

C. A. BACKSTROM.
 BURNER FOR COMBUSTION UNDER HIGH PRESSURE.
 APPLICATION FILED JUNE 21, 1909. RENEWED MAY 21, 1910.

974,624.

Patented Nov. 1, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

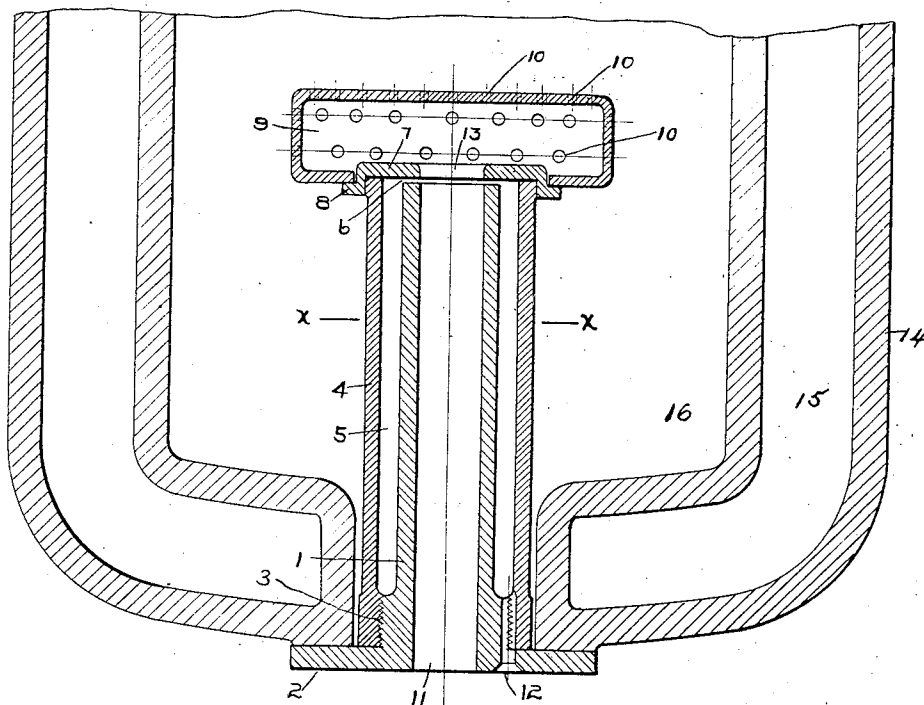


Fig. 3.

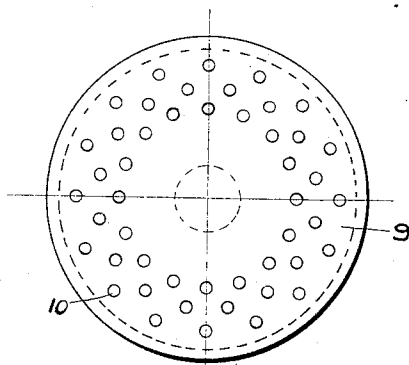
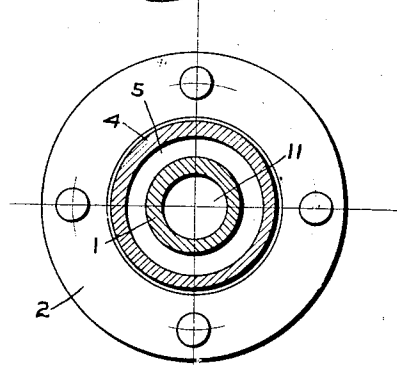


Fig. 2.



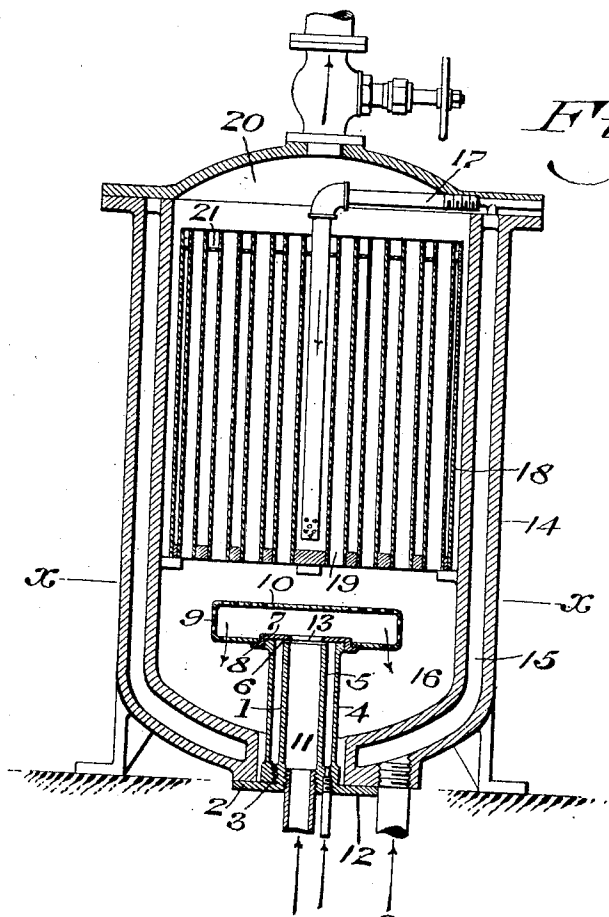
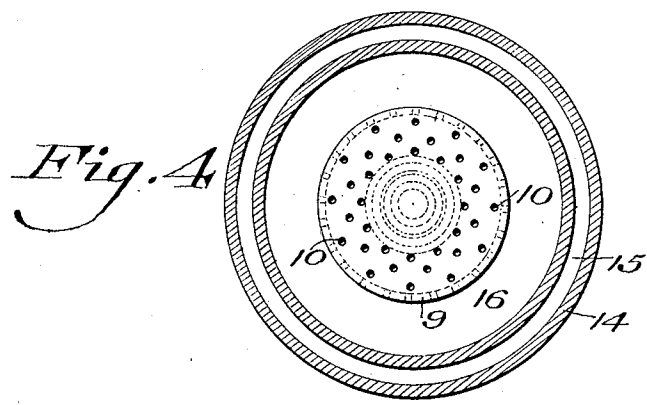
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UNITED STATES PATENT OFFICE.

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BURNER FOR COMBUSTION UNDER HIGH PRESSURE.

974,624.

Specification of Letters Patent.

Patented Nov. 1, 1910.

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To all whom it may concern:

Be it known that I, CHARLES A. BACKSTROM, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Burner for Combustion Under High Pressure, of which the following is a specification.

The object of my present invention is to devise a novel burner whereby combustion may take place under a pressure higher than atmospheric pressure.

In a co-pending application filed by me on September 15th, 1908, Serial No. 453,106 and allowed March 24th, 1909, I have shown and broadly claimed an apparatus for the utilization of products of combustion in combination with steam or other suitable gases, and my present invention is especially adapted to be employed in conjunction with an apparatus constructed in accordance with my prior application to which I have above referred. It will be readily seen that in an apparatus of this kind a burner constructed on the ordinary or conventional lines of hydrocarbon burners would result in an interrupted and more or less incomplete and unsteady combustion on account of the presence of large volumes of carbon-dioxid and nitrogen. To avoid such a state of affairs a perforated cap is provided, inclosing the burner and in which the combustion takes place and is wholly completed, driving out during its progress the objectionable or destructive gases. This cap becomes of a high temperature and thus insures a non-interruption in the combustion. In order that the fuel gases and the air will assume a very high temperature before uniting, the burner is provided with a long vaporizing chamber. Air under higher pressure than the atmosphere is introduced in the center of the burner proper and is in turn heated by the high temperature of the vaporizing chamber, in other words the fuel gas and the oxygen in the air are highly superheated before uniting with each other.

It is to be noted that in practice the entire burner is located at a point where the temperature of the combustion gases or products of combustion are of the highest temperature reaching approximately 2300° Fahrenheit.

For the purpose of illustrating the inven-

tion, one form thereof is shown in the accompanying drawings, since this embodiment has been found in practice to give a substantially perfect combustion without effecting the durability of the device, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and the invention is not limited to the exact arrangement and organization of these instrumentalities as herein set forth.

Figure 1 represents a sectional elevation of a burner embodying my invention and showing the same in assembled position with respect to a portion of an apparatus for utilizing the products of combustion. Fig. 2 represents a section on line *x-x*, Fig. 1. Fig. 3 represents a top plan view of the burner cap. Fig. 4 represents a section on line *x-x* Fig. 5. Fig. 5 represents a sectional elevation of a fluid generator in conjunction with which a burner embodying this invention is employed.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates a sleeve provided with a flange 2, whereby the same may be readily secured in position. The sleeve 1 is threaded as at 3 or otherwise adapted to receive an outer sleeve 4. The two sleeves form a vaporizing chamber 5. The inner sleeve is slightly shorter than the outer sleeve in order to provide an annular passage 6 for the fuel gas between the end of the sleeve 1 and the top plate 7 of the burner proper. The top plate is provided with a flange 8 which serves as a support for the cap 9. The cap 9 is provided with perforations 10 located on its circumference and partly on its upper face, as will be clearly understood from Fig. 3.

In order to clearly show that the burner is located in the heat zone of the apparatus there is shown in Fig. 5 a construction similar to that shown in the copending application hereinbefore referred to. 14 is the casing provided with a water jacket 15 for maintaining a high temperature difference between the atmosphere and the heat zone 16 of the apparatus suitable means being provided for rapidly feeding water to the water jacket 15 from whence it passes through a suitable conduit 17 to the boiler proper 18. The burner shown in Fig. 5 in the heat zone

of the apparatus is the same as that seen in Fig. 1 and has the same reference characters.

The operation is as follows:—Air under pressure higher than atmospheric is introduced at 11 and the fuel such as for example hydrocarbon or gas, is introduced at 12. The air as well as the fuel is superheated before it unites and passes through the aperture 13 where the combustion commences and as the combustion progresses, drives the detrimental carbon dioxide and nitrogen gases through the ports 10. The combustion is wholly completed or substantially completed within the cap 9. The products of combustion resulting from the combustion within the burner are driven out by the incoming charge and pass through the boiler tubes 19 and completely around the boiler into the mixing chamber 20 where they mix with the steam coming from the ports 21 surrounding the tubes 19 from whence they are led to a suitable point of utilization.

It will be apparent that the burner is shown as being located in the heat zone of an apparatus such as is shown in my prior allowed application, hereinbefore referred to.

I wish to call special attention to the fact that in my novel burner the combustion takes place and is fully completed within the cap 9 of the burner, which may be considered as the combustion chamber. No possible combustion can take place outside of this cap on account of the presence of a large amount of carbon dioxide and nitrogen.

The object of locating the burner proper within the heat zone is to utilize the heat of the products of combustion in vaporizing the fuel and superheating the air.

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

1. A burner located in a heat zone, said burner having a vaporizing and superheating chamber for the fuel and a superheating chamber for the air and provided with a

chamber receiving the united fuel and air and in which the combustion takes place and is fully completed, said chamber being provided with apertures communicating with the heat zone.

2. A burner located in a high pressure heat zone, said burner having an outer vaporizing and superheating chamber for the fuel and an inner superheating chamber for the air and provided with a chamber receiving the united fuel and air and in which the combustion takes place and is fully completed, said chamber being provided with apertures communicating with the high pressure heat zone.

3. A burner located in a high pressure heat zone, said burner having an outer vaporizing and superheating chamber surrounding the air conduit, and provided with a chamber in which the combustion takes place and is fully completed, said last named chamber having apertures communicating with the high pressure heat zone.

4. A burner located in a high pressure heat zone, of an apparatus for utilizing the products of combustion, said burner having a vaporizing and superheating chamber surrounding the air inlet, and provided with a chamber in which combustion takes place and is completed, said chamber having apertures communicating with the high pressure heat zone of the apparatus.

5. The combination in a burner for combustion at a pressure higher than atmospheric, of an inner sleeve forming an air conduit, an outer sleeve forming with the inner sleeve a vaporizing and superheating chamber for the fuel, a cap for the outer ends of said sleeves and a combustion chamber seated on said cap and provided with apertures.

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