

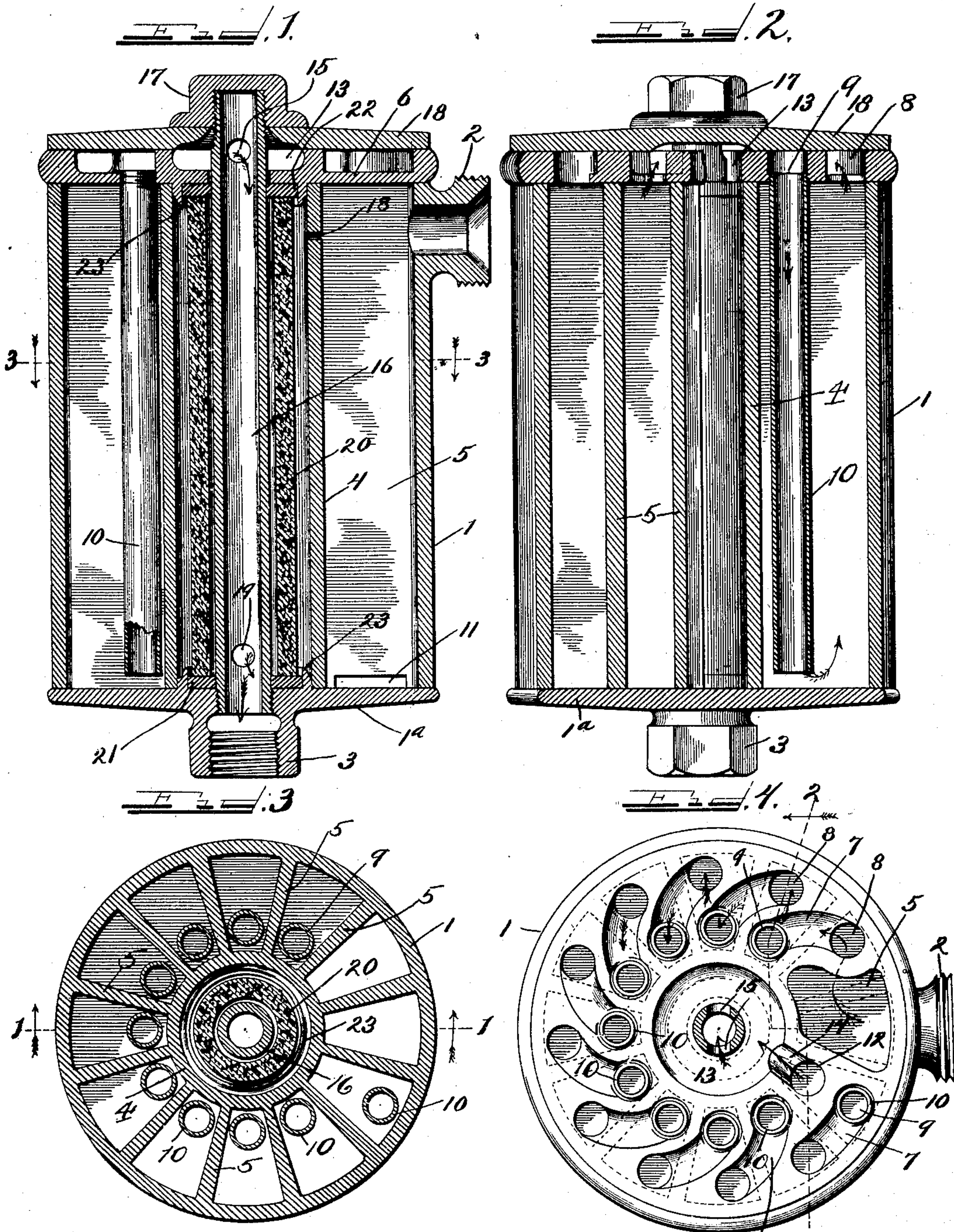
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C. H. ATKINS.
STEAM TRAP.

(Application filed Sept. 8, 1900.)

(No Model.)



Witnesses

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UNITED STATES PATENT OFFICE.

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STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 711,272, dated October 14, 1902.

Application filed September 8, 1900. Serial No. 29,389. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HENRY ATKINS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Traps, of which the following is a full, clear, and exact specification.

My invention relates more particularly to means for permitting the escape of water from steam-passages while preventing the escape of the steam; and it has for its primary object to seal the vent or outlet of the passage against the escape of the gaseous substance by means of a portion of the liquid and automatically discharge any liquid in excess of such portion.

A further object of my invention is to seal the vent or outlet of a steam-passage against the escape of steam by means of a portion of the water accumulating therein and to automatically discharge any water in excess of such portion, while at the same time allowing free discharge of any air that might have accumulated in the steam-passage.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a vertical sectional view of my improved apparatus, taken on the line 1 1, Fig. 3. Fig. 2 is a similar section taken on the line 2 2, Fig. 4. Fig. 3 is a transverse section taken on the line 3 3, Fig. 1; and Fig. 4 is a plan view with the cap or cover removed.

1 represents a shell or casing which is provided with a nipple 2, whereby it may be connected to the vent of the passage to be relieved of the surplus liquid, as before described, or of the liquid and air without permitting the escape of the steam or other gaseous substance which it is desired to retain therein. The bottom of this shell 1 is provided with an outlet-nipple 3, which may be

connected to any suitable pipe or passage (not shown) leading to the sewer or to any other convenient place or, if desired, to a pump or other suitable apparatus for drawing off the surplus water or liquid accumulated in the shell or chamber 1. The shell 1 is provided with an inner wall 4, which is preferably formed therewith, and is in the form of a cylinder arranged concentrically with the shell 1, and the space between this cylinder 4 and the outer wall of the shell is divided vertically from top to bottom into a plurality or series of passages by means of vertical partitions 5. Placed upon the upper end of the shell and having its bearing as well upon the upper ends of the partitions 5 and the cylinder 4 is a plate 6, whose upper face is formed with a series of channels 7, at the ends of which are formed holes or apertures 8 9, respectively, which extend through the plate 6 and communicate with the passages between the partitions 5, so as to place one of said passages in communication with the next, and so on throughout the entire series, and depending from the apertures 9 of each of these channels 7 is a tube or passage 10 of smaller cross-section than the passage between partitions 5 and which compels the liquid or other substance rising in the passage between the partitions 5 and crossing over along the channels 7 to descend to the bottom of the next passage between the partitions 5 before it can escape thereinto, the lower ends of the tubes 10 being arranged in close propinquity to the lower end of the shell 1, as clearly illustrated in Figs. 1 and 2. The inlet 2, which is arranged at the upper end of the shell, as shown in Fig. 1, discharges wholly between two of the partitions 5, and this passage opposite the inlet is not provided with one of the tubes 10, but the partition 5 on one side thereof is cut away at the bottom, as shown at 11, to form communication directly with the next passage, so that the liquid may rise in the latter, escape upwardly through the aperture 8 and along the channel 7, and thence descend into the next vertical passage through the first one of the tubes 10, whence it again

rises in the vertical passage containing said first tube 10 and crosses over to the next one of the tubes 10 and descends, as already described, and so on until the vertical passage adjacent to that into which the inlet 2 dis-
 5 charges is reached. The liquid enters this latter passage through the crossover-channel 7 and the last one of the depending tubes 10, and after discharging from the latter it
 10 rises and discharges from the vertical passage containing said tube through a top opening 12, formed in the plate 6, and thence into a central cavity 13, via a channel 14, connecting the top opening 12 therewith, the
 15 cavity 13 being constituted by a depression at about the center of the plate 6, as clearly shown in Figs. 1 and 4. After entering the cavity 13 the liquid discharges through one or more perforations 15, formed in the upper
 20 end of a central pipe 16, whose lower end is in direct communication with the outlet 3. The upper end of the pipe 16 is threaded and has secured thereon a nut 17, which bears upon a cap 18, arranged over the plate 6 and
 25 constituting the upper sides of the channels 7 and 14 and of the cavity 13. The lower end of the pipe 16 is threaded in a bottom plate 1^a of the shell 1, which closes the lower ends of the passages formed by the vertical
 30 partitions 5. If the passage-ways formed by the partitions 5 and the tubes 10 be partially filled with liquid and pressure be applied at the inlet 2, whether induced by suction at the outlet 3 or by an increase of pressure at
 35 the inlet, the liquid will rise in each of the passages formed by the partitions 5 until the combined weight of the columns counterbalances the pressure at the inlet, and consequently if such pressure be due to steam or
 40 gas at the inlet the liquid in the passages will effectually seal the passage-way to the escape of such steam or gas. If a surplus of water enters through the inlet, it will pass into the first passages formed by the parti-
 45 tions 5 and discharge the surplus through the tube 10 into the next passage between the partitions 5, and so on until the surplus water is discharged through the tube 16 and outlet 3 and the counterbalancing-levels are
 50 restored. By this means it will be seen that the pressure at the inlet 2 may be effectually resisted and prevented from escaping by a hydrostatic column of compact and convenient form.

55 In many uses to which my invention may be put it is feasible to maintain the pressure in the inlet 2 at a substantially uniform degree, and consequently the escape of the steam or other gaseous substance which it is
 60 desired to retain in the passage to which the apparatus is applied may be prevented at all times by a portion of the liquid contained in the up and down passages of the apparatus.

65 When the apparatus is used in connection with steam-passages, it is often desirable to not only relieve the steam-passage of the sur-

plus water of condensation accumulating therein, but to permit the escape of air and gases therefrom without permitting the es-
 70 cape of the steam. I will now describe the means whereby this may be automatically accomplished. As shown in Fig. 1, the upper end of the cylinder 4 is provided with a small air-vent 18, arranged opposite or in di-
 75 rect communication with the inlet 2 and at such an elevation that it will normally be above the level of that portion of the liquid which can remain in the up and down pas-
 80 sages without being forced out by the pressure at the inlet 2, and formed in the pipe 16, at a point between the portion inclosed by the cylinder 4, is an outlet 19, which permits
 85 any air or water that may find their way between the pipe 16 and cylinder 4 to escape into the outlet 3. Now in order that the air entering the inlet 2 may take this direct pas-
 90 sage via the vent 18 and aperture 19 to the outlet 3 without also permitting the steam to escape I interpose in this direct passage a porous steam-barrier composed of some suit-
 95 able material which will be pervious to air but impervious to steam or which, in other words, will cause the steam to condense before it can percolate through it. A suitable substance for this purpose is ordinary brick-
 100 clay baked as usual or carbon; but any other porous granular material might be utilized. This steam-barrier is best made in the form of a cylinder 20, which is placed around the
 105 pipe 16 and is closed at both ends by gaskets 21 22, which are compressed against the plates 1^a, 6, respectively, the said plates being preferably provided with annular flanges 23, which center the cylinder 20. Thus it is
 110 seen that the volume of air entering through the vent 18 is spread out over a large porous area and as a consequence permitted to escape rapidly through the aperture 19. It is also evident that any water which might find its way into the cylinder 4 will finally escape
 through the outlet 3.

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

1. A device for the purpose specified, em-
 115 bracing a liquid passage-way communicating at its ends with an inlet and an outlet, and formed of a series of short communicating up and down passages, the down passages being of a different cross-sectional area from the
 120 up passages.

2. A device for the purpose specified embracing a liquid passage-way communicating at its ends with an inlet and an outlet, and
 125 formed of a series of short communicating up and down passages, the down passages being of a different cross-sectional area from the up passages, and means to produce a lower pressure at the outlet than at the inlet.

3. In a device for the purpose described the
 130 combination of a series of up and down connected passages having communication at

one end with an inlet and provided at the other end with an outlet, a direct passage between said inlet and outlet and a porous substance closing said direct passage, substantially as set forth.

4. In a device for the purpose described the combination, of a series of up and down connected passages having communication at one end with an inlet and provided with an outlet at the other end, a direct passage leading from a point at the upper end of said series of up and down passages to said outlet and a porous substance closing said direct passage, substantially as set forth.

5. In a device for the purpose described the combination, of a series of up and down passages communicating at one end with an inlet and having an outlet at the other end, a chamber having direct communication with said inlet and outlet and a porous substance intersecting said direct communication, substantially as set forth.

6. In a device for the purpose described the combination of the shell 1 having the partitions 5 forming vertical passages one of which is provided with an inlet at the top and an outlet into the next passage at the bottom, smaller passages depending into said vertical passages and each having communication at its upper end with the next adjacent larger passage, the one of said vertical passages

most remote from said inlet being provided with an outlet, substantially as set forth.

7. In a device for the purpose described the combination of the shell 1 having the internal cylinder 4 provided with an air-vent at its upper end and the space between said shell and cylinder divided into vertical passages one of which has an inlet at its upper end and an outlet at its lower end into the next adjacent passage, the plate 6 secured over the upper ends of said passages and having the apertures 8 and depending tubes 10 communicating with said apertures and dipping into said vertical passages, the aperture 12, the channel 14, the cavity 13 communicating with said channel 14, the cap 18 arranged over said plate 6 and closing said cavity 13, the pipe 16 communicating with cavity 13 and passing downwardly through said cylinder and having an aperture in the side thereof, said cylinder being provided with an outlet communicating with the lower end of said pipe 16 and a porous cylinder surrounding said pipe 16 around said side opening therein and being closed at opposite ends, substantially as set forth.

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Witnesses:

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