

H. T. CORNWALL.
DRAFT REGULATOR.
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2 SHEETS—SHEET 2.

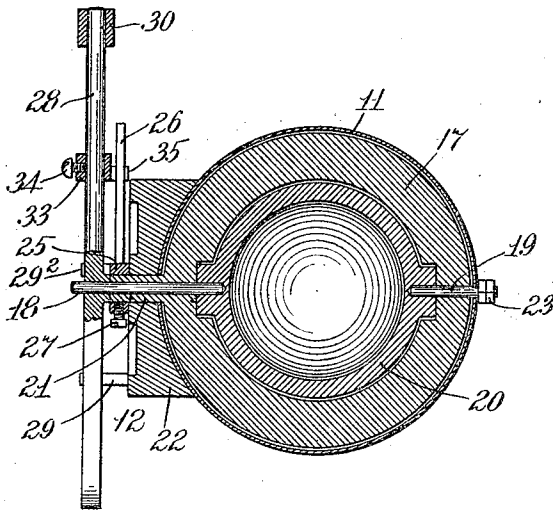


Fig. 5.

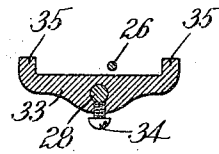


Fig. 6.

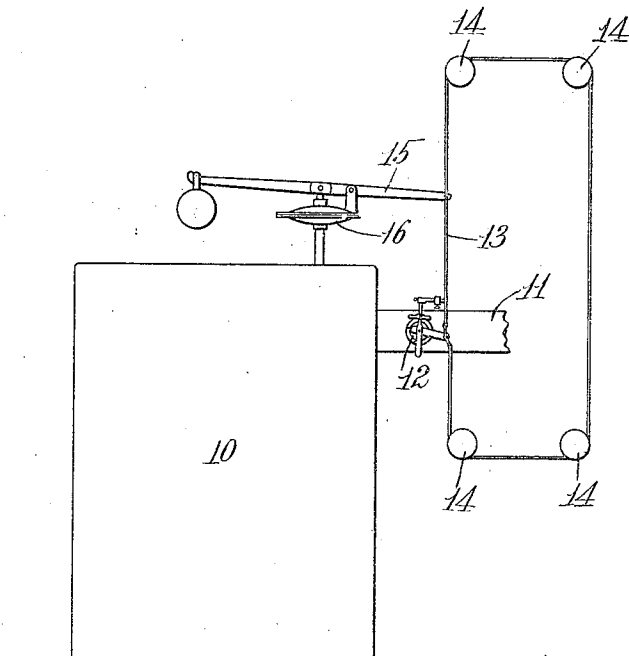


Fig. 7.

Witnesses.

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UNITED STATES PATENT OFFICE.

HANFORD T. CORNWALL, OF BROCKTON, MASSACHUSETTS.

DRAFT-REGULATOR.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HANFORD T. CORNWALL, a citizen of the United States, residing at Brockton, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Draft-Regulators, of which the following is a specification.

This invention relates to an improved device for regulating the draft in smoke flues and pipes for furnaces boilers and the like.

The object of the invention is to provide a draft regulator which can be operated either automatically by means of a suitable diaphragm regulator or by hand as may be desired.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings: Figure 1 is a side elevation of my improved draft regulator showing the same attached to a smoke pipe, the smoke pipe being broken away to save space in the drawings, the parts outside the smoke pipe being in the position which they occupy when the damper is closed. Fig. 2 is an end elevation as viewed from the right of Fig. 1, with the smoke pipe shown in section. Fig. 3 is a side elevation similar to Fig. 1, with the parts in the positions occupied when the damper is open. Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 2. Fig. 5 is a sectional elevation taken on line 5—5 of Fig. 1. Fig. 6 is a detail section taken on line 6—6 of Fig. 1. Fig. 7 is a diagrammatic view illustrating my improved draft regulator applied to the smoke pipe of a boiler. Fig. 8 is a side elevation similar to Fig. 1 showing a modified form of my invention. Fig. 9 is a detail sectional elevation taken on line 9—9 of Fig. 8.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is a boiler, 11 the smoke pipe leading from said boiler, 12 my improved draft regulator, 13 an endless chain extending over pulleys 14, 14 and connected to my improved draft regulator, as hereinafter fully described, and also connected to the arm 15 of the diaphragm regulator 16, the construction of which is well known to those skilled in this art.

The draft regulator 12 consists of a primary damper 17 which is journaled to ro-

tate within the smoke pipe 11 and upon rods 18 and 19 fastened to opposite sides, respectively, of the auxiliary damper 20, said auxiliary damper being of a hollow hemispherical shape with the concave portion thereof opening toward that end of the smoke pipe which is attached to the boiler or furnace. At the left hand side of the primary damper 17 a boss or sleeve 21, preferably integral with said damper, extends through and is journaled to rotate in a collar 22 which is fastened to the smoke pipe 11. (Fig. 5). The rod 19 which is fastened to the auxiliary damper 20 is journaled in the smoke pipe 11 and is prevented from moving longitudinally thereof by nuts 23 on the outside of the smoke pipe. The rod 18 projects through the primary damper 17 and through the collar 22.

A bell-crank lever 24 having a horizontal arm 25 and a vertical arm 26 is fastened by a screw 27 to the sleeve hub 21 of the primary damper 17. The outer end of the arm 25 has fastened thereto the chain 13 which leads to the lever 15 of the diaphragm regulator 16.

The rod 18 has an arm or lever 28 fast thereto, the lower end of which rests against a stop-pin 29 when the parts are in the position illustrated in Fig. 1. The upper end of the arm 28 has another arm 30 fast thereto and to this arm 30 a weight 31 is adjustably fastened by means of a set-screw 32. A cross-bar 33 is adjustably fastened to the upper portion of the arm 28 by means of a set-screw 34 and this cross-bar has ears 35, 35 projecting horizontally therefrom toward the smoke pipe 11. The vertical arm 26 of the bell-crank lever 24 projects upwardly between these ears 35, 35. It will be noted that the primary damper and the auxiliary damper may be rotated independently of each other about a common axis extending transversely of the smoke pipe 11.

The general operation of the device hereinbefore specifically described and illustrated in Figs. 1 to 7 inclusive is as follows: Assuming the parts to be in the position illustrated in Figs. 1 and 4 and the pressure of steam decreases, then the diaphragm regulator lever 15 will move upwardly at the right hand end thereof (Fig. 7), thus moving the chain 13 upwardly and moving the horizontal arm 25 of the bell-crank lever 24

upwardly. This will cause the primary damper 17 to rock about its axis and partially open the space between the interior of the smoke pipe and the periphery of the auxiliary damper, and this operation will continue until the vertical arm 26 engages the ear 35 at the left hand end of the cross-bar 33 (Fig. 1), whereupon the arm 28 will be tipped toward the left at its upper end and both of the dampers will then begin to open. When the arm 28 has tipped the auxiliary damper to such an angle at the left of its position in Fig. 1 that the center of gravity shall have passed beyond a vertical plane extending through the common axis of the dampers 17 and 20, then the weighted arm 28 will cause said arm and auxiliary damper to tip to its extreme open position as illustrated in Fig. 3 and as illustrated in dotted lines (Fig. 4), and the upper portion of the arm 28 will come to a rest against the pin 29². The smoke pipe will then have the draft turned on to its full extent and as the steam pressure increases, the lever 15 will be moved upwardly at the left of its pivot and downwardly at its right hand end, thus lowering the chain 13 (see Fig. 7) adjacent to said lever 15 and moving the arm 25 of the bell-crank lever downwardly, thus rocking the arm 26 of said lever toward the right from the position illustrated in Fig. 3 to that illustrated in Fig. 1 and moving the different parts from the position illustrated in Fig. 3 to that illustrated in Fig. 1 and from the position illustrated in dotted lines (Fig. 4) to that illustrated in full lines in said figure. It will be noted that by adjusting the weight 31 toward the right (Fig. 1) the center of gravity of the auxiliary damper and the arms attached thereto will be moved farther toward the right of the vertical plane extending through the common axis of the auxiliary and primary dampers, and by moving said weight toward the left the center of gravity of such combination of levers and the auxiliary damper will be moved toward the left, so that during the operation hereinbefore described the movement of the auxiliary damper into its extreme position, as shown in dotted lines (Fig. 4) will commence sooner or later according to the position of the weight 31 upon the arm 30. This time may also be regulated by moving the cross-bar 33 upwardly or downwardly upon the upper end of the arm 28, so that the end of the arm 26 will engage the ears 35 sooner or later comparatively.

The movement of the outer or primary damper 17 is sufficient for all ordinary changes which are required in the draft in the smoke pipe, so that the gases which are located near the pipe are the ones which will ordinarily be affected by the operation of my

improved draft regulator within certain limits, but when it is desired to throw the damper wide open, then both auxiliary and primary dampers are thrown into the positions shown in Fig. 4 in dotted lines, as when, for instance, a new fire is being built or when coal is fed to the fire.

It will be noted that the edge 20' of the auxiliary damper (see Fig. 4) is made comparatively thin so as to obstruct as little as possible the passage of the smoke and gases as they pass from the boiler to the chimney flue when the primary damper 17 is open or comparatively open. It will also be understood that in the general operation of my improved draft regulator, the object is to manipulate the primary damper to a certain extent without having any effect upon the position of the auxiliary damper 20 and the primary damper being located adjacent to the inner surface of the smoke pipe will regulate the gases and smoke which are located near the inner surface of said smoke pipe, but the highly heated gases and products of combustion are always to be found substantially in the center of the smoke pipe or flue and the auxiliary damper is so located and so formed as to hold back these heated gases and products of combustion and thus increase the efficiency of the boiler by saving the heat units contained within said heated gases and products of combustion and holding them back in the boiler.

In the form of my invention illustrated in Figs. 8 and 9 the regulator is adapted to be operated by hand. The form of my invention illustrated in Figs. 1 to 7 can also be operated by hand if the chain 13 is disconnected. Referring, then, to Figs. 8 and 9, 11' is the smoke pipe, 12' is the draft regulator and the primary and auxiliary dampers are the same as in the form of my invention hereinbefore described. The lever 25' is provided with a handle 36 by which it is operated and said lever 25' is fast to the primary damper. Said lever 25' is provided with a spring latch 37 which is pivoted at 38 to said lever, the inner end of the latch being adapted to engage teeth 39 formed upon a flange 40 upon the collar 22'. The lever 28' is fastened to the auxiliary damper and is provided with a spring latch 37' which is also adapted to engage the teeth 39 and lock said lever 28' and the auxiliary damper in position. In operating this form of my device, the two auxiliary levers 25' and 28' are operated by hand and are unlocked from the collar 22' by rocking the spring latches 37 and 37', respectively, until they are out of engagement with the teeth 39 and then moving the lever 25' or the lever 28' to the desired position, when upon releasing the spring latch 37 or 37', the same will spring into engagement with the teeth 39 and lock the lever 25' or 28' in position.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. In combination, a smoke pipe, a primary damper consisting of a ring and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending transversely of said smoke pipe, means outside said smoke pipe whereby said primary damper may be rotated, and other means adapted to be operated by said first named means, whereby said auxiliary damper may be rotated.

2. In combination, a smoke pipe, a primary damper consisting of a ring and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending transversely of said smoke pipe, an arm outside said smoke pipe fast to said primary damper, another arm outside said smoke pipe fast to said auxiliary damper, said primary damper arm adapted to engage and rotate said auxiliary damper arm.

3. In combination, a smoke pipe, a primary damper consisting of a ring and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending transversely of said smoke pipe, an arm outside said smoke pipe fast to said primary damper, another arm outside said smoke pipe fast to said auxiliary damper, and weighted to overbalance said auxiliary damper, and means adapted to limit the movement of said weighted arm in opposite directions, said primary damper arm adapted to engage and rotate said auxiliary damper arm.

4. In combination, a smoke pipe, a primary damper consisting of a ring and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending transversely of said smoke pipe, a bell crank lever outside said smoke pipe fast to said primary damper, another lever outside said smoke pipe fast to said auxiliary damper, a cross-bar fast to said auxiliary damper lever with lugs projecting horizontally therefrom at its opposite ends, one arm of said bell crank lever projecting between said lugs.

5. In combination, a smoke pipe, a primary damper consisting of a ring and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending trans-

versely of said smoke pipe, a bell-crank lever outside said smoke pipe fast to said primary damper, another lever outside said smoke pipe fast to said auxiliary damper and weighted to overbalance said auxiliary damper, means adapted to limit the movement of said weighted arm in opposite directions, a cross-bar fast to said auxiliary damper lever with lugs projecting horizontally therefrom at its opposite ends, one arm of said bell-crank lever projecting between said lugs and adapted to play therebetween.

6. In combination, a smoke pipe, a primary damper consisting of a ring and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending transversely of said smoke pipe, an arm outside said smoke pipe fast to said primary damper, another arm outside said smoke pipe fast to said auxiliary damper, a weight fast to said auxiliary damper arm adjustable relatively to a vertical plane containing said axis and adapted to overbalance said auxiliary damper, and means adapted to limit the movement of said auxiliary damper arm in opposite directions, said primary damper arm adapted to engage and rotate said auxiliary damper arm.

7. In combination, a smoke pipe, a primary damper consisting of a ring, and an auxiliary damper located within said ring, both of said dampers journaled to rotate independently of each other within said smoke pipe about a common axis extending transversely of said smoke pipe, means outside said smoke pipe, whereby said primary damper may be rotated, and other means adapted to be operated by said first named means, whereby said auxiliary damper may be rotated, a boiler, a regulator connected to said boiler, and means operatively connecting said regulator to said first named means.

8. A draft regulator adapted to be inserted in a smoke pipe having, in combination, a primary damper consisting of a ring, and an auxiliary damper consisting of a hollow hemispherical member located within said ring, the greatest diameter of said hemispherical member being approximately equal to the spherical diameter of said member, said primary damper and auxiliary damper being journaled to rotate independently about a common axis.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HANFORD T. CORNWALL.

Witnesses:

CHARLES S. GOODING,
LOUIS A. JONES.