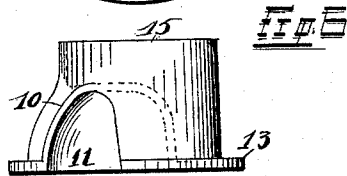
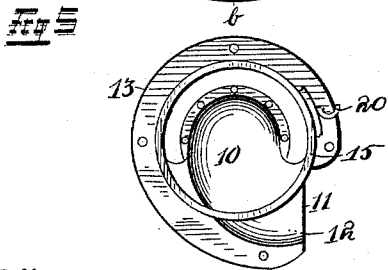
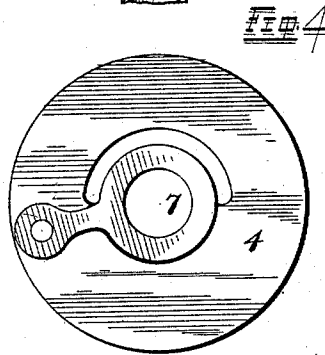
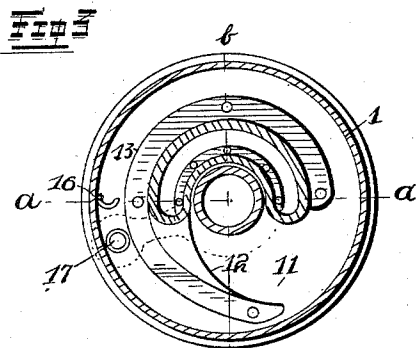
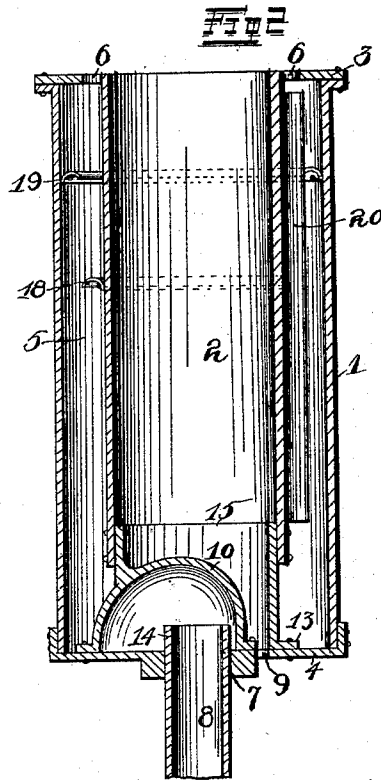
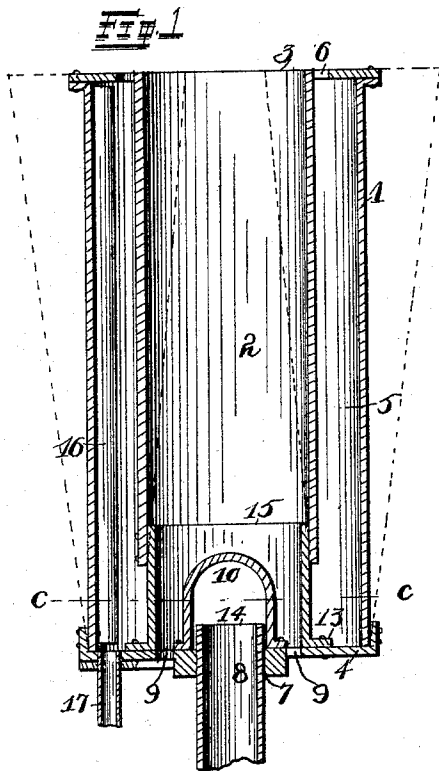


(No Model.)

J. L. HORNIG.
EXHAUST HEAD.

No. 485,195.

Patented Nov. 1, 1892.



Witnesses
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UNITED STATES PATENT OFFICE.

JULIUS L. HORNIG, OF ST. LOUIS, MISSOURI.

EXHAUST-HEAD.

SPECIFICATION forming part of Letters Patent No. 485,195, dated November 1, 1892.

Application filed June 9, 1892. Serial No. 438,144. (No model.)

To all whom it may concern:

Be it known that I, JULIUS L. HORNIG, a citizen of the United States, and a resident of St. Louis, State of Missouri, have invented certain new and useful Improvements in Steam-Exhaust Heads, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to "steam-exhaust heads" and "steam-condensers" in which the condensing-surfaces are cooled by circulating currents of air.

The object of the invention is to provide a device of this kind which shall impart a "cyclonic" or "whirling" movement to the steam entering the condensing-chambers, one in which direct air-passages and internal condensing-surfaces shall be employed, and one which shall be simple in construction and of low cost.

In the drawings, Figure 1 is a sectional elevation of my improved exhaust-head, taken on line *a a* of Fig. 3. Fig. 2 is a sectional elevation of the same, taken on line *b b* of Fig. 3. Fig. 3 is a sectional plan view taken on the line *c c* of Fig. 1. Fig. 4 is an inverted plan view of the exhaust-head. Fig. 5 is a top plan view of a deflecting-cap made use of in the invention, and Fig. 6 is a side elevation of said cap.

1 indicates the outer shell of the device, which is preferably constructed in the form of a cylinder with parallel sides, but which of course may have a greater diameter at the top than at the bottom end, as indicated by dotted lines in Fig. 1.

2 indicates a cylinder of smaller diameter than the cylinder 1 and located concentrically within said cylinder 1. This inner cylinder preferably has its walls extending parallel to the walls of the cylinder 1; but it may be constructed in the form of a truncated cone and have its walls diverging outwardly, so as to lie parallel to the walls of the outer casing when they are diverged, or its walls may converge upwardly, as indicated by dotted lines in Fig. 1.

The two cylinders 1 and 2 form what I may term "inner" and "outer" condensing-surfaces, and they are properly held in relative posi-

tion by means of an upper head 3 and a lower head 4, which have a specific construction hereinafter described. This arrangement of one cylinder within another forms a single annular condensing-chamber 5, having straight vertical walls between the two cylinders, into which the exhaust-steam is discharged. The upper head 3 is so constructed that the upper end of the inner cylinder 2 is open freely to the atmosphere and so that exit-passages 6, which may be of any suitable shape, are provided for the passage of steam from the condensing-chamber 5. The lower head 4 is provided with a central opening 7, which is engaged by the exhaust-pipe 8, the upper end of which latter projects some distance beyond the inner surface of said head for a purpose hereinafter mentioned. Said head 4 is also provided with a radial or otherwise-formed air-inlet opening 9, which freely permits passage of air from the exterior of the exhaust-head to the interior of the inner cylinder 2. (See Figs. 2 and 4.)

The exhaust-steam, before being thrown into the condensing-chamber between the two cylinders, enters the interior of a deflecting-elbow 10, which has its upper end closed by a curved wall and which has a lateral opening 11, leading into the condensing-chamber 5 at the lower end of said condensing-chamber.

It will be observed that the deflecting-elbow 10 has a concave interior surface which is located above the projecting end of the exhaust-pipe 8, which surface has the effect of changing the direction of the entering steam from a vertical to a horizontal direction. Said deflecting-elbow also has a curved horizontal passage 12, having curved side walls and extending outwardly with a sort of volute curve to the opening 11 and forming a clear passage-way between the projecting end of the exhaust-pipe 8 and said opening. It will be observed that the air-inlet opening 9 is located closely adjacent the opening 7 in the lower head 4, and also that the steam-exit openings 6 are located closer adjacent the walls of the inner cylinder than they are adjacent the walls of the outer cylinder. The lower portion of the deflecting-elbow 10 is provided with a peripheral flange 13, by means of which said elbow is secured in position upon the

lower head 4 above the projecting end 14 of the exhaust-pipe 8. The upper portion of said elbow 10 is provided with a circular flange 15, which is preferably cast integral with said elbow and projects upwardly therefrom. The diameter of the flange 15 is such that it is inserted within the lower end of the inner cylinder 2, and said end is secured to said flange by means of suitable rivets or other fastening devices.

16 indicates a U-shaped drain-channel, preferably made of sheet metal and located within the condensing-chamber 5 longitudinally thereof and extending throughout the length of said chamber, or nearly so, so that its lower end will discharge the drain-water upon the bottom of the said chamber at a point adjacent the drain-pipe 17, which latter enters the bottom of said condensing-chamber and is adapted to conduct all water of condensation from said chamber to any point desired.

In some instances I may desire to make use of U-shaped drain-channels, as 18, inverted and secured to the exterior of the inner cylinder 2 at an elevation some distance above the longitudinal center of the length of said inner cylinder, and likewise similar transverse inverted channels 19, which are located upon and project from the interior surface of the outer cylinder 1 at a higher elevation than that at which said transverse channels 18 are located.

Of course I may increase the number of the channels 18 and 19, if so desired. Their purpose is to retard the upwardly-moving steam in the condensing-chamber 5 and cause it to be retained in said chamber a short space of time. These transverse channels 5, I may term "annular" channels. Projecting from and secured to the exterior surface of the inner cylinder 2 longitudinally thereof is another vertical drain-channel 20, U-shaped in cross-section, similar to the before-mentioned vertical channel 16. It will be observed that the lower end of this channel 20 terminates a considerable distance above the lower end of the cylinder 2, so that it will in no way interrupt the free issuance of steam from the opening 11 in the deflecting-elbow 10.

It will be further observed that I have provided an improved exhaust-head having an internal condensing-shell, which is open the full area of its upper end directly to the atmosphere and has a straight vertical air-passage therethrough, extending its full length without interruption.

The operation is as follows: Steam being admitted to the interior of the deflecting-elbow 10 by way of the exhaust-pipe 8 strikes the curved upper interior surface of said elbow, and is thereby deflected laterally into the horizontal passage 12, having a curved outer wall, and is forced into the lower end of the condensing-chamber 5 by way of the discharge-opening 11 in said deflecting-elbow, and has imparted to it by such movement a whirling or circular movement, which it re-

tains (if the pressure of the issuing steam is great enough) until it has risen in a spiral direction fully one-half the height of the said chamber, and during such spiral movement said steam of course is traveled around the inner cylinder. During the movements just mentioned the steam has come in contact with the vertical drain-channels 16 and 20, and has thereby been caused to part with the water of condensation carried by it, which water is caught by said vertical channels and led downwardly to the bottom of the condensing-chamber, where it gravitates to the opening to which the drain-pipe 17 is connected. During the upward movement of the steam in the chamber 5 it comes in contact with the transverse drain-channels 18 and 19, and is thereby retained within said chamber a short period of time and likewise caused to discharge water of condensation which gravitates to the drain-pipe 17 and is disposed of in any desired manner. The steam after passing the transverse channel 19 (if any there be) will make its exit freely through the passages or openings 6.

My improved device has great condensing capacity by reason of the internal condensing-surfaces possessed by the inner cylinder 2 and the deflecting-elbow 10. The air contained within the inner cylinder naturally rises upon becoming heated from contact with said cylinder, and thereby creates a considerable draft upwardly through said cylinder, air entering through the opening 9 and making its exit by way of the open upper end of the inner cylinder. By reason of the internal condensing-surfaces continuously in contact with the air ample condensing-surface is provided with a comparatively-small exhaust-head. By extending upwardly to a sufficient height the outer and inner condensing-surfaces condensation of the entire quantity of steam carried by the exhaust-pipe 8 may be condensed.

What I claim is—

1. In an exhaust-head, the combination, with an external shell 1, of an internal shell 2, fitted therein and forming an annular chamber 5 between said shells, said shell 2 being open at each end, and an exhaust-pipe connection fitted to impart a whirling movement to the steam entering the chamber 5, substantially as and for the purpose set forth.

2. The improved exhaust-head constructed with an external shell 1, an internal shell 2, open at its upper end direct to the atmosphere and having a straight vertical air-passage extending through it unobstructed, an upper head 3, connecting the upper ends of both shells, a lower head 4, fitted for connection with the exhaust-pipe and closing the steam-space between the two shells, and a deflecting-elbow 10, mounted upon said lower head and arranged to impart a whirling movement to the steam as it enters the steam-space between the shells, substantially as specified.

3. An exhaust-head having external and

internal shells, an upper head 3, having steam-exit passages 6 and connecting said shells at their upper ends, a lower head 4, fitted for connection with an exhaust-pipe and closing the steam-space between said shells at their lower ends, and a deflecting-elbow 10, having its upper end closed by a curved wall and provided with a lateral opening 11, leading into said steam-space, said deflecting-elbow being located upon said lower head and surrounded by said external shell, substantially as specified.

4. An exhaust-head constructed with external and internal shells having vertical parallel walls, a U-shaped drain-channel 16, mounted vertically upon the interior surface of said external shell, a U-shaped drain-channel 20, projecting from and secured to the external surface of the internal shell, a deflecting-elbow arranged to impart a whirling movement to steam in the space between said shells, and a drain-pipe arranged to carry drip-water from said steam-space, substantially as specified.

5. An exhaust-head constructed with ex-

ternal and internal shells having vertical parallel walls, an upper head 3, having steam-exit openings 6 and connecting said shells at their upper ends, a lower head 4, provided with a central opening 7, constructed to be engaged by the exhaust-pipe, a projection upon the inner side of said head, surrounding the opening 7, and said head also provided with an air-inlet opening 9, and a deflecting-elbow 10, having its upper end closed by a curved wall and provided with a lateral opening 11, leading into the chamber or steam-space between said shells, said elbow being located upon said lower head and surrounded by said external shell, a circular flange 15, cast integral with the upper portion of said elbow, and the lower end of said internal shell connected to said flange, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JULIUS L. HORNIG.

Witnesses:

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HERBERT S. ROBINSON.