No. 685,504. Patented Oct. 29, 1901.

W. A. BOLE & E. RUUD.

CARBURETER.

(Application filed May 5, 1900.)

(No Model.)

Fig. 3.

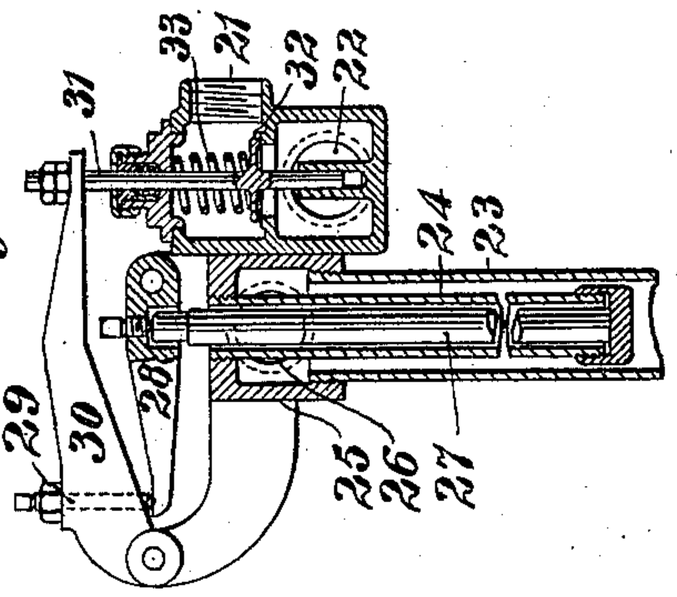

Fig. 4.

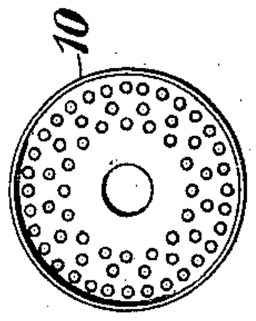

Fig. 5.

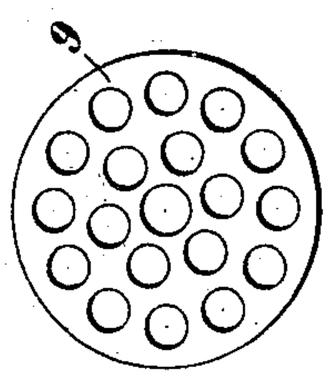

Fig. 1.

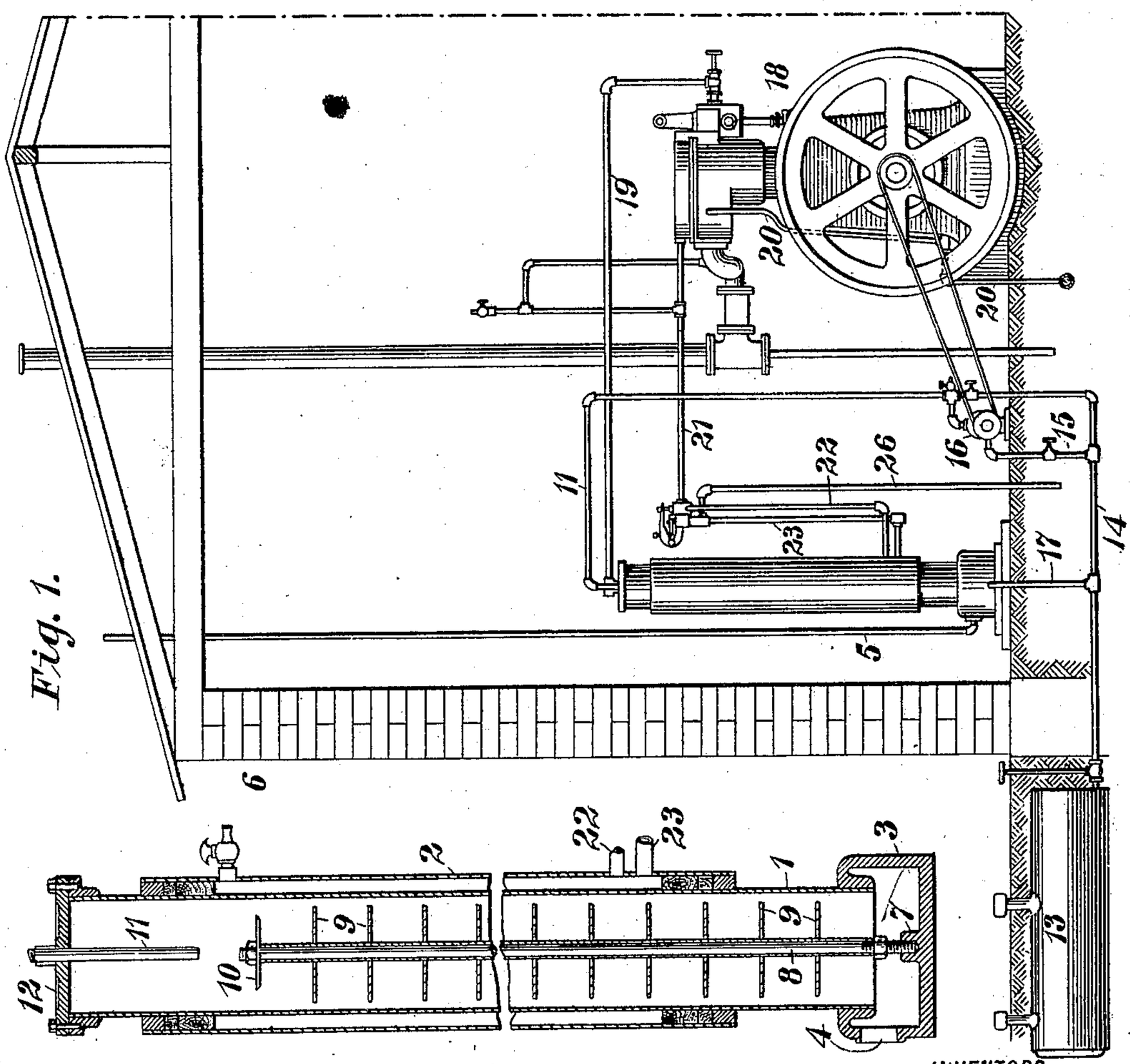

Fig. 2.

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CARBURETER.

SPECIFICATION forming part of Letters Patent No. 685,504, dated October 29, 1901.

Application filed May 5, 1900. Serial No. 15,608. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM A. BOLE and EDWIN RUUD, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gasifiers for Internal-Combustion Engines, of which the following is a specification.

Our invention relates to apparatus for producing a saturated mixture of air and gasolene for use in the operation of internal-combustion or explosive engines; and it has for its object to provide a simple and efficient apparatus which shall be automatic and continuous in its operation and the use of which is devoid of all danger arising from the escape of gas from the apparatus.

With these ends in view we have devised the apparatus shown in the accompanying drawings, in which—

Figure 1 is a view in side elevation of the apparatus employed in practicing our invention, a portion of the building in which the apparatus is located being also shown in section. Fig. 2 is a longitudinal sectional view of the saturating-chamber, in which the mixture of air and gasolene is effected. Fig. 3 is a longitudinal sectional view of a thermostatic device for regulating the temperature within the saturating-chamber. Fig. 4 is a plan view of a distributing-plate, and Fig. 5 is a plan view of one of the mixing or deflecting plates.

Since the apparatus devised by us is employed for making a saturated mixture of air and gasolene, we term it a "gasifier," and it will be hereinafter so designated and referred to.

The receptacle in which the saturation of air with gasolene is effected comprises an upright sheet-metal tubular chamber 1, having a jacket 2, which surrounds the chamber and extends longitudinally throughout the greater portion of its length. The bottom of tube 1 is fitted into and supported by a hollow casting 3, that constitutes a chamber to receive the unabsorbed portion of the gasolene that descends through the chamber 1. The casting 3 is provided at one side with an opening 4, into which is fitted one end of an air-inlet pipe 5. As here shown, this air-inlet pipe extends vertically through the roof of the building 6, in which the apparatus is located; but obviously the air might be supplied to the opening 4 through a pipe extending in a different direction and of different length from that shown. In fact the size of the pipe 5 and of the opening 4 may be different from what is shown, and more than one opening and more than one pipe may be employed, if desired. The only restriction as regards this feature of the apparatus is that the means for supplying the air shall be such as to provide air in sufficient quantity.

Supported in a suitable socket 7 in the bottom of the casting 3 is a rod 8, on which are supported, at suitable intervals, perforated mixing or baffling plates 9, these plates being preferably so disposed that the perforations in adjacent plates will be out of alinement, so as to provide zigzag paths for the ascending air and the descending gasolene, and thus facilitate the saturating operation. At the top of rod 8 is supported a perforated dish-shaped distributing-plate 10, into which the gasolene flows from the lower end of the supply-pipe 11, this pipe being supported by a cap-plate 12, through which it projects. The gasolene which is supplied to the saturating-chamber through the pipe 11 is derived primarily from a gasolene tank or receptacle 13 through pipes 14 and 15, a suitable pump 16 being employed for forcing the gasolene through the pipe 11. When the circulatory system is once in operation, only sufficient gasolene will be drawn from the tank 13 to take the place of that which is absorbed by the current of air flowing through the saturating-chamber. The unvaporized gasolene that flows into the chamber in casting 3 flows out into the pipe 14 through a pipe 17 and is pumped back through pipes 15 and 11 into the saturating-chamber.

The pump 16 may be driven from any suitable source of power, but preferably, as here shown, from the shaft of an internal-combustion engine 18, to which the saturated mixture is supplied through a pipe 19, leading from the top of this chamber to the mixing-

valve of the engine. In order that the apparatus may be successfully operated, it is essential that the temperature of the saturating-chamber be maintained approximately uniform. We therefore supply hot water to the jacket 2 and regulate the temperature of the water in the jacket by means of a suitable thermostatic device. Since it is necessary to cool the cylinders and other hot parts of the engine by means of jackets to which cold water is supplied, it is convenient and economical to employ the water thus heated in the engine-jackets for maintaining a proper temperature in the chamber of the gasifier. The cold water is supplied to the jackets of the engine through a pipe 20, and the hot water is taken from the jackets of the engine by means of a pipe 21 and flows therefrom through the pipe 22 into the jacket 2, near its lower end. As the water supplied through the pipe 22 rises in the jacket it becomes cool and flows down and out through the pipe 23, in the upper end of which is located a tube 24, of brass or some other metal, having a comparative large coefficient of expansion, the lower end of this tube being free and the upper end rigidly fastened to a cap-piece or coupling 25. Extending from the cap-piece or coupling 25 is a waste-pipe 26, through which the cold water flows. Located in the tube 24 is a rod 27, of steel or other suitable material, the coefficient of expansion of which is less than that of the metal of which tube 24 is comprised. Resting upon the upper end of this rod 27 is a pivoted lever 28, upon the free end of which rests the end of a screw 29, that is adjustably mounted in a lever-arm 30. The free end of the arm 30 supports the stem 31 of a valve 32, the latter being pressed toward its seat by means of a coiled spring 33, this valve when closed serving to cut off connection between pipes 21 and 22. It will be readily understood that the several parts of this thermostatic controlling device may be so adjusted as to insure a practically constant temperature of the water flowing from the jacket 2, and consequently to maintain the temperature within the saturating-chamber at such a degree as will give the best results in the saturating operation.

It is to be understood that we do not limit our invention to the specific details of apparatus illustrated and described, since these may be variously modified without in any way restricting the spirit and scope of the invention.

As has been already stated, the opening or openings through which the air is admitted to the gasifier may be of any size, provided the total cross-sectional area is equal to or greater than the cross-sectional area of the pipe 19, there being no attempt to measure or limit the quantity of air admitted to the gasifier. There is also no measurement or limitation of the quantity of gasolene pumped through the apparatus, the sole consideration in this connection being that sufficient gasolene is pumped to completely saturate the air flowing in the opposite direction. It follows from the fact that the air is taken into the apparatus at atmospheric pressure by suction that the pressure within the gasifier is always less than atmospheric pressure when the apparatus is in operation. It is obvious, therefore, that no escape of gas from the apparatus to the atmosphere can take place, and since the mixture of air and gasolene-vapor in the gasifier is too rich to explode all danger of injuries in the use of the apparatus is obviated. The engine, which is supplied with the mixture, determines the quantity of air that is taken into the gasifier, and since there is a complete circulatory system for the gasolene the operation of the engine is in no way affected by increasing the speed at which the pump operates beyond that speed which shall be determined upon as adequate to supply sufficient gasolene.

We claim as our invention—

1. The combination with a gasolene-engine, a gasolene-receptacle and a saturating-chamber having an air-inlet at its bottom, a gas-outlet at its top and internal means for effecting saturation of the air as it passes through the apparatus, of a pump having pipe connections with the gasolene-receptacle and with both the top and the bottom of the saturating-chamber whereby a complete circulation of all gasolene drawn from the receptacle is effected, a hot-water jacket for the saturating-chamber, means for insuring water circulation therethrough and means for controlling the temperature of the water in said jacket.

2. A gasifier for gasolene-engines having an air-inlet at or near its lower end, a gasolene-inlet and a gas-outlet at its upper end, baffle-plates for subdividing the oppositely-flowing currents of air and gasolene and a hot-water jacket, in combination with pipes and a pump for maintaining circulation of all unvaporized gasolene that is supplied to the gasifier, means for maintaining a substantially uniform supply of gasolene in the circulatory system and means for maintaining a supply of hot water, at the desired temperature, to the gasifier-jacket.

3. A gasifier for gasolene-engines, comprising a saturating-chamber having a gasolene-inlet at its top, an air-inlet at or near its bottom and intermediate means for subdividing the falling gasolene into a spray, an external pump for withdrawing substantially all of the unvaporized gasolene from the bottom of the saturating-chamber and returning it to the top, and means for supplying the amount of gasolene that is necessary to maintain a substantially constant quantity in the circulatory system.

4. A gasifier for gasolene-engines, comprising a saturating-chamber having a gasolene-inlet at its top, an air-inlet at or near its bottom and intermediate means for subdividing the falling gasolene into a spray, an external

pump for withdrawing substantially all of the unvaporized gasolene from the bottom of the saturating-chamber and returning it to the top, means for supplying the pump with such additional amount of gasolene as is necessary to maintain a substantially constant quantity in the circulatory system and means for subjecting the saturating-chamber to an automatically-regulated degree of heat.

5. A gasifier for gasolene-engines having means for maintaining a continuous circulation of a substantially uniform quantity of gasolene therethrough in one direction and a substantially unrestricted current of air at or below atmospheric pressure in the opposite direction, means for subdividing the currents of air and gasolene and a heating-jacket, in combination with a gasolene-engine, connections between its cylinders and the gasifier-outlet, connections between its water jacket or jackets and the heating-jacket of the gasifier and thermostatic means for maintaining the desired temperature in said heating-jacket.

6. The combination with a gasolene-engine having a water-jacket, a gasolene-receptacle, and a saturating-chamber having a gasolene-inlet and a gas-outlet at one end and a gasolene-outlet and an air-inlet at the opposite end, means for effecting saturation of the air as it passes through the chamber, and a water-jacket, of pipe connections between the saturating-chamber jacket and the engine-jacket and means for effecting a circulation of a substantially uniform quantity of gasolene through the saturating-chamber.

7. The combination with a gasolene-engine having a water-jacket, a gasolene-receptacle, and a saturating-chamber having a gasolene-inlet and a gas-outlet at one end and a gasolene-outlet and an air-inlet at the opposite end, means for effecting saturation of the air as it passes through the chamber, and a water-jacket, of pipe connections between the saturating-chamber jacket and the engine-jacket, thermostatic means for controlling the temperature of the water in the saturating-chamber jacket and means for effecting a circulation of a substantially uniform quantity of gasolene through the saturating-chamber.

In testimony whereof we have hereunto subscribed our names this 4th day of May, A. D. 1900.

WILLIAM A. BOLE.
EDWIN RUUD.

Witnesses:
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JAS. FERRIS.