

No. 657,922.

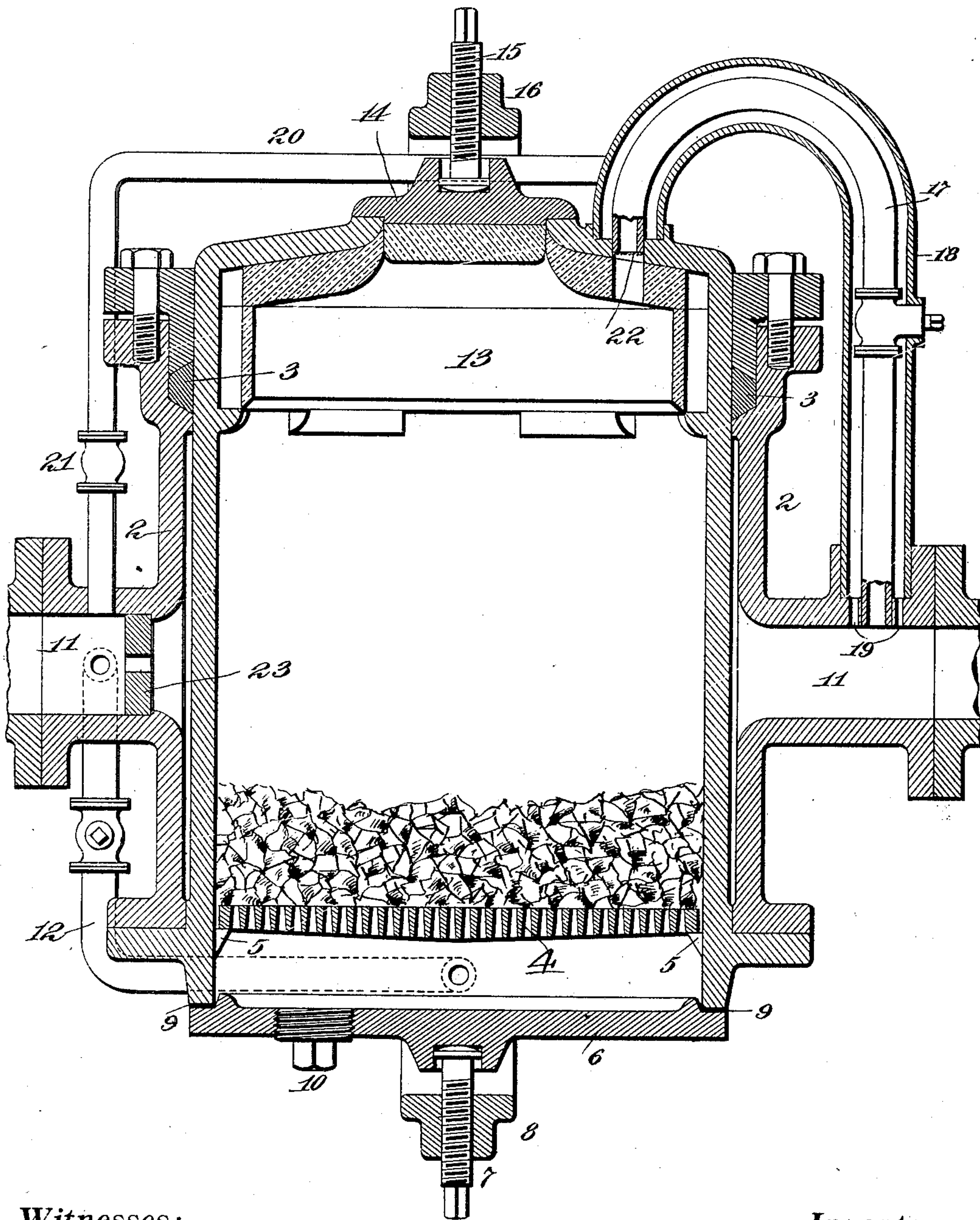
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T. A. EDISON.

APPARATUS FOR REHEATING COMPRESSED AIR FOR INDUSTRIAL PURPOSES.

(Application filed Dec. 12, 1899.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

APPARATUS FOR REHEATING COMPRESSED AIR FOR INDUSTRIAL PURPOSES.

SPECIFICATION forming part of Letters Patent No. 657,922, dated September 18, 1900.

Application filed December 12, 1899. Serial No. 740,065. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Reheating Compressed Air for Industrial Purposes, (Case No. 1,019,) of which the following is a specification.

In Letters Patent dated February 20, 1900, No. 643,764, I have described a process or method of heating compressed air which consists in directing a portion of the compressed air into intimate proximity with a source of burning combustible, whereby heat will be imparted to the compressed air by radiation, in effecting a reduction in pressure of the air between the source of heat and the point of use, in causing a portion of the air to flow by reason of such reduction of pressure through the burning combustible, whereby combustion will be maintained and the air so introduced will be directly heated to a very high temperature, and in mixing the directly heated portion of the air with the indirectly heated portion of the air prior to use.

The apparatus forming the subject of the present application, which I have designed for carrying said process or method into effect, comprises a receptacle or reheater interpolated in the air-pipe between the source of supply and a translating device, said receptacle containing, preferably, a solid or approximately solid combustible and being of such a character as to enable a portion of the air to be reheated by radiation—as, for example, by being provided with an inclosing jacket interposed in the conductor and through which a portion of the air will pass, a by-pass being provided which extends through the reheating-chamber to permit a portion of the air to pass directly through the reheater to support combustion and to be heated directly, and means being provided to permit a drop in the air-pressure between the inlet to said by-pass and the translating device to automatically cause air to flow through the by-pass in quantity depending upon the consumption at the translating device.

In order that my invention may be better understood, attention is directed to the accompanying drawing, forming a part of this

specification, and in which the figure illustrates a sectional view of the preferred construction of reheater embodying the present improvements.

1 represents a cylindrical reheating-chamber surrounded by a jacket 2, suitably packed, as at 3, to prevent leakage.

4 is a grate or grid carried on lugs or ears 5.

The bottom of the chamber comprises a door 6, adapted to be pressed tightly in place by a screw 7 working in a bridge 8, pivoted at one end and locked at the other, in the usual way. Asbestos packing 9 is preferably interposed between the door 6 and the bottom of the chamber 1. If desired, the door 6 may be provided with a screw-plug 10 for the introduction of burning waste to start the combustion. The plug may, however, be dispensed with and the combustion be started in any other suitable way. The main air-pipe 11 leads into and out of the jacket at diametric points, as shown.

12 is a conducting-pipe which leads into the chamber 1, below the grate 4 and above the door 6, so that the opening or closing of the door does not affect the pipe connections. The supply of air to the lower part of the chamber 1 keeps it cool, but the upper portion becomes intensely heated, and unless suitably insulated there will be considerable loss by radiation. I therefore prefer to provide the upper part of the chamber 1 with a fire-brick or asbestos lining 13, secured in place in any suitable way. The chamber is provided with a suitably lined or insulated upper door or manhole 14, adapted to be forced down into position by a screw 15, working in a bridge-piece 16. A pipe 17 leads from the chamber 1 at one side of the manhole 14 and connects with the air-pipe 11 at the discharge end, as shown. This pipe also becomes intensely heated, and to prevent loss by radiation I prefer to inclose it with a jacket-pipe 18, having ports 19 connected to the air-pipe, whereby the heat radiated from the pipe 17 will be communicated to the compressed air. In order to maintain a circulation of air in the pipe 18 and around the pipe 17, I prefer to employ a by-pass 20, having a regulating-valve 21 therein, said pipe extending from the inlet-pipe 11 to the pipe 18, as shown. In some instances the re-

heater will be provided at the mouth of the pipe 17 with a fine screen 22 to prevent large particles of ash from passing into the translating device. When charcoal is employed as a combustible, the ash produced is so fine that such a screen is not necessary. When only a moderate amount of air is passing through the reheater, its velocity is insufficient to carry off any ash therefrom, even when anthracite coal is employed as the combustible; but in order to meet all the exigencies of use, and particularly to prevent any ash from being carried into the translating device when the velocity of the air in the by-pass is relatively excessive such a screen may be conveniently employed.

A disk 23 is placed in the inlet part of the air-pipe 11, between the inlet to the pipe 12 and the point of use, so as to permit a drop in pressure to take place beyond the reheater, and thereby effect a positive flow of air through the pipe 12, the reheating-chamber 1, and the pipe 17.

The operation of the apparatus will be as follows: A suitable combustible, preferably of a solid character, is placed in the reheater upon the grid or grate 4, as shown, and is ignited in any suitable way. Compressed air from a suitable source of supply is now allowed to pass through the jacket 2 onto the translating device or devices. A portion, preferably a very small portion, of this air passes through the pipe 12 and enters the combustion-chamber of the reheater below the combustible, and thence passes evenly through the combustion-chamber of the reheater will be thus directly and intensely reheated and will pass out of the reheater with the products of combustion and enter the air-pipe between the reheater and the translating device. The larger portion of air passing through the jacket 2 will be heated by radiation and convection from the reheater, and the temperature of this air will be further augmented by the intermixture with it of the more-highly heated but smaller proportion of air entering the air-pipe from the interior of the reheater. By providing the pipe 12 with a valve 24 therein any suitable proportion of air may be caused to pass through the reheater, it being obvious that

the greater the proportion of this air the more rapidly will the combustible be consumed, and in consequence the higher will be the temperature of combustion and of the reheated air also. It thus becomes possible to regulate the temperature of the reheated air within wide limits.

By providing a device like the disk 23 to effect a very slight retardation in the flow of the compressed air a drop in pressure in the air-pipe adjacent to the reheater is secured and the flow through the by-pass and reheater is thus assured. It will be obvious that the extent of the drop in pressure will be dependent upon the rapidity with which the reheated compressed air is consumed at the translating devices. Hence if there is no consumption of the reheated compressed air the pressure will be the same on both sides of the reheater. By reason of this fact the flow of air through the by-pass will be substantially proportional to the drop in the pressure, and as the heat developed by the reheater is dependent upon the direct air-supply to the same it follows that a greater heat will be generated in the reheater as the consumption of the reheated air is increased. Hence the device is approximately self-regulating.

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

An apparatus for heating air, comprising a pipe supplying compressed air from a source of supply to a translating device, a reheater in said pipe for heating the air therein by radiation, a solid combustible in the reheater, a by-pass including the reheater for permitting a portion of the air to pass through the reheater to support combustion and to be heated directly, and means to permit a drop in the air-pressure between the inlet to said by-pass and the translating device to automatically cause air to flow through the by-pass in quantity depending upon the consumption at the translating device, substantially as set forth.

This specification signed and witnessed this 9th day of December, 1899.

THOMAS A. EDISON.

Witnesses:

W. E. GILMORE,
J. F. RANDOLPH.