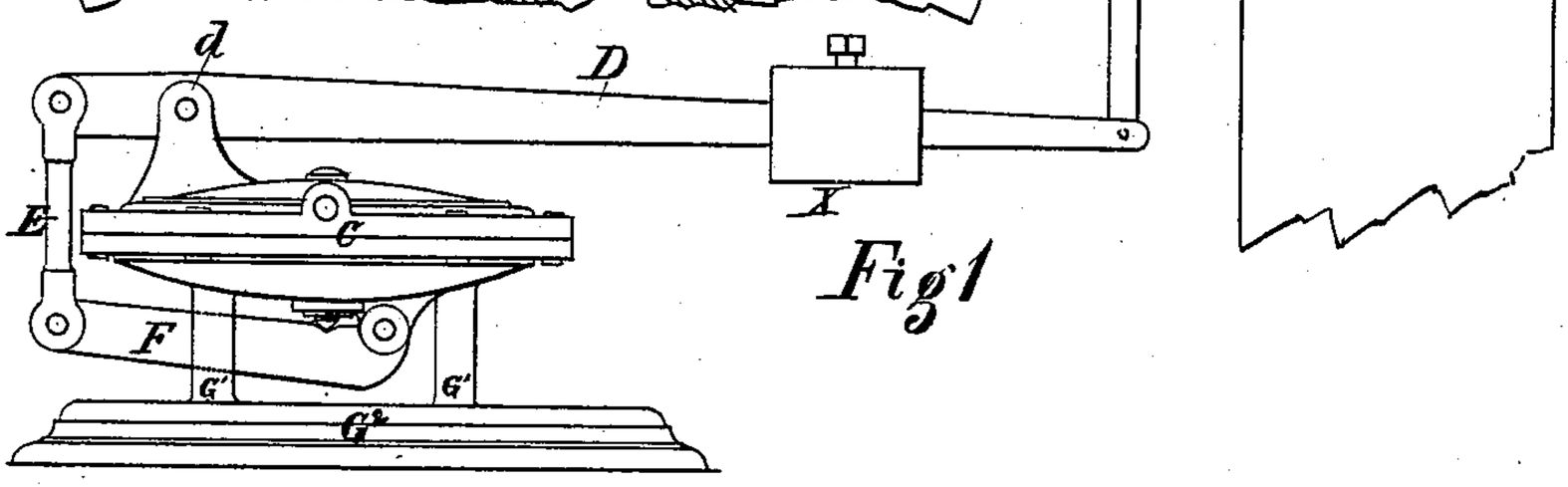
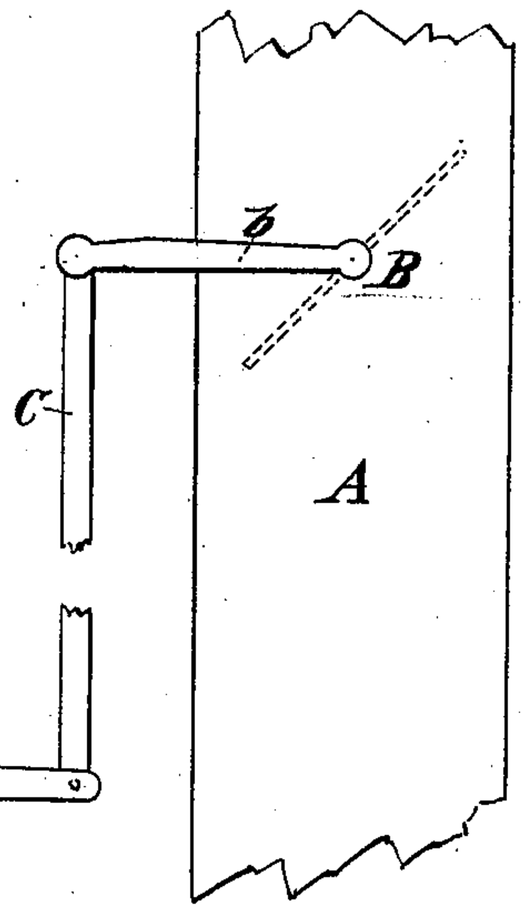


Fig 1





WITNESSES =

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Charles R. Searle

INVENTOR =

William D. Dickey

by his attorney C. C. Stetson

UNITED STATES PATENT OFFICE.

WILLIAM D. DICKEY, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, JOHN W. HANDREN, AND JOHN N. ROBINS, OF SAME PLACE.

DAMPER-REGULATOR FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 234,970, dated November 30, 1880.

Application filed July 19, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. DICKEY, a citizen of the United States, residing in the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Damper-Regulators for Furnaces, of which the following is a specification.

I have discovered that the diaphragm and appurtenances connected with the pressure-regulator set forth in patent to me dated September 16, 1879, No. 219,625, will serve successfully, if enlarged and properly modified, to actuate the damper of a large furnace or series of furnaces for a boiler or series of boilers.

The objections to rubber bags and analogous short-lived constructions for this purpose are serious. The rubber is certain to die in a year or less, even when carefully shielded by water from the direct contact of the steam, and if steam often comes to it, by any mistake in blowing off the water to clear the apparatus, the rubber becomes brittle and cracks much sooner.

My invention makes it practicable to use metal for all the parts, and the device promises to be indefinitely durable, as well as sensitive and efficient.

The accompanying drawings form a part of this specification.

Figure 1 is an elevation of the entire apparatus on a small scale. Fig. 2 is an elevation of the diaphragm and its immediate connections, on a larger scale, partly in section. Fig. 3 is a corresponding top view of the parts immediately below the metal diaphragm with the metal diaphragm removed.

Similar letters of reference indicate like parts in all the drawings.

A is the chimney or stack leading from the furnace or furnaces of a steam-boiler, which may be assumed to be the boilers of a large manufactory discharging into a single flue. B is a damper hung delicately therein, and capable of being turned by acting on an arm, *b*, on the shaft outside. C is a rod leading down therefrom to the lever D. The lever D turns on a knife-edge or analogous center, *d*, and is connected by a link, E, to a lever, F, turning on knife-edges below the diaphragm-case. The latter is a stout cast-iron structure (marked G) supported on legs G′, resting on a bed-plate, G^2. The main case G is in two parts flanged together, receiving between the flanges the edges of a thin diaphragm, H, of steel, hard iron, spring brass, phosphor-bronze, or other elastic metal.

The center of the bottom carries a loose-fitting center piece, J, deeply hollowed on the under side to receive a freely-moving thrust-piece or toggle, I, resting on the lever F. The center piece, J, is equipped with a flange, J′, which supports the knife-edges *m′* on the inner ends of the radial levers M, which turn on fixed supports *m* at their outer ends, and are arranged around so as, with the top of the center thrust-piece, J, to support the entire surface of the diaphragm H. The upper face of each lever M is depressed at its mid-length M′. The diaphragm H is bellied downward by the pressure of the steam, so as to match the upper surface of each lever. This construction has the effect to make a broad and shallow annular corrugation, H′, in the diaphragm H, which, without materially weakening the metal or affecting the action of the apparatus in other respects, greatly facilitates the contraction and expansion which are required as the levers M M′ and diaphragm H H′ work up and down.

The upper portion of the interior of the stout casing G is formed with stops G^3 G^4, which arrest the rise of the diaphragm when the pressure of the steam is reduced. They prevent the diaphragm rising too high and becoming broken, and thus hold all the parts in condition ready for immediate service without lost motion when a sufficient pressure of the steam is again received. The outer series, G^3, extend down farther than the central one, G^4, to compensate for the depressions or annular corrugations H′ M′. The outer series, G^3, may be a continuous rim with the exception of a hole at one point to allow the pressure to be freely communicated to the space within.

L is a sub-layer of thin tough material. I have used successfully stout Manila paper. It covers the joint around the top of the center bearing-piece, J, and also the joints be-

tween the joining edges of the several triangular levers M. This device may be worked with some success by allowing the thin layer L to extend continuously under the entire diaphragm; but it is preferable to form it as shown, covering a liberal portion at the center and extending outward nearly to the periphery and along the line joining the adjacent edges of the levers M. The upper surfaces of the levers being cast with corresponding shallow recesses, receive this sub-layer L, and its top lies about flush with the adjacent surfaces of the several levers. The result is a smooth and practically continuous bed for the diaphragm, and as the levers work the sub-layer L reduces any tendency to abrasive action on the smooth under surface of the diaphragm.

I so proportion the parts that the lever D is supported on a stop, K, when it sinks to its lowest position.

It will be understood that the weight X may be adjusted outward and inward on the lever D, according to the pressure at which it is desired the damper shall commence to close. The damper B is fitted with a sufficient amount of space around it when closed to allow a moderate flow of the hot gases. The apparatus, when rightly adjusted, is sensitive and throws the damper wide open when the pressure sinks much below, or throws it into its most shut position when the pressure rises to any considerable extent above the required pressure.

Modifications may be made by any good mechanic. I have shown the link E as joined to the levers D F by pins of oval section, but knife-edges or other forms of joints may be substituted.

I claim as my invention—

1. In combination with the flue A, damper B, and connections *b* C D E F I, the central thrust-piece, J, provided with a flange, J′, radial levers M, depressed at M′, and provided with the knife-edges *m′*, and case G, receiving pressure from the steam controlled by the damper, as herein specified.

2. The stops G^3 G^4, in combination with the casing G, metallic diaphragm H, radial levers M, and thrust-piece J J′, and their connections, adapted to guard against the straining of the diaphragm when the pressure is reduced, as herein specified.

3. The series of radial levers M, having the depression M′ extending annularly around, in combination with the diaphragm H, casing G, connections J I F E D, for operating the damper, as herein specified.

4. In combination with the metallic diaphragm H, radial levers M, and thrust-piece J, the flexible substratum L, arranged to cover the joints between the levers M, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 3d day of June, 1880, in the presence of two subscribing witnesses.

WILLIAM D. DICKEY.

Witnesses:

W. COLBORNE BROOKES,

W. C. DEY.