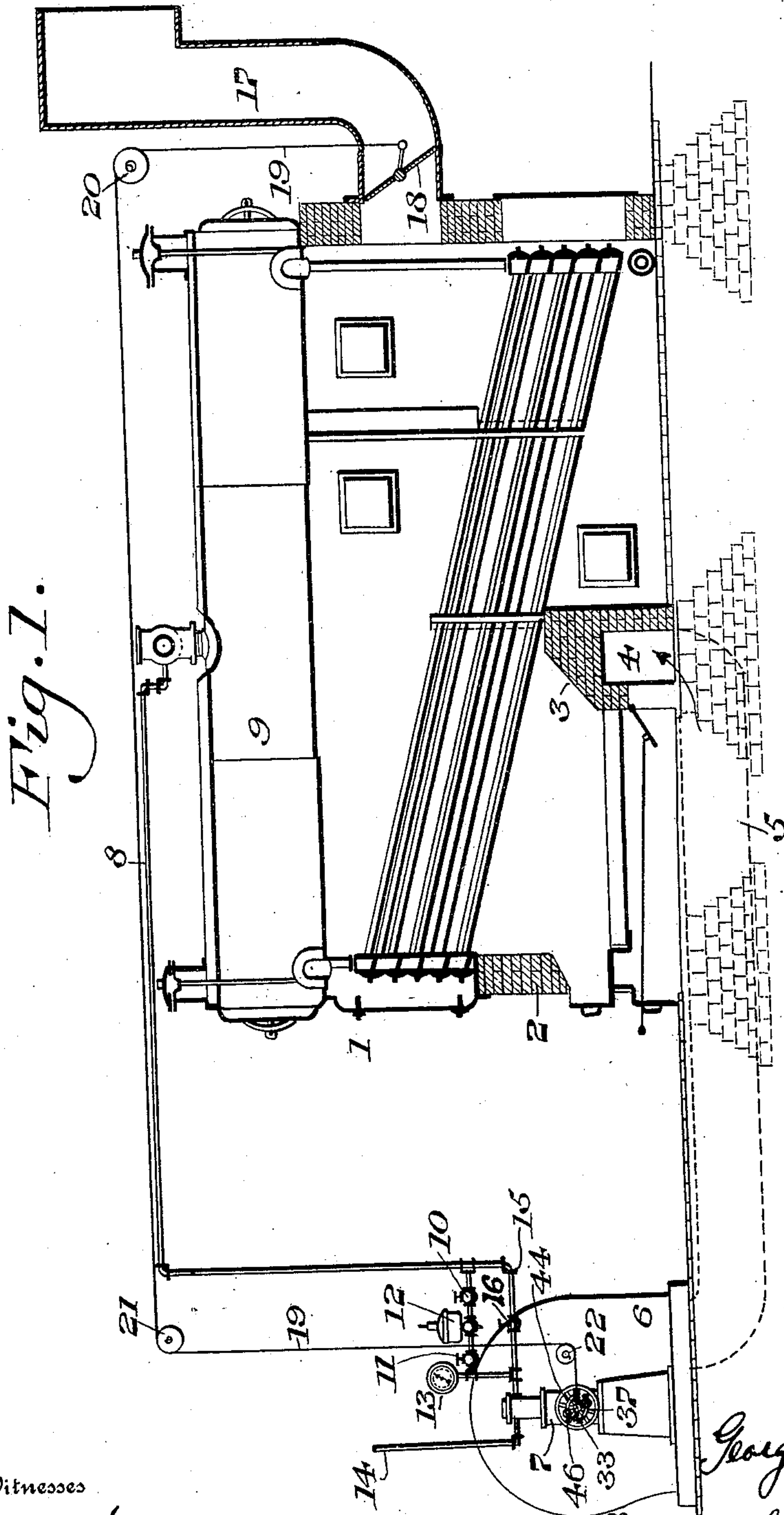


No. 860,974.

PATENTED JULY 23, 1907.

G. W. GOEHNS.
FURNACE REGULATION.
APPLICATION FILED NOV. 3, 1906.

2 SHEETS—SHEET 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

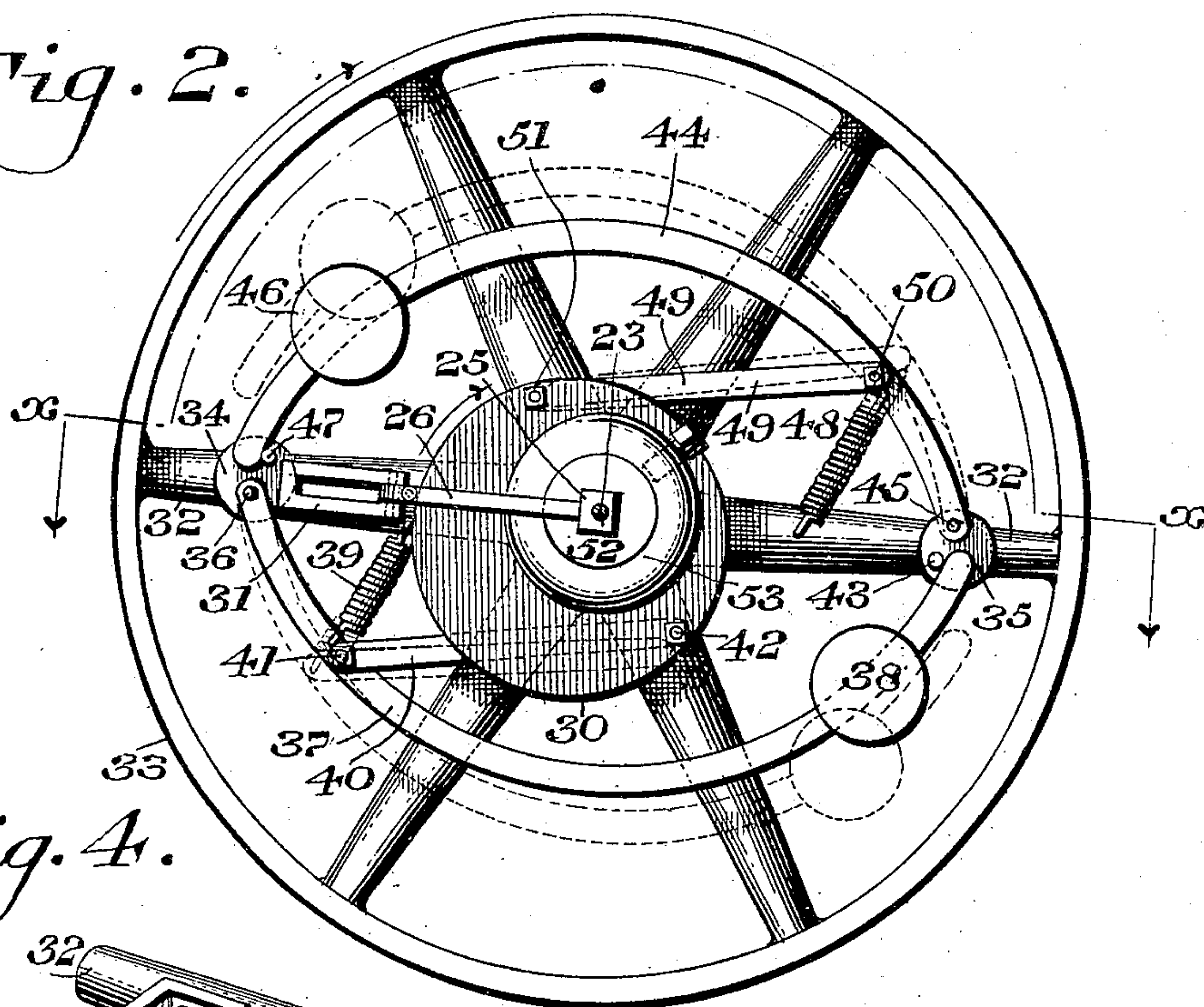


Fig. 4.

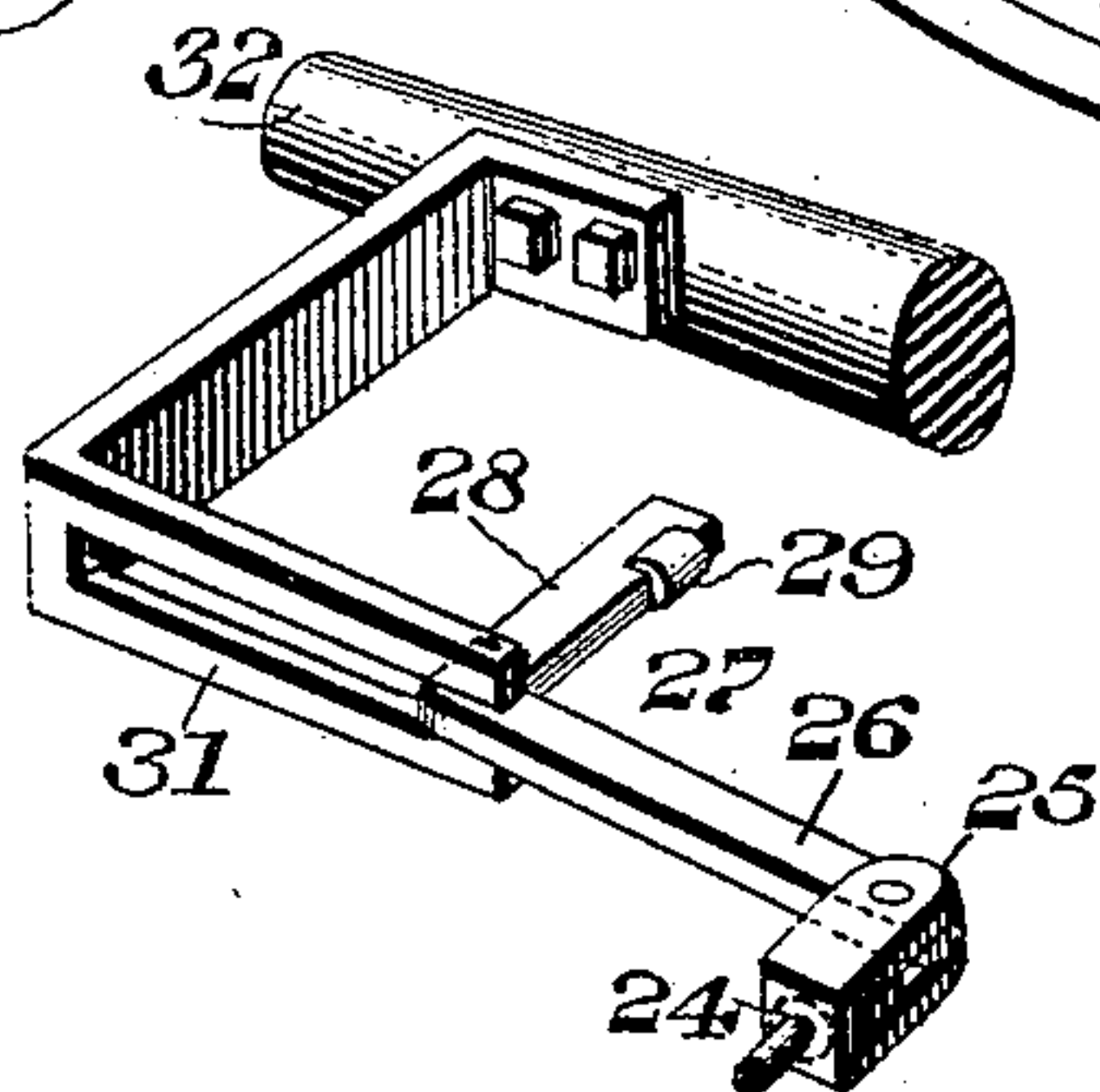
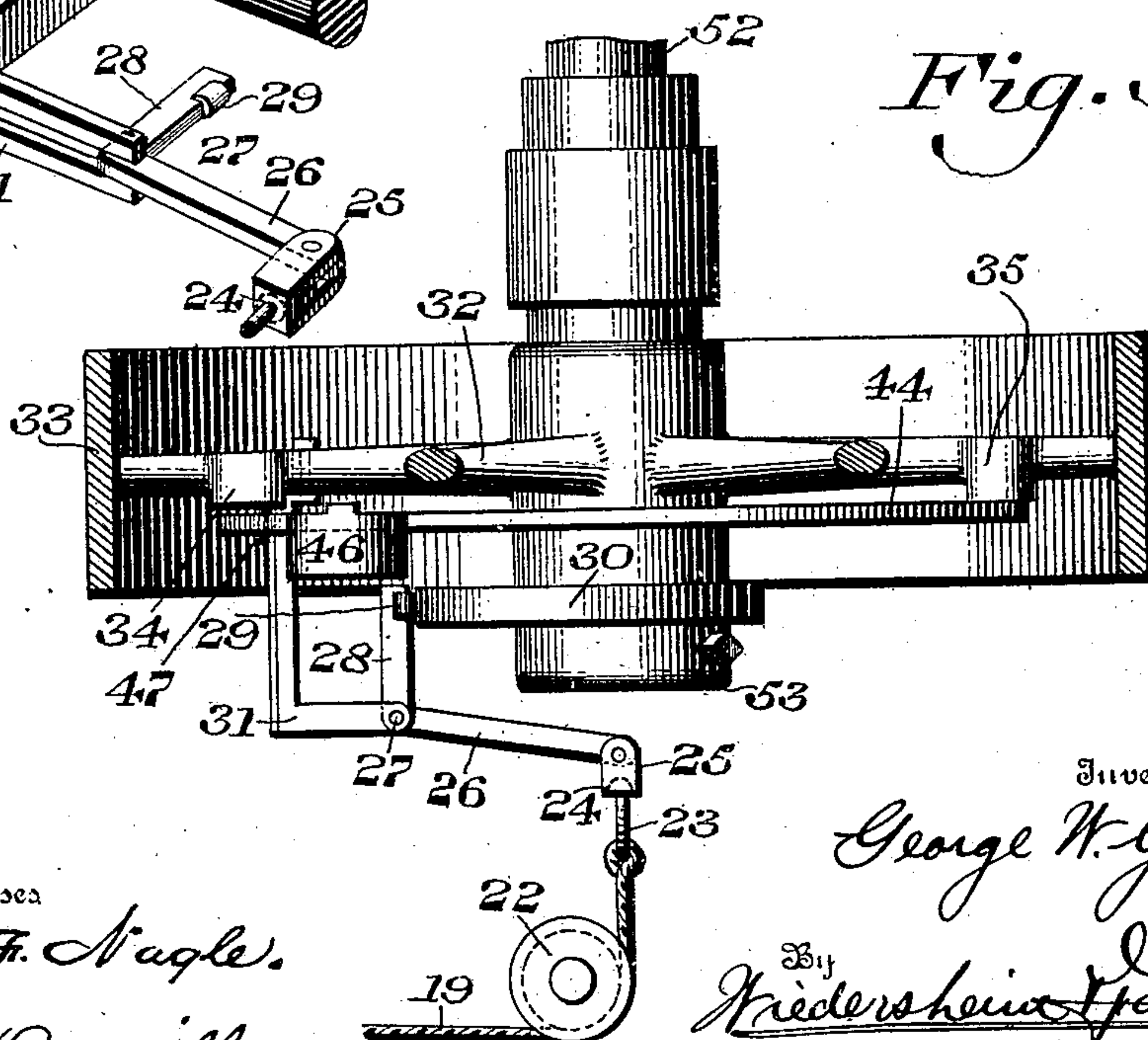


Fig. 3.



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UNITED STATES PATENT OFFICE.

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FURNACE REGULATION.

No. 860,974.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed November 3, 1906. Serial No. 341,950.

To all whom it may concern:

Be it known that I, GEORGE W. GOEHNS, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Furnace Regulation, of which the following is a specification.

My invention consists of a novel apparatus for the regulation of furnaces and comprises automatic means adapted to be effected by variations of speed in a steam or other engine for maintaining in the fire chamber of a forced draft furnace a uniform or substantially uniform pressure that may be equal or substantially equal to that of the outside atmosphere of the furnace room, so that an equable condition of the furnace fire may be maintained, whereby a maximum efficiency, maximum economy of fuel consumption and minimum liability of injury to the furnace or its adjuncts by the inrush of cold air, when the door of the furnace fire box is opened, is attained, provision being made for regulating the outlet for the products of combustion correspondingly with and commensurate to the regulation of the forced draft, with graduated rate of combustion between the extremes, by means of a novel construction and combination of an engine, a blower and a controlling device responding to variations of the speed of said engine, said controlling device and damper in the outlet flue being connected together so as to operate automatically and conjointly or in unison according as the steam pressure or speed of the engine varies.

To the above ends my invention consists broadly of a novel combination of a blower, an engine and a controlling or regulating device, an outlet from the blower leading to the ash pit, bridge wall or any other suitable part of the furnace, a damper in the outlet flue of the furnace and a connection common to said damper and controlling device whereby any variation in the steam pressure or speed of said engine will be communicated to said damper in said outlet flue, and said damper thus adjusted automatically in either of its extremes, as well as its intermediate positions.

For the purpose of illustrating my invention, I have shown one form of apparatus, as this embodiment best illustrates the principle of my invention, although it is obvious that the principal instrumentalities of which my invention consists can be variously arranged and organized, and in the accompanying drawings, I have shown one embodiment thereof which I have found in practice to give satisfactory and reliable results, although it is to be understood that my invention is not limited to the specific arrangement and organization of these instrumentalities.

Figure 1 represents a side elevation of a steam boiler partly in section, having a regulating device embody-

ing my invention applied thereto. Fig. 2 represents on an enlarged scale, a front elevation of the preferred form of the damper governing or regulating device employed. Fig. 3 represents a section on line $x-x$, Fig. 2. Fig. 4 represents a perspective view of a portion of the controlling device to be hereinafter referred to, showing the manner of pivoting and supporting a portion of the controlling device.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings. 1 designates a steam boiler of any usual or approved construction, the same being shown in the present instance as being of the tubular type, although it will be apparent that my invention is capable of general application to boilers or furnaces of any type or construction, said boiler being provided with the furnace 2, having a bridge wall 3 provided with a chamber 4 therein into which leads the duct or passage 5 from the blower 6 which may be of any conventional type, which latter is operated by the engine 7 of any approved construction. The steam is conducted to the engine 7 by means of a main or supply pipe 8, which leads from the steam drum 9. The steam is supplied to the engine from the pipe 8 through the steam cocks 10 and 11, the steam regulating valve 12 located between them and the steam gage 13, beyond which the steam pipe passes to the engine 7 and is exhausted therefrom through the pipe 14. The by-pass connection 15, containing a valve or steam cock 16, is connected around the parts 10, 11, 12 and 13, it being apparent, upon the operation of the blower 6 driven by the engine 7, which is supplied with steam in the manner described, that air from said blower will be forced through the duct 5 into the ash pit or bridge or other desired point of the furnace, the products of combustion passing out through the flue 17 in which is located the damper 18, which latter has a flexible chain, cord or other connection 19 leading therefrom over the pulley 20, thence over the pulley 21, thence under the pulley 22, the terminal of said connection 19 being secured to the rod 23 which is swiveled, as indicated at 24, in the head 25, which is pivotally attached to the arm 26 of the elbow lever 27, whose other arm 28 is provided with the roller or its equivalent 29, which is adapted to coact with the periphery of the eccentric 30, said elbow lever 27 being pivotally secured in the bracket 31, which is secured to one of the spokes 32 of the wheel 33, as will be understood from Fig. 4.

34 and 35 designate bosses preferably mounted diametrically to each other on the opposite spokes 32 of the wheel 33 upon which are mounted respectively counterbalancing or equalizing devices for the eccentric 30 whose construction will now be explained in detail.

The boss 34 has pivoted thereto at 36 one end of the curved or other shaped arm 37 whose other end is provided with a ball or counterbalance 38, said arm 37 being held in normal position by reason of the spring 39 which has one end attached thereto, while its other end is attached to a suitable fixed point as one of the spokes 32.

40 designates a link having one end pivotally attached as at 41 to the arm 37, while its other end is pivotally attached to the eccentric 30 at the point 42, the free end of said arm 37 being normally held in contact with the abutment 43 by means of the spring 39. In a like manner the opposite half of the controlling device is provided with a curved or other shaped arm 44 having one end pivoted at 45 to the boss 35, while its other end carries a counterbalance 46 thereon, said arm being held in position against the stop or abutment 47 by means of the spring 48, which is connected in substantially the manner already described with respect to the spring 39.

49 designates a link having one end 50 attached to the arm 44, while its other end is pivotally attached, as indicated at 51, to the eccentric 30.

It will be apparent to those skilled in the art that the engine shaft 52 is rotated by the engine and that the eccentric 30 is loosely mounted upon said shaft and held in position by the collar 53, so as to permit an independent adjustment of said eccentric with respect to said shaft, whereby as the speed of rotation of the engine shaft 52 and the wheel 33 increases, the arms 37 and 44 with their weights 38 and 46 will fly outwardly and move into the position indicated in dotted lines in Fig. 2, whereupon by reason of the intermediate connections, the eccentric 30 will be given an adjustment or rotation independent of the shaft 52, whereupon by reason of the contact of the roller 29 with the periphery of said eccentric, a pull in the proper direction will be exerted upon the arm 36 and connection 19, so that the damper 18 in the outlet flue will be opened or closed or partly opened or closed or held in its intermediate positions according to requirements as will be apparent to those skilled in this art.

It will be apparent from the foregoing that in the broad aspects of my novel invention, I have provided for the automatic regulation of the damper in the outlet flue by a simple automatic, apparatus adjusted by and dependent upon variations of speed of the engine which cannot easily get out of order and which is positive and efficient under all conditions and I am enabled to dispense with the various forms of diaphragm regulators, ball governors and the like which necessitates the employment of belting, gearing and other accessories which are liable to get out of order.

It will further be apparent that instead of a blower-engine actuated by steam from the boiler, the motor or engine of the blower may be of a different character and may be actuated from another source of power.

In the claims I have used the term "blower" to include any apparatus for supplying air to the furnace at a pressure above atmospheric pressure, and it will be apparent that instead of automatically controlling the volume of air supplied to and the volume of gases discharged from the furnace by the steam pressure or other function of the furnace, it will be obvious that one of these may be controlled by hand or in any

other manner including steam-pressure, provided the other is simultaneously and automatically controlled correspondingly by any suitable means so as to maintain a substantially uniform pressure in the furnace under varying rates of combustion as herein described.

It will also be apparent that in my system of furnace regulator the blower engine is controlled so as to regulate the blower relatively to the steam pressure of the boiler, so that the stack damper 18 may occupy not only the two extreme positions, one open and the other closed, but will in addition assume whatever intermediate position may be requisite according to the variations of steam pressure and speed of rotation of the controlling device, whereby there will be no great variation of boiler pressure and no liability of expulsion of gases from the fire box into the boiler room when the blower speed is increased and before the damper opens, nor will there be liability when the damper is open of causing a reduction of pressure in the fire box below that of the boiler room atmosphere causing an inrush of a large quantity of cold air should the furnace door be opened.

It will be apparent that the pressure duct 5 may discharge in the furnace or fire box at other points than that shown and that the damper 18 may be located in other positions than that shown without departing from the spirit of my invention.

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

1. The combination of a combustion chamber, a blower for supplying air thereto, a device for controlling the outlet for products of combustion, means for operating said blower, a controlling device having an eccentric adjustable by variations of speed of said blower operating means, and connections from said outlet controlling device to said eccentric.

2. The combination of a combustion chamber, a blower for supplying air thereto, an outlet flue from said combustion chamber, a damper therein, a motor for said blower, a controlling device on the motor shaft, a shifting eccentric for said controller and connections from the eccentric of said controlling device to said damper.

3. The combination of a combustion chamber, a blower for supplying air thereto, an outlet for the products of combustion, a damper for controlling said outlet, means for operating said blower, a controlling device operable in unison with said blower, an eccentric on said controlling device adapted to be automatically operated according to the variation of speed, a damper and mechanism intermediate said eccentric and damper, whereby the pressure in said combustion chamber will be automatically maintained substantially constant under varying rates of combustion.

4. The combination of a combustion chamber, a blower for supplying air thereto, an outlet for the products of combustion, a damper for controlling said outlet, a motor for operating said blower, a motor shaft, an eccentric loose on said motor shaft, governing devices for shifting the position of said eccentric according to variations of pressure in said combustion chamber, and mechanism intermediate said eccentric and damper, whereby the latter may be adjusted in either of its extreme or intermediate positions, according to requirements.

5. The combination of a combustion chamber, having a hollow bridge wall, a blower for supplying air thereto, an outlet for the products of combustion, a damper for controlling said outlet, means for operating said blower, a controlling device operative in unison with said blower, an eccentric capable of independent shifting with respect to its shaft and adapted to be automatically operated according to variations of speed, arms pivotally supported on said controlling device having balls thereon, connec-

tions common to said arms and eccentric, and mechanism intermediate said eccentric and damper whereby the pressure in said combustion chamber will be automatically maintained substantially constant under varying rates of combustion.

5 6. The combination of a combustion chamber, a blower for supplying air thereto, an outlet for the products of combustion, a damper for controlling said outlet, a motor for operating said blower, a motor shaft, an eccentric 0 loose on said shaft, a lever suitably fulcrumed and carrying a roller adapted to bear upon said eccentric, govern-

ing devices for shifting the position of said eccentric according to variations of pressure in said combustion chamber, and mechanism intermediate said lever and damper, whereby the latter may be adjusted into either 15 of its extreme or intermediate positions according to requirements.

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E. HAYWARD FAIRBANKS.