(No Model.)

C. KNELL.

CONDENSER HEAD FOR EXHAUST PIPES.

No. 455,405. Patented July 7, 1891.

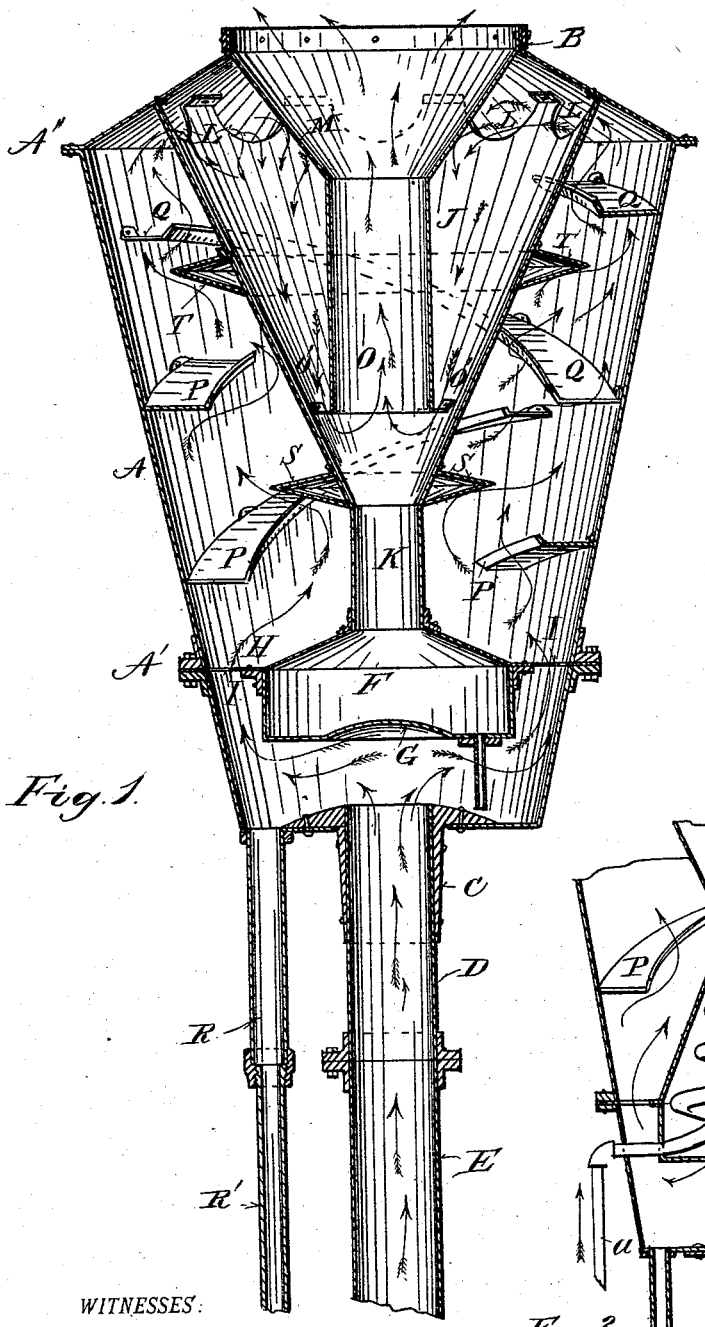

Fig. 1.

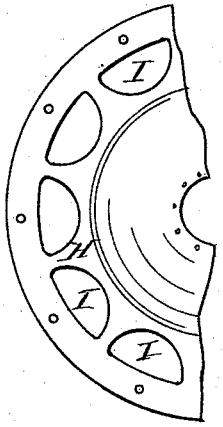

Fig. 2.

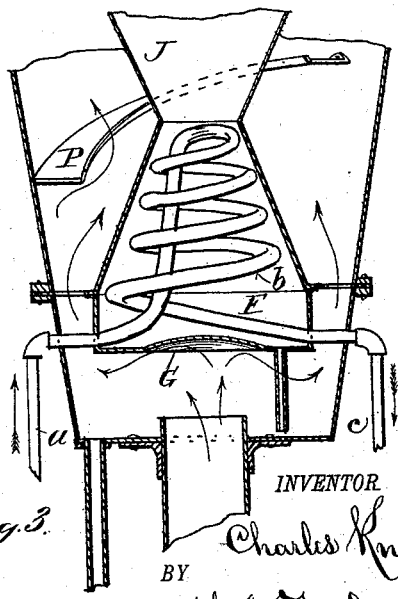

Fig. 3.

WITNESSES:

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CONDENSER-HEAD FOR EXHAUST-PIPES.

SPECIFICATION forming part of Letters Patent No. 455,405, dated July 7, 1891.

Application filed February 2, 1891. Serial No. 379,888. (No model.)

To all whom it may concern:

Be it known that I, CHARLES KNELL, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Condenser-Heads for Exhaust-Pipes, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain new and useful improvements in condenser-heads for exhaust-pipes, being especially adapted for non-condensing engines.

My improvements have reference to deflectors for the steam-currents adapted to collect on their surfaces the condensed steam and oil and deliver the same to the waste-pipe; have reference to a reverse spiral form of said deflector especially adapted to break up said steam-currents while conducting them outward; have reference to a means for promoting the condensation of this steam and the heating of feed-water for the boiler, and have reference to other points, hereinafter described and claimed.

In the accompanying drawings, forming a part of this specification, in which like reference-letters indicate corresponding parts, Figure 1 represents a vertical section of my improved condenser-head; Fig. 2, a plan view of a portion of the perforated supporting-web of the drip-chamber; and Fig. 3, a vertical section, similar to Fig. 1, of a portion of the head, showing the water-pipes located in the drip-chamber.

Letter A designates the shell of a condenser-head, preferably bolted together in sections at flanged joints A′ A″ and having a strong band B about the top thereof, as shown in Fig. 1. To the bottom of this shell is secured the flanged casting C, riveted to the connecting-joint D, carried by the exhaust-pipe E. Any other means of supporting the exhaust-head adjacent to the exhaust-pipe, so as to receive the steam therefrom, may be employed. Within the shell A is supported a drip-chamber F, having a concave bottom G, or otherwise adapted to oppose the exhaust-steam as it issues from the pipe E and deflect the same outward and upward. The said chamber is preferably supported by means of a web or flange H, conveniently forming the top of said chamber, or otherwise secured thereto, and preferably bolted into the flange-joint A′ of the shells. This web is provided with openings I, through which the steam passes upward within the said shell. A conical extension J is riveted to said shell at its upper edge, or otherwise supported, and connected by a pipe K with said drip-chamber F. Openings L in said extension J give exit to the steam preferably near the upper edge of said extension, from whence an inner cone M, preferably provided with a tubular lower portion O, steadied within the extension J by arms O′, so as to leave an annular space between said extension and the portion O, whereby the steam is deflected downward and upward through this central opening to its final exit from the head. Within the shell A, and conveniently secured to the same, are portions or segments of web-spirals, said spirals being reversed in their direction, so as to constitute a series P in one direction and another series Q in a reverse direction. The direction of the spirals of both series are outward in the direction of the steam-currents, so as to guide or direct them without greatly obstructing their progress. Each segment is preferably provided with an upturned edge on its inner side, whereby the water from the condensed steam and the oil contained therein will be deposited on said spirals and conducted downward to the bottom of said shell, from whence it is removed by a main drip-pipe R, connected to a waste-pipe R′, adapted to deliver the condensed water and oil to a tank or other receptacle. In order to deflect the steam under said spiral segments, annular flanges S and T are carried by the extension J or otherwise mounted at convenient distances apart, and preferably having their surfaces inclined to the horizontal, whereby the condensed steam and oil deposited thereon is readily discharged and finds its way downward to the bottom of the shell. The exhaust-steam is thus thoroughly agitated or broken up in order to bring all of its component parts in contact with the adjacent surfaces of the head, whereby the contained oil and water of condensation is deposited on said surfaces and conducted to the said waste-pipe. These reversed spirals P and

Q, before described, are especially adapted to agitate and yet lead forward the steam-currents, since they change the direction of said currents while leading them onward, and thus facilitate the deposition of particles of oil and water thereon. The remaining particles of oil which may pass outward with the steam-currents through the said openings L meet the inner cone M and are deposited thereon and led downward into the drip-chamber F, while the remainder of the exhaust-steam, practically free from oil, passes upward through the tubular central portion and is discharged from said head. The bottom of the said drip-chamber is provided with a pipe U to deliver the water to the bottom of the shell, whence it finds its way to the main drip-pipe R, before mentioned.

The casting C is preferably provided with a raised upper portion, forming a retaining-wall to prevent the entrance of the condensed water and oil within the exhaust-pipe. It also serves as a bracing-flange to carry firmly the exhaust-head upon the supporting-pipe. It will be observed that no portion of the exhaust-steam finds free exit from the head, but all of its particles are brought in contact with the reversed spirals and deflecting-flanges as it passes upward between the shell A and the conical extension J of the drip-chamber, and is then deflected backward by the inner cone M, and finally is discharged from under the lower edge thereof.

This device has been in practical operation for a number of months, being connected to the exhaust-pipe of a stationary engine using eighty-five barrels of water per day of ten hours, on an average, of which amount about fifteen barrels is returned by the use of my device. This large amount of mingled oil and water is thus prevented from being distributed over the roofs and other portions of the surrounding buildings, and the nuisance caused by the said oil and water deposits is thus avoided. Aside from this, however, it will be seen that this large proportion of steam-water is returned and may be used again as feed-water, and is especially adapted for this use because of its higher temperature. This is a point of great practical importance, and in Fig. 3 I have shown a means of heating the feed-water itself by the exhaust-steam in connection with my device, and without interfering with its action as an exhaust-head. The feed-pipe *a*, adapted to be connected to the ordinary feed-pump or other source of supply, and coupled to the coil *b*, within the drip-chamber F, where its temperature is raised by the exhaust-steam about said chamber, and is finally returned by the pipe *c* to a tank or other receptacle, or it may be conducted by the said pipe *c* directly to the boiler when used under pressure. It will be seen from Fig. 3 that the spiral form of pipe secures perfect drainage of the water, and thus the water is not liable to remain therein when the supply is shut off for any purpose; also, it will be seen that this feed-water serves to cool the surrounding walls of the chamber, which thus assists in the condensation of the exhaust-steam impinging thereon. This produces a certain rarefication within said head, and thus assists in the discharge of the exhaust-steam from the exhaust-pipe, which serves to relieve the back-pressure. It has been found from practical experiments that this exhaust-head does not materially increase the back-pressure on the engine. It is believed that this perfection of operation is due to the points of construction and otherwise, as hereinbefore described and brought out.

It is observed that the form of device shown in Fig. 3 is adapted to be used particularly with exhaust-pipes of low altitude, in which the feed-water would not have to be conducted an unnecessarily long distance.

The preferred material of which my condenser-head is formed is galvanized sheet-iron, as that is adapted to stand the action of the weather and is light and strong when fashioned as above described.

I do not wish to limit myself to the exact form and construction herein shown and described; also, though I have described and shown web-spirals with upturned edges, these spirals may be otherwise formed and of more than two series, as long as the action hereinbefore described is secured.

If desired, the drip-chamber F may be dispensed with and the exhaust-steam and water pipes come in direct contact.

I claim—

1. In a condenser-head, the combination, with the shell and an interior deflector, of annular deflecting-flanges mounted between said members and having their upper and lower surfaces reversely inclined to the horizontal to promote the discharge of deposits therefrom.

2. In a condenser-head, the combination, with a shell having inlet and outlet steam-openings, of an interior drip-chamber having a supporting web or flange carried by said shell and provided with openings to allow the steam-currents to pass, a cone-shaped extension from said drip-chamber adapted to discharge drip thereinto, series of reversely-mounted segments, annular inclined deflectors, both mounted between said extension and said shell to agitate the steam in its outward passage, and outlets for the drip from said shell and drip-chamber.

3. In a condenser-head, the combination, with a shell having inlet and outlet steam-openings, of water-pipes within said shell adapted to raise the temperature of the water passing through them and promote the condensation of the said steam, segmental spiral deflectors reversely inclined to each other to direct and agitate said steam-currents, and means to collect and discharge the drip and deposits from said steam-currents.

4. In a condenser-head, the combination, with a shell having inlet and outlet steam-openings, and an interior cone-shaped deflector having exit-openings, of series of inclined web-spirals having upturned edges to carry off the drip and mounted between said deflector and the shell, the direction of the spirals in one series being reverse to that of the adjacent series, substantially as shown, and for the purpose described.

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

CHARLES KNELL.

Witnesses:
GEORGE HENRY MEYER,
BENJAMIN F. MCCANN.