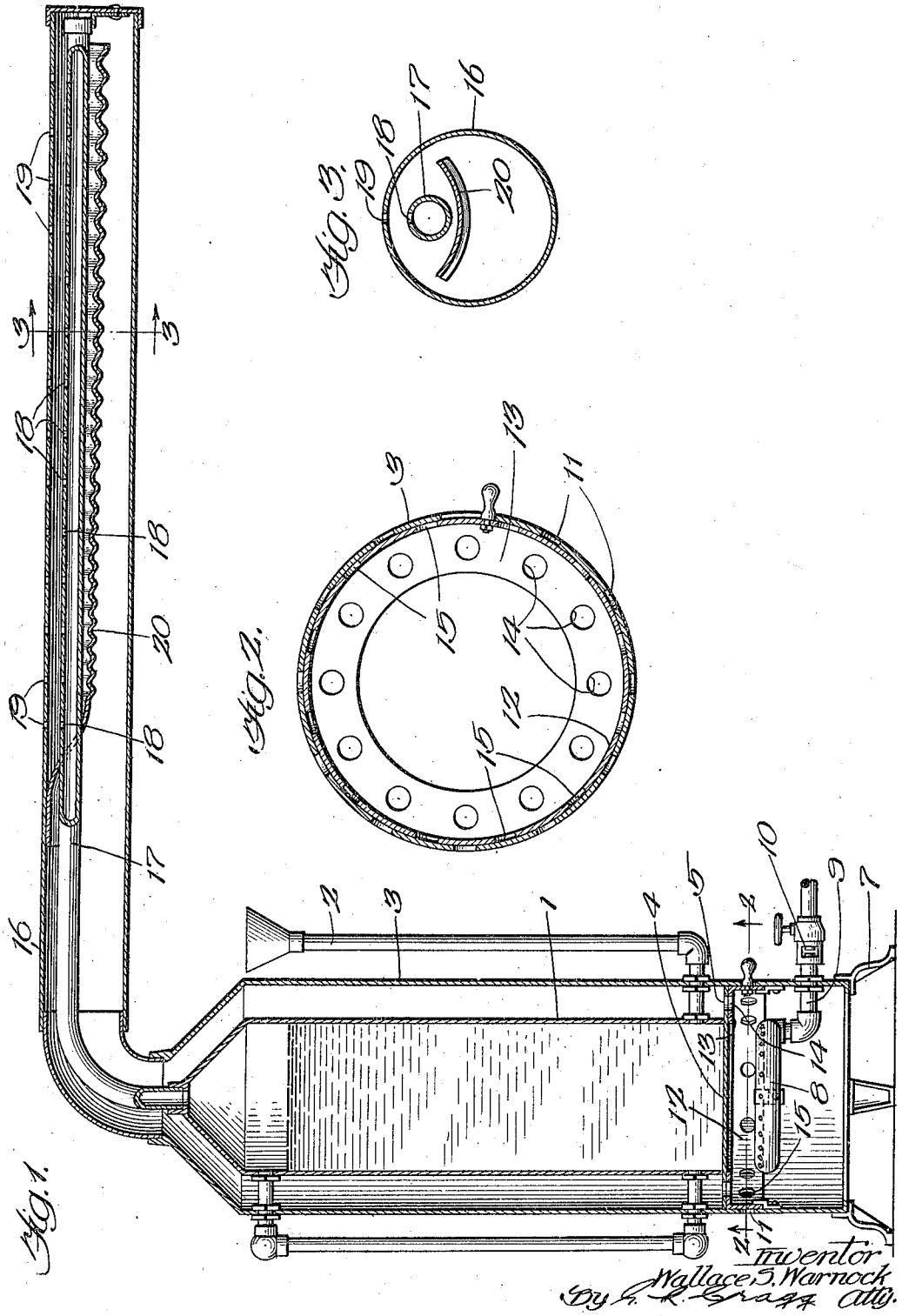
W. S. WARNOCK.

STEAM PRODUCER.

APPLICATION FILED DEC. 16, 1920.

1,398,986. Patented Dec. 6, 1921.



UNITED STATES PATENT OFFICE.

WALLACE S. WARNOCK, OF CHICAGO, ILLINOIS.

STEAM-PRODUCER.

1,398,986. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed December 16, 1920. Serial No. 431,109.

To all whom it may concern:

Be it known that I, WALLACE S. WARNOCK, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Steam-Producers, of which the following is a full, clear, concise, and exact description.

My invention relates to apparatus for producing steam and has for its object the provision of a construction whereby the steam may be dried, one use of the dry steam being to effect the elimination of static charges of electricity from sheets of paper that are passing through printing presses.

In carrying out my invention I employ a water container, means for heating the water in the container to produce steam, a pipe for conveying steam from the container and perforated to permit discharge of steam therefrom, and means for effecting the flow of heated gas through the steam preferably after such steam has been discharged from the pipe.

In the preferred embodiment of the invention the container is surrounded by a jacket that is spaced apart therefrom, a pipe leading from the jacket for conveying the gas and surrounding the pipe that conveys the steam. The same heating means, such as a gas burner, which converts the water into steam is also effective in supplying heated gas, such as the products of combustion generated at the burner, to the space between the jacket and the water container and the pipe communicating with this space. Thus a single source of heat serves to generate the steam and to furnish dry hot gas that passes through the steam to absorb the moisture therefrom in order that the steam may issue from the equipment in such a dry state as readily to effect the elimination of static charges of electricity, although the invention is not to be limited to any particular use to which it may be put.

The invention will be fully described in connection with the accompanying drawing showing the preferred embodiment thereof and in which Figure 1 is a longitudinal sectional elevation of a steam generator equipped in accordance with the invention; Fig. 2 is a sectional view on line 2—2 of Fig. 1 but on a larger scale; and Fig. 3 is a sectional view on line 3—3 of Fig. 1, also on a larger scale.

Like parts are indicated by similar characters of reference throughout the different figures.

The water container 1 may be of any suitable construction, that illustrated being preferred. A water supply pipe 2 communicates with the lower end of the container 1 and terminates at its upper end above the normal level of the water. A jacket 3 surrounds the container 2 and is spaced apart therefrom, the floor 4 of the container being laterally extended to join the jacket and also constitute a floor beneath the space that is between the jacket and the container. Apertures 5 are provided in the portion of the floor 4 that underlies the space between the jacket and the container. The jacket is continued downwardly, as indicated at 6, and is opened at its lowermost end where it is supported upon the legs 7. Any suitable source of heat may be employed to heat the water, the source of heat 8 which is illustrated being below the floor 4 and capable of burning gas supplied thereto through the pipe 9 and an air mixing valve 10 that is provided to establish a suitable mixture of air and gas passing to the burner. The lower continuation of the jacket 3 is provided with openings 11. The jacket 3, and particularly its lower extension, is preferably cylindrical and I provide a cylindrical damper 12 in the lower continuation of the jacket that immediately underlies the floor 4. This damper has a horizontal portion 13 containing openings 14 adapted to be brought into registry with the openings 5 upon suitable rotary adjustment of the damper. The cylindrical portion of the damper has openings 15 adapted to be brought into registry with the openings 11 in the lower portion of the jacket. The sets of openings 14 and 15 are offset so that when the openings 14 in the damper are in registry with the openings 5 in the floor 4, the openings 15 are brought out of registry with the openings 11 and, when the openings 15 in the damper are in registry with the openings 11 in the lower portion of the jacket, the openings 14 are brought out of registry with the openings 5 in the floor 4. Initially, the damper 12 is so adjusted that the openings 5 and 14 are closed, the water being brought to a steam generating temperature during this adjustment of the damper. When the water has been heated to a boiling point the damper is adjusted to bring the openings 5 and 14 into registry so that the heated air and other

gas, namely the products of combustion due to the operation of the burner 8, may pass upwardly through the space between the container and the jacket, from which space the heated gas is discharged into the pipe 16 that conveys the heated gas away from the equipment. This pipe 16 surrounds the pipe 17 that is in communication with the upper end of the water container 1 and which is provided for passing the undried steam from the container. The pipe 17 has perforations 18 distributed along its length through which the wet steam is discharged into the space that intervenes between the two nested pipes 16 and 17. The steam thus discharged finds its way through the perforations 19 formed in the pipe 16 along the same. The heated gas that is conveyed by the pipe 16 passes through the steam which is finding its way from the perforations 18 through the perforations 19 and across the path followed by the heated gas.

In order that the gas may be most effective in the discharge of its function, I provide a transversely corrugated deflector 20 within the gas pipe and extending from an upper portion of this pipe to a place beneath and along the steam pipe where the deflector is spaced apart from both pipes and serves to direct the upward flow of gas into the steam that is flowing from the perforations 18 to the perforations 19.

In order that the deflector may more effectively discharge its function which is the even distribution of the gas throughout the steam, the corrugations in the deflector are closer together and shallower at the end of the deflector which is nearer the water container, the space between the corrugations gradually widening and the corrugations becoming gradually deeper toward the other end of the deflector.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. In a steam producer, the combination with a container for water; of a jacket spaced apart from and surrounding the container; a pipe leading from the jacket to convey gas from the space between the jacket and container and perforated to discharge into the atmosphere; a pipe for conveying steam from the container and located within and spaced apart from the first pipe and perforated to discharge steam into the first aforesaid pipe; a fuel burner below the water container and the space between the jacket and water container, said jacket being downwardly continued to inclose the burner; a damper serving, in one adjustment to admit air below the container and cut off flow of gas to the space between the jacket and container, and in an alternative adjustment to cut off flow of air to the space below the container and to permit the flow of gas to the space between the jacket and container; and a transversely corrugated deflector within the gas pipe extending forwardly from an upper portion of this pipe beneath and along the steam pipe where the deflector is spaced apart from both pipes and serves to direct the upward flow of gas into the steam discharging from the steam pipe.

2. In a steam producer, the combination with a container for water; of a jacket spaced apart from and surrounding the container; a pipe leading from the jacket to convey gas from the space between the jacket and container and perforated to discharge into the atmosphere; a pipe for conveying steam from the container and located within and spaced apart from the first pipe and perforated to discharge steam into the first aforesaid pipe; a fuel burner below the water container and the space between the jacket and water container, said jacket being downwardly continued to inclose the burner; a damper serving, in one adjustment to admit air below the container and cut off flow of gas to the space between the jacket and container, and in an alternative adjustment to cut off flow of air to the space below the container and to permit the flow of gas to the space between the jacket and container; and a deflector within the gas pipe extending forwardly from an upper portion of this pipe beneath and along the steam pipe where the deflector is spaced apart from both pipes and serves to direct the upward flow of gas into the steam discharging from the steam pipe.

3. In a steam producer, the combination with a container for water; of a jacket spaced apart from and surrounding the container; a pipe leading from the jacket to convey gas from the space between the jacket and container and perforated to discharge into the atmosphere; a pipe for conveying steam from the container and located within and spaced apart from the first pipe and perforated to discharge steam into the first aforesaid pipe; a fuel burner below the water container and the space between the jacket and water container, said jacket being downwardly continued to inclose the burner; and a damper serving, in one adjustment to admit air below the container and cut off flow of gas to the space between the jacket and container, and in an alternative adjustment to cut off flow of air to the space below the container and to permit the flow of gas to the space between the jacket and container.

4. In a steam producer, the combination with a container for water; of a jacket spaced apart from and surrounding the container; a pipe leading from the jacket to convey gas from the space between the jacket and container and perforated to discharge into the atmosphere; a pipe for conveying steam from the container and located within and spaced apart from the first pipe and perforated to discharge steam into the first aforesaid pipe; means for heating the water in the container and the gas in the space between the container and jacket; and a transversely corrugated deflector within the gas pipe extending forwardly from an upper portion of this pipe beneath and along the steam pipe where the deflector is spaced apart from both pipes and serves to direct the upward flow of gas into the steam discharging from the steam pipe.

5. In a steam producer, the combination with a container for water; of a jacket spaced apart from and surrounding the container; a pipe leading from the jacket to convey gas from the space between the jacket and container and perforated to discharge into the atmosphere; a pipe for conveying steam from the container and located within and spaced apart from the first pipe and perforated to discharge steam into the first aforesaid pipe; means for heating the water in the container and the gas in the space between the container and jacket; and a deflector within the gas pipe extending forwardly from an upper portion of this pipe beneath and along the steam pipe where the deflector is spaced apart from both pipes and serves to direct the upward flow of gas into the steam discharging from the steam pipe.

6. In a steam producer, the combination with a container for water; of a jacket spaced apart from and surrounding the container; a pipe leading from the jacket to convey gas from the space between the jacket and container and perforated to discharge into the atmosphere; a pipe for conveying steam from the container and located within and spaced apart from the first pipe and perforated to discharge steam into the first aforesaid pipe; and means for heating the water in the container and the gas in the space between the container and jacket.

7. In a steam producer, the combination with a water container; of means for heating the water in the container to produce steam; two communicating perforated nested spaced apart pipes through the inner one of which steam is conveyed from the container and into the outer one; and means for effecting the flow of gas through the steam flowing in the space between said pipes.

8. In a steam producer, the combination with a water container; of means for heating the water in the container to produce steam; two communicating nested spaced apart pipes through one of which the steam is conveyed to the other from the container; and means for effecting the flow of gas through the other pipe and into the steam conveyed to this pipe by the first pipe.

9. In a steam producer, the combination with a water container; of means for heating the water in the container to produce steam; two communicating perforated nested spaced apart pipes through the inner one of which steam is conveyed from the container and into the outer one; means for effecting the flow of gas through the steam flowing in the space between said pipes; and means for heating said gas.

10. In a steam producer, the combination with a water container; of means for heating the water in the container to produce steam; two communicating nested spaced apart pipes through one of which the steam is conveyed to the other from the container; means for effecting the flow of gas through the other pipe and into the steam conveyed to this pipe by the first pipe; and means for heating said gas.

In witness whereof, I hereunto subscribe my name this twenty-ninth day of November, A. D. 1920.

WALLACE S. WARNOCK.