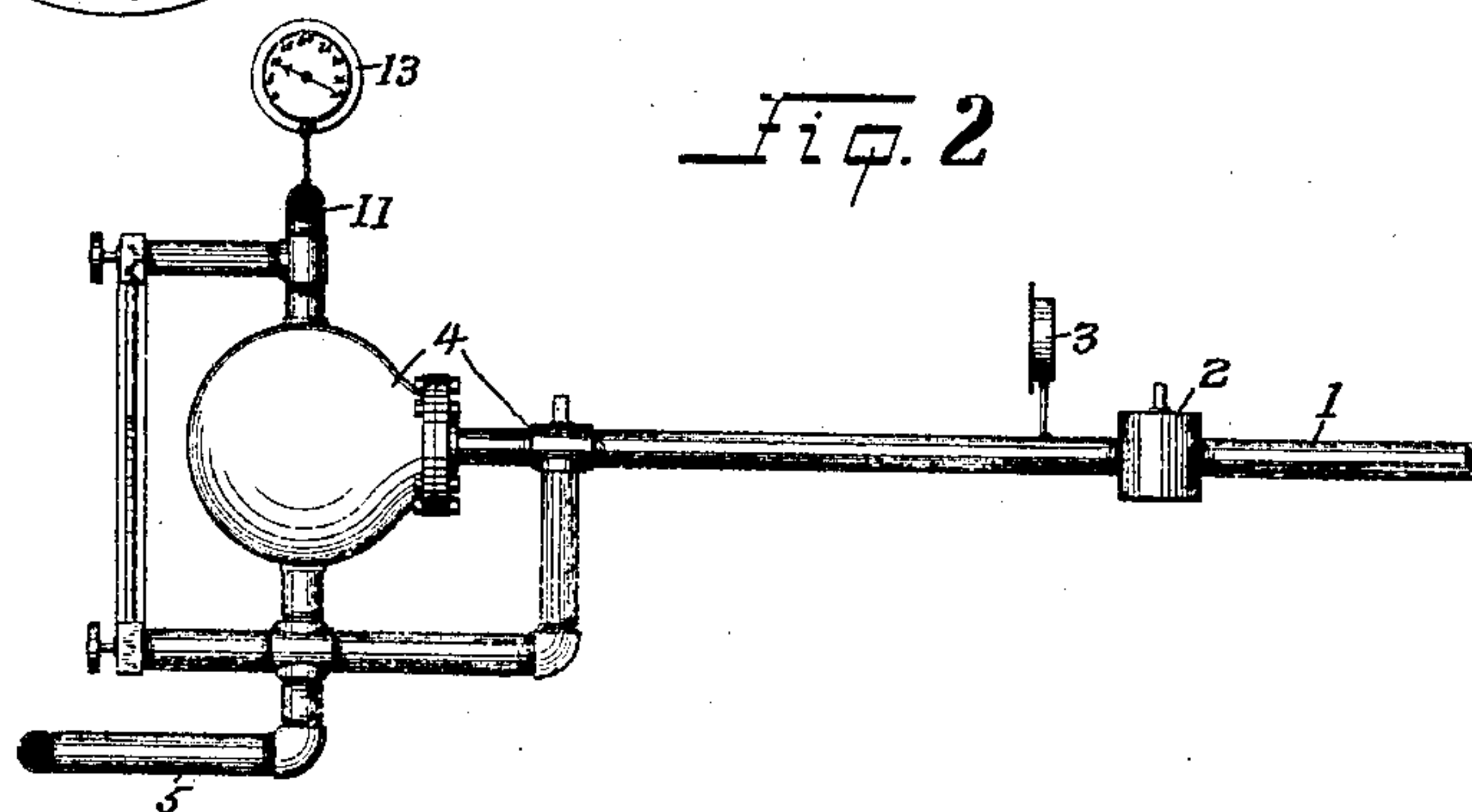
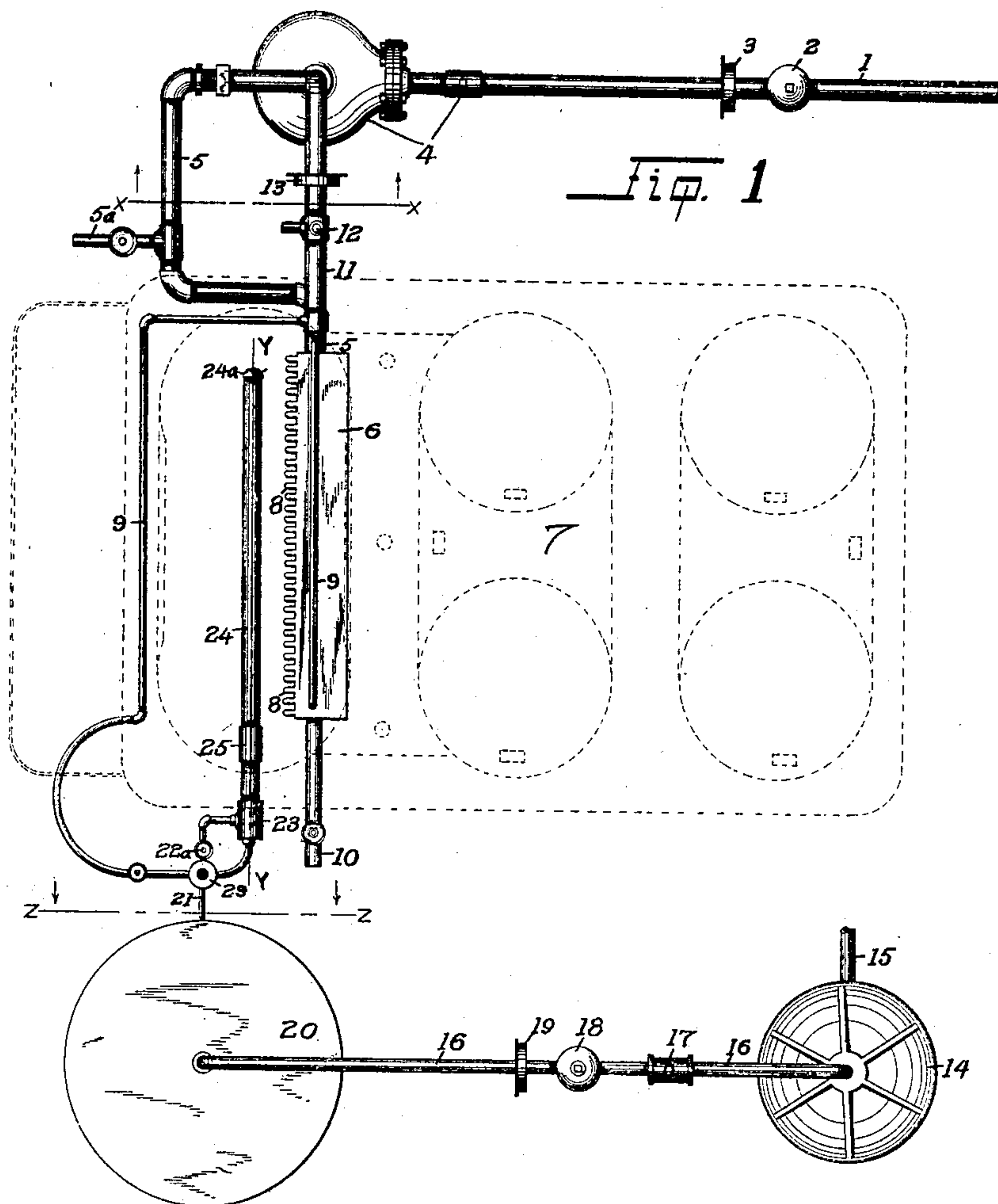


No. 814,091.

PATENTED MAR. 6, 1906.

I. E. SMITH.
OIL BURNING SYSTEM.
APPLICATION FILED MAY 3, 1905.

3 SHEETS—SHEET 1.



Witnesses
Frank H. Carter
Percy S. Webster.

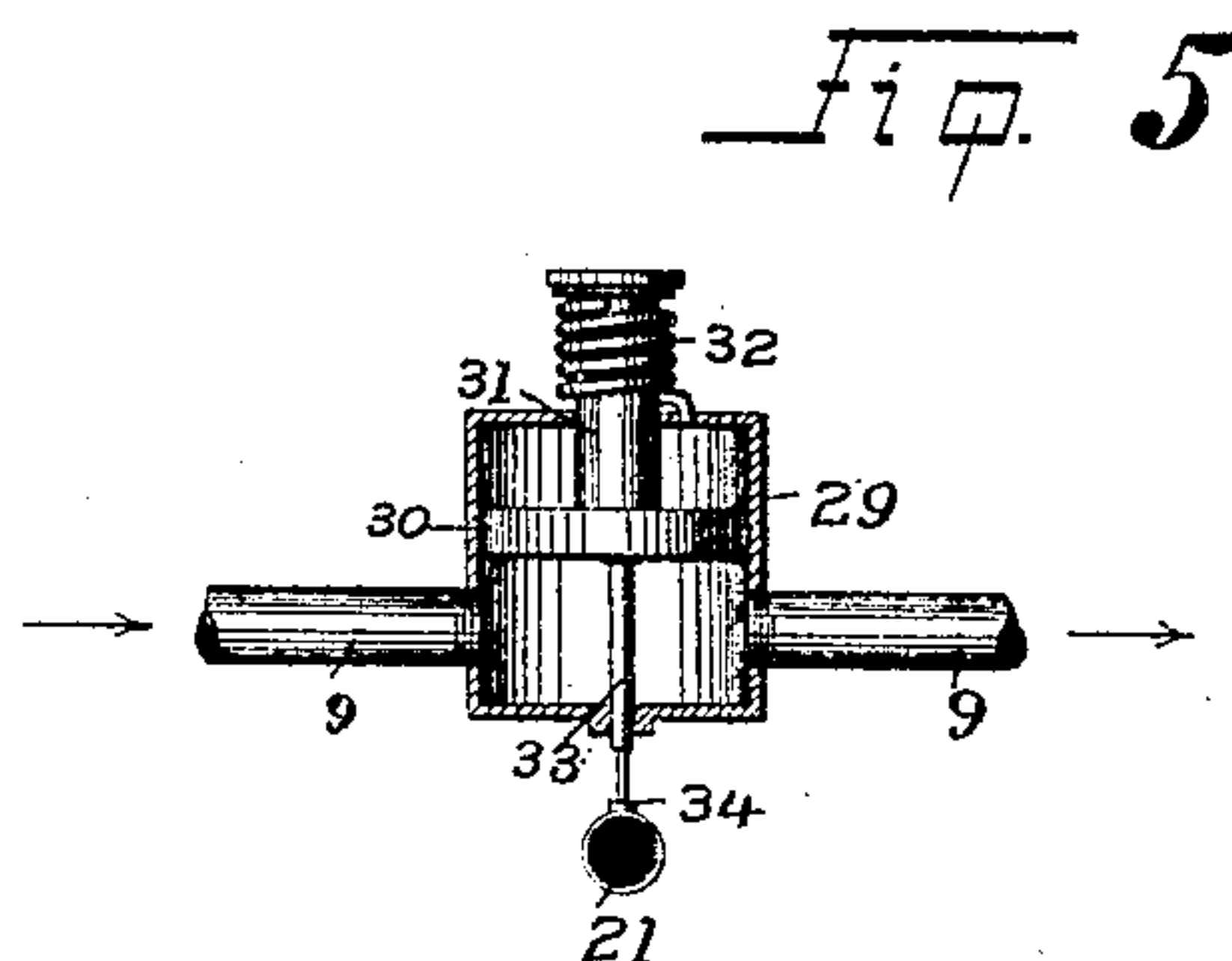
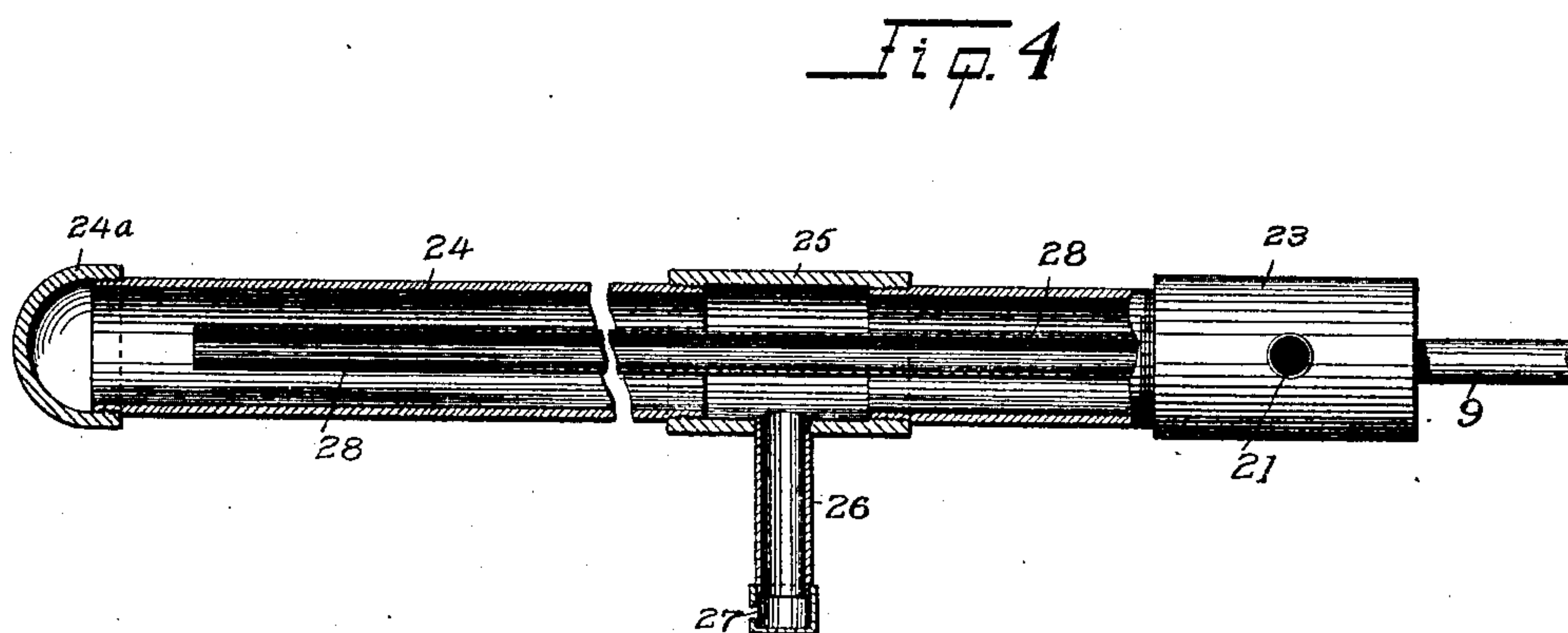
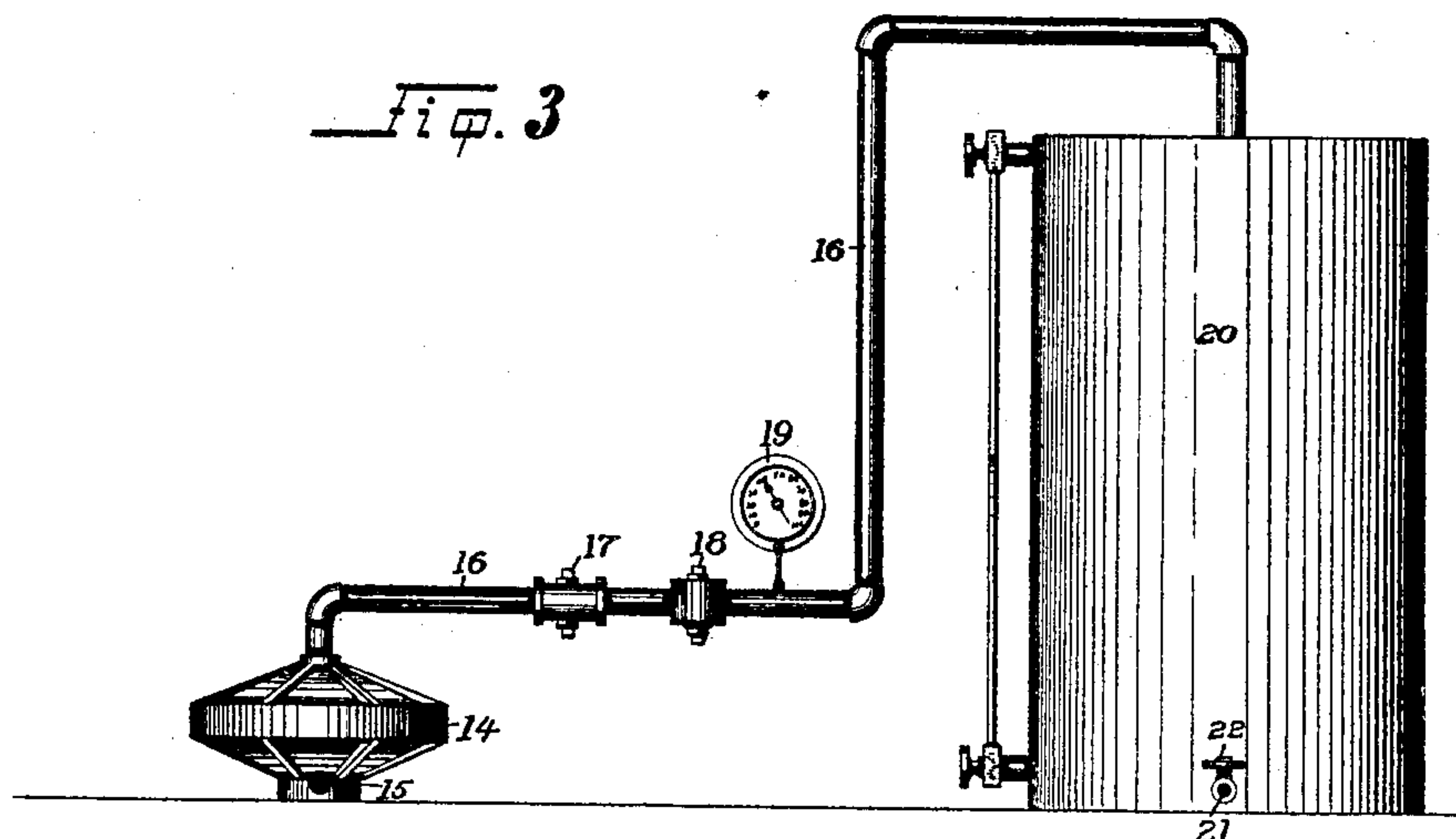
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3 SHEETS—SHEET 2.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 6

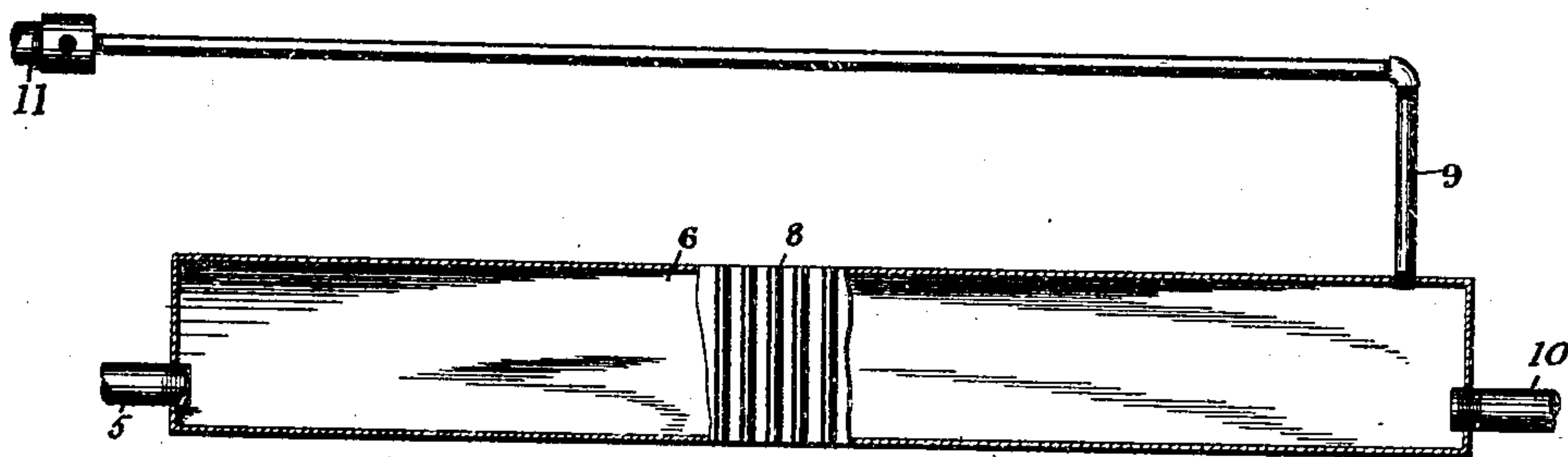
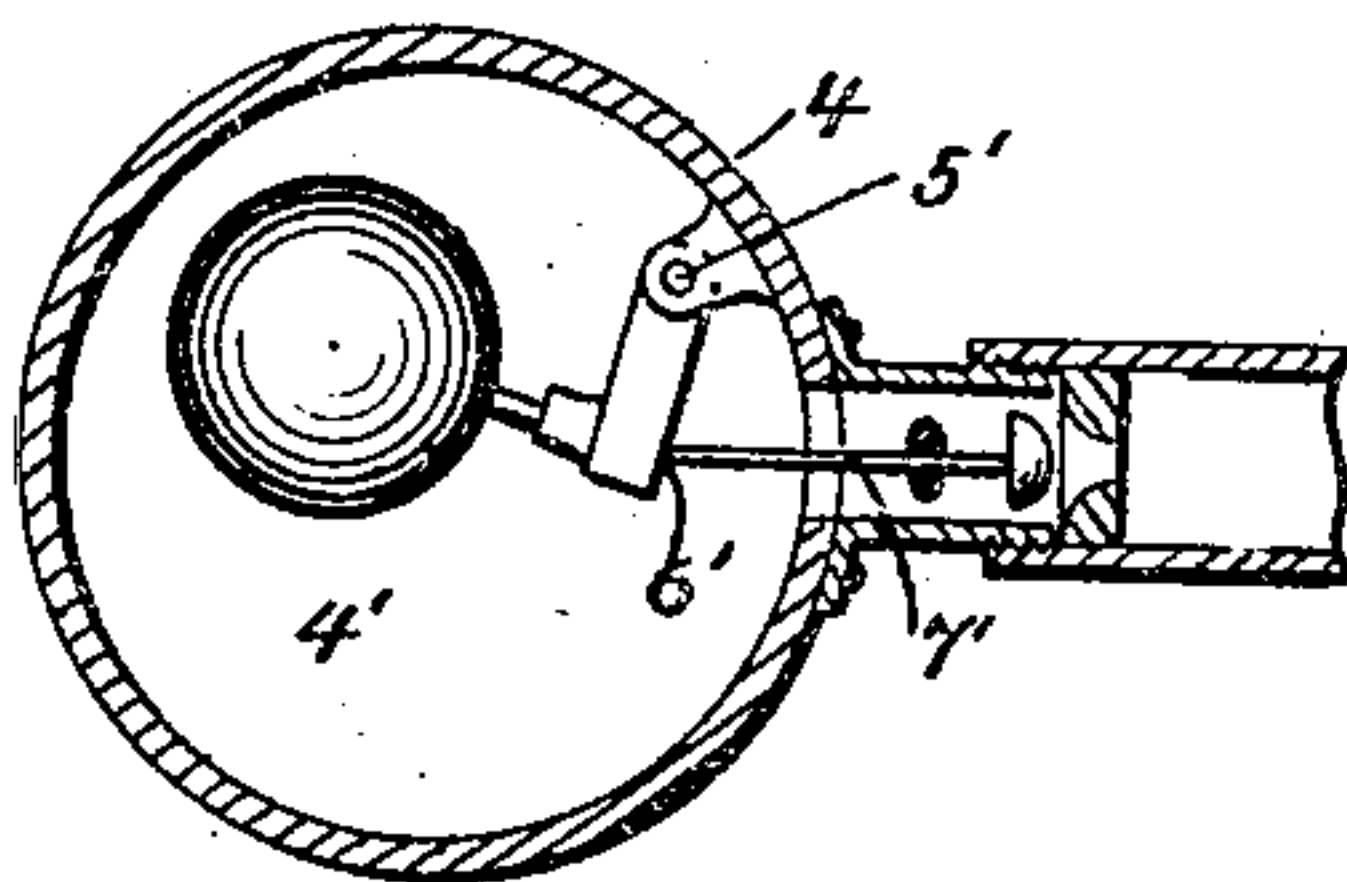


Fig. 7



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UNITED STATES PATENT OFFICE.

IRA E. SMITH, OF SACRAMENTO, CALIFORNIA.

OIL-BURNING SYSTEM.

No. 814,091.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed May 3, 1905. Serial No. 258,708.

To all whom it may concern:

Be it known that I, IRA E. SMITH, a citizen of the United States, and a resident of Sacramento, in the county of Sacramento and State of California, have invented certain new and useful Improvements in Oil-Burning Systems; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and the characters of reference marked thereon, which form a part of this specification.

My invention relates to oil-burning systems such as are used in connection with cooking-stoves, furnaces, and all heating contrivances, and particularly those used in restaurants and hotels, and I produce perfect combustion without causing smoke, soot, or smell, which are usually the three obnoxious features of oil-burners.

The object of my invention is to provide an oil-burning system for ranges, &c., to which oil and steam are automatically fed in proper proportions for atomizing the oil at the burner.

I am aware that attempts have been made to use crude or other low-grade petroleum as a fuel for heating purposes; but prior to my invention this has not, as a rule, been successfully done, because the heavier hydrocarbons held in suspension or solution by the lighter hydrocarbons are, when subjected to heat, deposited in the burner or apparatus employed, such deposit accumulating rapidly and choking up the apparatus, and the said material deposited, as described, is further deleterious, because it forms a non-heat-conducting coating within the apparatus. In my invention I have done away with this and have a clear apparatus all the time.

In the drawings similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a top plan view of my improved system. Fig. 2 is a sectional view taken on a line *x x* of Fig. 1. Fig. 3 is a sectional view taken on a line *z z* of Fig. 1. Fig. 4 is a sectional view of a burner proper. Fig. 5 is a sectional view of an automatic safety shut-off. Fig. 6 is a sectional view of a steam-boiler. Fig. 7 is a detail sectional view of a float-valve mechanism employed by me.

For the purpose of more fully elucidating my invention I will divide this description

into three divisions—namely, the steam-supply, the oil-supply, and the burner proper.

Steam-supply.—1 designates a water-pipe connected to the city main or other source of supply and having, say, a pressure of forty pounds. Located in this pipe is a water-pressure regulator 2 and a water-pressure gage 3. Said pipe connects at its other end with a float-valve mechanism 4, from which a pipe 5 leads to a steam-boiler 6, located within a stove 7, said float-valve mechanism consisting of a casing and a ball-cock, and within the casing is arranged a ball or float 4', which is pivoted at 5', and bears at 6' against the end of the stem 7' of the ball-cock. Said boiler is provided with corrugations 8 on the side which faces the flame.

9 is a small pipe leading from the top of the boiler and extending around the inside of the stove and out through the front and thence to the burner, to which it is connected in a manner hereinafter shown.

5^a is a blow-off valve leading from the pipe 5, and 10 is a similar valve leading from the boiler 6.

Connecting the pipe 9 with the float-valve 4 is a pipe 11, and in this pipe is located a pop-valve 12 and a steam-gage 13.

The object of the steam-supply being connected to the float-valve is to prevent a vacuum forming therein.

When the fire is started, the water in the boiler is vaporized and passes through the pipe 9 and to the pipe 11 and around the stove, by which process it is superheated, and then it passes into the burner, as will be shown. When ten pounds pressure is generated, the pop-valve exhausts, thus preventing a greater pressure than is required and which would have the effect of extinguishing the fire. The regulator 2 maintains a uniform pressure against the float-valve mechanism, thereby assisting said float-valve to work uniformly. As the water in the boiler 6 is lowered by evaporation the float-valve immediately operates and admits just as much water as is evaporated, and when the desired water-level is reached the water is shut off. The float-valve being automatic, a constant water-supply is maintained. The corrugations 8 present a greater heating-surface to the flame than a smooth surface, and they conduct the heat into the boiler.

Oil-supply.—14 is an automatic water-pressure air-pump connected to a source of water-supply 15. Leading from said air-

pump 14 is a pipe 16, which pipe is connected to the top of an oil-tank 20. Located in the said pipe 16 is a check-valve 17, an air-pressure regulator 18, and a gage 19.

21 is a supply-pipe leading from the oil-tank 20 and connected to the burner, as will be shown. Said pipe is provided with a stop-cock 22^a.

The regulator 18 permits of a uniform pressure on the oil in the tank 20, and the check-valve 17 keeps the air from rushing back into the pipe 16 and pump 14 when said pump ceases to operate, which would cause the pressure to leave the oil and the fire to go out.

Burner proper.—The steam-pipe 9 and the oil-pipe 21 connect with an ejector 23, (used as an injector in this connection,) to which ejector is connected a large pipe 24, which extends into the stove 7, said pipe 24 being provided with a T-joint 25 at a point just within the stove. Said pipe 24 is closed at one end by a cap 24^a. 26 is a small burner-pipe connected to the T-joint 25 and extending downward therefrom, the said pipe opening into the pipe 24. The lower end of said pipe 26 is closed by a cap, which is provided with a narrow slit 27, through which the combustible material passes.

28 is a small pipe connected with the oil and steam supply within the ejector 23 and extending to a point near the closed end of the pipe 24, the inner end of said pipe 28 being open.

The steam and oil meet in the ejector 23, and the steam atomizes the oil and drives it through the pipe 28 into the pipe 24, where it expands and passes back and into the pipe 26 and through the slit 27, at which point it is ignited, and the fire thus formed continues to generate the desired quantity of steam, as described. The steam and oil as a vapor is superheated as it passes through pipe 28, expanding into pipe 24 and passing into pipe 26, by the flame emitting from the slit 27, the pipe 24 extending over the flame.

In operating my burner proper instead of superheating the oil as an oil, I superheat the oil in combination with steam as a vapor. By using this method in a burner as described no deposit of heavy hydrocarbons can accumulate in the apparatus. The pressure of steam keeps the mixture agitated and forces out any deposit that would have a tendency to accumulate, thereby keeping the apparatus clear. This is a very valuable point, as when the oil is superheated as an oil alone it chokes the burner, as set forth in my introductory brief. The process of the oil and steam passing through the small pipe 28 into the large pipe 24 admits of the expansion which must necessarily take place in atomizing and superheating the oil.

Throughout this description I have used the word "ejector." As stated, I use it as an injector in my device, as I have found that

by so doing I can more thoroughly atomize the oil and operate my device.

In operating my device the fire of course might unexpectedly go out and the oil continue to run and overflow and cause dangerous gases. To prevent this, I have provided a safety shut-off valve formed of a shell 29, into the lower portion of which the steam-pipe 9 enters and leaves. Located in said shell is a piston 30, provided with a stem 31, around which is a spiral spring 32 of less power than the steam-pressure used, said spring being attached at its upper end to the stem 31 and at its lower end to the top of the shell 29, so that the spring will tend to pull down the stem. To the lower end of said piston is a shaft 33, connected with a needle-valve 34 in the oil-pipe 21. Thus when the fire is burning the force of the steam passing through the shell 29 holds the piston up, which action keeps the needle-valve 34 open. When the fire goes out, (if it does,) the steam-pressure of course ceases, and then the spring 32 pulls the piston 30 downward, and thus closes the valve 34 in the pipe 21 and shuts off the oil-supply. This same device could also be used continuously without the necessity of operating my valves after the system had been regulated as desired, as this automatic shut-off valve would, after the initial fire was started, automatically open and close the oil-supply. This of course is of value, as most cooks are not capable of successfully handling a system of valves, but if a system acts automatically they can use it.

I have now entered into a detailed description of the construction and relative arrangement of parts embraced in the present and preferred embodiment of my invention. I do not wish, however, to be understood as confining myself to such specific detail, as such changes and modifications may be made in practice as fairly fall within the scope of my claims.

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

1. In a device of the kind described the combination of a burner proper, means for supplying steam to said burner, an oil-supply for said burner comprising a supply-tank, an automatic water-pressure air-pump, a pipe connecting said pump to the top of said supply-tank, an air-pressure regulator located in said pipe, a check-valve located between said regulator and said pump, a pipe connecting said tank with said burner, a suitable stop-cock in said pipe, and an automatic shut-off valve connected in said last-named pipe, and regulated by the said steam-supply, as set forth herein.

2. In an oil-burning system, for cook-stoves, the combination of a burner proper located in the stove, means for supplying oil to said burner, a steam-supply consisting of a water-

pressure pipe connected to a steam-boiler arranged in the stove, a water-pressure regulator located in said pipe, a float-valve mechanism connected to said pipe and located between the regulator and the boiler, said float-valve mechanism comprising a float-valve chamber and a float-valve, a pipe leading from said float-valve chamber to said boiler, a pipe leading from said boiler to said float-valve chamber, and a pipe leading from the top of said boiler to said burner, and oil-supply-regulating means mounted on the oil-supply pipe and operable by the steam as set forth.

3. In a device of the kind described the combination of a burner consisting of two pipes one within the other the outer one be-

ing closed at both ends and the inner one being open at its inner end and connected with an ejector at the other, a burner-pipe leading from said outer pipe and provided with a slit at its lower end, an oil-pipe connected with said ejector, a steam-pipe connected with said ejector, and an automatic shut-off valve located in the oil-pipe and operated by the steam passing through the steam-pipe, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

IRA E. SMITH.

Witnesses:

PERCY S. WEBSTER,
FRANK H. CARTER.