

(No Model.)

N. W. PRATT.

METHOD OF APPORTIONING FURNACE DRAFT FOR BATTERIES OF
STEAM BOILERS.

No. 382,490.

Patented May 8, 1888.

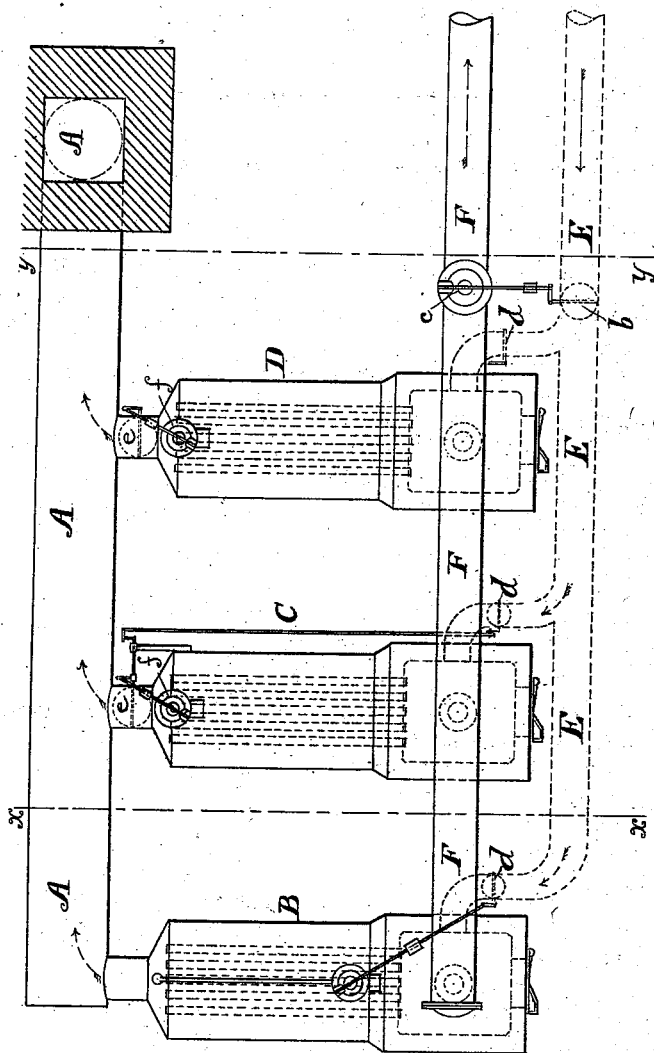


Fig. 1.

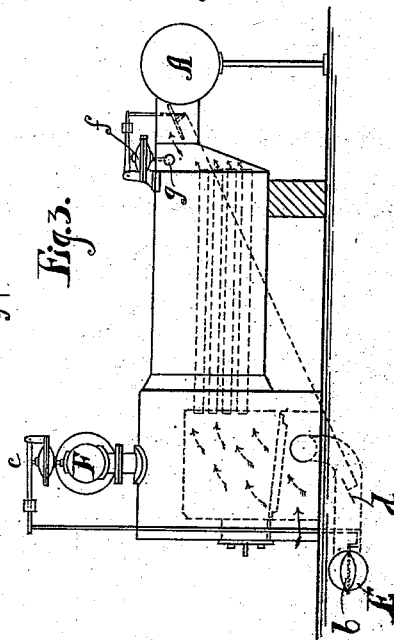


Fig. 3.

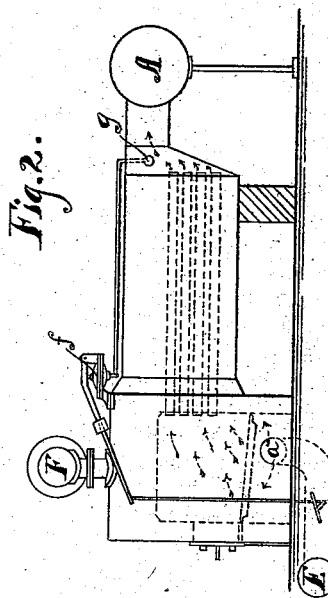


Fig. 2.

WITNESSES:

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METHOD OF APPORTIONING FURNACE-DRAFT FOR BATTERIES OF STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 382,490, dated May 8, 1888.

Application filed January 10, 1878. Serial No. 260,315. (No model.)

To all whom it may concern:

Be it known that I, NAT. W. PRATT, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have
5 invented certain new and useful Improvements in Methods of Apportioning Furnace-Draft for Batteries of Steam-Boilers, of which the following is a specification.

This invention consists in a method of controlling the amount of air supplied to steam-boiler furnaces according to the rate of combustion required in order to maintain a given pressure of steam; and the object of the invention is to so apportion the total amount of air
10 supplied to the furnaces of a whole battery of boilers that the several fires shall be soonest equalized by delivering to each the different amounts of air which their different conditions may require, such equalization being intended
15 for the purpose of increasing the efficiency of the steam regulation under violent fluctuations in the amount of power consumed. This equalization is effected by employing a double system of draft regulation, the total air-supply
20 being regulated by the steam-pressure, the apportioning of the total to each furnace being regulated by the temperature of the escaping gases of the same respectively.

In the accompanying drawings a battery of
30 three boilers is represented in diagram, the form chosen, for clearness of illustration, being of the locomotive type, although the invention is obviously applicable to all forms.

Figure 1 is a plan view; Fig. 2, a sectional elevation of the system, taken on the line *xx*; and Fig. 3, a similar view taken on the line *yy*.

A is the common flue, through which the draft is conveyed from the several boilers B C D composing the battery.

E is the air-pipe employed for conducting the air beneath the grates at *a*, Fig. 2. The features of the invention are applicable to either a forced blast or a natural draft, and the draft-controlling apparatus shown is applicable to both methods.

F is the common drum or steam-conductor connecting and leading from the several boilers to the point of steam eduction.

b is the main damper, which governs the
50 total amount of air supplied to the whole battery of boilers, the said damper being controlled by the action of the varying steam-

pressure upon the flexible diaphragm of the pressure-regulator *c*, increasing or decreasing the total air-supply as more or less steam is
55 consumed.

The auxiliary dampers *d*, provided in the draft-pipe at its several branches or points of entrance to the furnaces, or the auxiliary dampers *e*, placed at the points of exit of the furnace-draft to the flue A, or both sets of dampers, are connected to and regulated by the thermostat pressure-regulators *f*, the latter being actuated by the expansion or contraction of
60 fluid within the bulbs *g*, exposed to the temperature of the escaping gases from each furnace independently.

The pipe E may be employed for conducting either a forced or a natural draft. The dampers *d* and dampers *e* serve identical functions
70 whether the draft be forced or natural, and said double sets of dampers *d* and *e* may be used singly or together, the different arrangements being exemplified, as will be understood by an inspection of Figs. 2 and 3.

In the operation of the invention the steam-pressure actuates the main damper *b*, controlling the general air-supply, closing it partially when the pressure rises to the desired point and opening it when the pressure falls, the
80 consequent amount of air passing through the grates bearing a definite relation to the amount of coal burned to develop the required horsepower. The amount of coal burned is thus decreased or increased, and the steam generated
85 automatically holds the pressure approximately to the desired point under varying demands for steam; but the efficiency of a general draft-control system in which the regulation is extended only to the total air-supply as
90 applied to a battery of boilers is limited, especially in cases where the amount of power required fluctuates very violently, inasmuch as the different conditions of the various fires may require specific amounts of air-supply to
95 control them with quick response.

For illustration, given a battery of three boilers having their fires at different conditions or periods of activity, the fire which has reached the best condition will, receiving the
100 full supply of air, be rapidly forced and comparatively soon burned out, while contributing the greatest amount of heat. The furnace which has been freshly charged with fuel will

be developing the least share of heat, and, while supplied with the same amount of air as the one previously described, will take some time to reach an equal condition, whereas the
5 third furnace, having its fire nearly burned out, would not receive a greater proportion of air than its condition required. To compensate for these varying conditions, the auxiliary dampers *d* and dampers *e*, or both in conjunction,
10 are operated by the fluctuations in temperatures of the fires by means of the thermostats *g* and flexible diaphragms of the regulators *f*, so as to close said dampers if the temperature of the escaping gases is higher than
15 the normal and open them when their temperature is low, thus decreasing the specific air-supply to the furnace delivering the highest temperature, and vice versa. The fires becoming equalized, the effectiveness of the total
20 air regulation as controlled by the damper *b* is materially extended, and therefore increased in its rapidity of action by reason of the uni-

formity of combustion promoted throughout the several fires.

The apparatus herein described for practicing the method claimed forms the subject-matter of a separate application filed by me June 23, 1887, Serial No. 242,209.

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

The method described of first controlling the total air-supply to the furnaces of a battery of steam-boilers by a regulator operated by the
35 varying steam-pressure within said boilers, and, second, apportioning said air-supply to the several furnaces by regulators operated by the respective varying temperatures of said furnaces.

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Witnesses:

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