(No Model.)

A. WERNER.

MIXING APPARATUS.

No. 490,525. Patented Jan. 24, 1893.

Fig: 1.

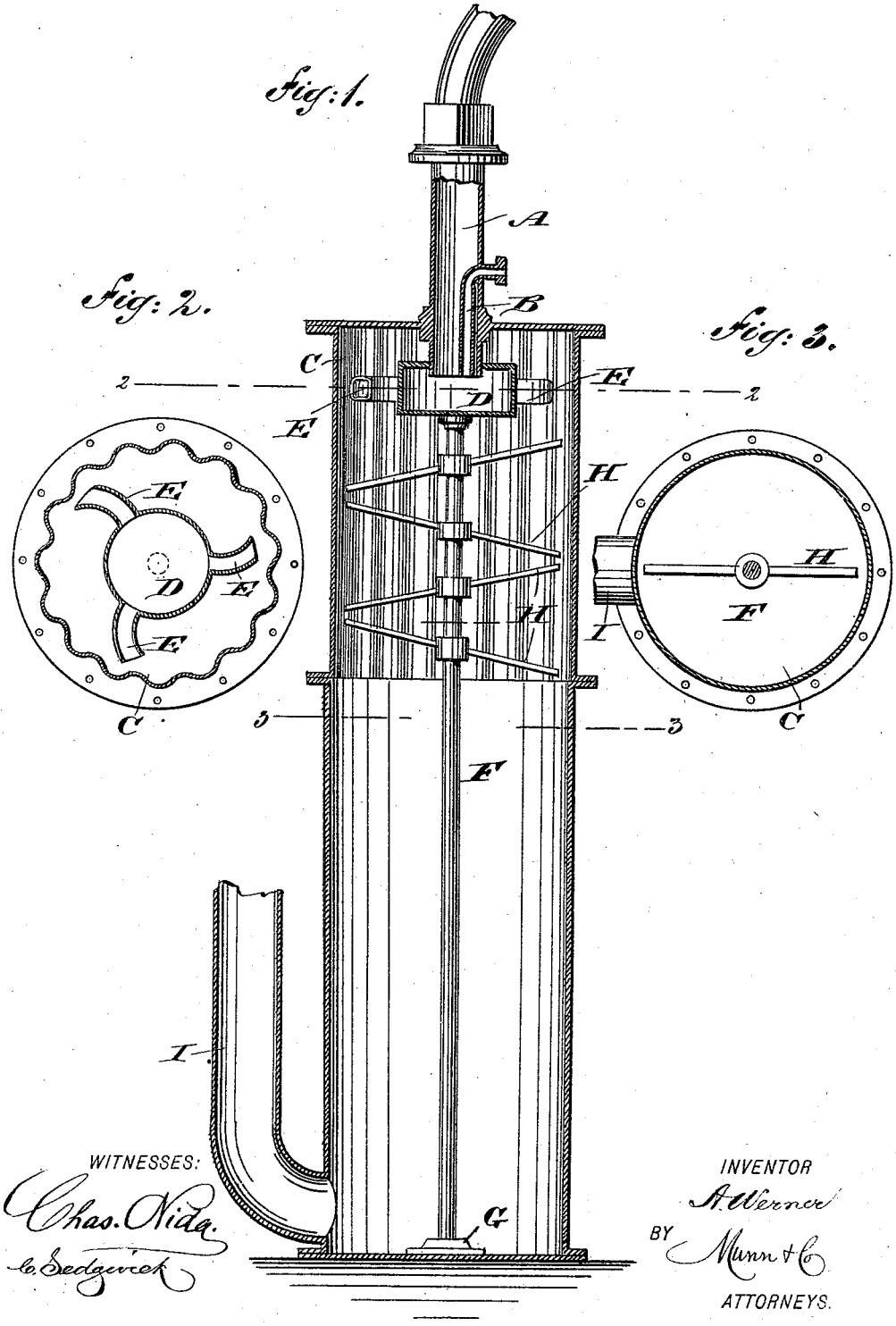

Fig: 2.

Fig: 3.

WITNESSES:

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MIXING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 490,525, dated January 24, 1893.

Application filed August 2, 1892. Serial No. 441,935. (No model.)

To all whom it may concern:

Be it known that I, AUGUST WERNER, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Mixing Apparatus, of which the following is a full, clear, and exact description.

The invention relates to devices for charging liquids with gases, and is more especially designed for use in the method of charging liquids described in the application for Letters Patent of the United States, Serial No. 431,202, filed by me April 29, 1892.

The object of the present invention is to provide a new and improved liquid and gas mixing apparatus which is simple and durable in construction, and arranged in such a manner that the moving column of liquid actuates the mechanism for completely mixing the gas with the liquid.

The invention consists of a wheel driven by the force of the moving column of liquid, the said wheel being mounted to turn in a casing having an outlet or discharge pipe, a liquid supply pipe opening into the said wheel at the center thereof, and a gas supply pipe extending into the said liquid supply pipe and discharging through the latter into the said wheel.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement; Fig. 2 is a sectional plan view of the same on the line 2—2 of Fig. 1; and Fig. 3 is a similar view of the same on the line 3—3 of Fig. 1.

The improved mixing apparatus is provided with a liquid supply pipe A connected with a suitable source of supply so that the liquid flows through the said pipe. In the lower end of the latter is arranged a gas supply pipe connected at its outer end with a suitable source of gas supply, the lower end of the said gas supply pipe being flush with the lower end of the liquid supply pipe A. The liquid supply pipe A extends through a cover into a casing C arranged vertically and preferably made in two parts, of which the upper part is corrugated and the lower part cylindrical, as is plainly shown in the drawings. Within this vessel C is arranged a wheel D made hollow, and into which opens centrally the liquid supply pipe A containing the lower end of the gas supply pipe B, so that both the liquid and the gas pass into the interior of the wheel D. The latter is provided in its rim with curved outlet pipes E through which the liquid and gas can escape and, in so doing, re-act on the pipes and the wheel D to impart a rotary motion to the latter, in the well-known manner. The wheel D is mounted at its bottom on a vertically disposed shaft F set in a step G arranged in the bottom of the vessel C, the top of the wheel D having its bearing on the lower or inner end of the pipe A. On the shaft F directly below the wheel D, and within the corrugated part of the casing C, are arranged stirring or agitating arms H, preferably set at an angle to the shaft, as is plainly indicated in Fig. 1. From the lower end of the casing C leads a discharge pipe I, through which passes the charged liquid to a receiving vessel or tank.

The operation is as follows; The liquid flowing through the pipe A and the gas passing through the pipe B simultaneously pass into the wheel D, in which a preliminary mixing of the liquid and gas takes place, the mixture passing through the outlet pipes E into the upper part of the casing C and at the same time imparting a rotary motion to the wheel D, as above described. The charged liquid, after leaving the pipes E, strikes the corrugations of the upper part of the casing C, so that the liquid and gas are divided into very fine particles, and the particles are beaten by the agitating arms H, so that both the liquid and the gas are considerably stirred up and finally mix very completely before reaching the lower part of the casing C. The liquid thus becomes charged very minutely with the gas, and the charged liquid finally flows out through the pipe I to a receiving vessel. It will be seen that by this arrangement the column of moving liquid serves to actuate the mixing device.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent;—

1. A mixing apparatus comprising a wheel adapted to be driven by the moving column of liquid, a liquid supply pipe opening into the said wheel at the center thereof, and a gas supply pipe extending into the said liquid supply pipe so as to discharge its gas into the said wheel simultaneously with the liquid from the said liquid supply pipe, substantially as shown and described.

2. A mixing apparatus comprising a casing, a liquid supply pipe extending into the said casing, a gas supply pipe passing through part of the said liquid supply pipe, and a wheel mounted to turn within the said casing and connected with the said liquid supply pipe so that the entering liquid revolves the said wheel, substantially as shown and described.

3. A mixing apparatus comprising a casing, a liquid supply pipe extending into the said casing, a gas supply pipe passing through part of the said liquid supply pipe, a wheel mounted to turn within the said casing and connected with the said liquid supply pipe so that the entering liquid revolves the said wheel, and agitating arms held on the shaft of the said wheel within the said casing, substantially as shown and described.

4. In a mixing apparatus, the combination with a corrugated casing, of a wheel mounted to turn therein and connected with the liquid supply and gas supply to furnish the motive power for revolving the said wheel, a shaft carrying the said wheel, and agitating arms secured on the said shaft within the said corrugated casing, substantially as shown and described.

AUGUST WERNER.

Witnesses:
THEO. G. HOSTER,
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