(No Model.) 2 Sheets—Sheet 1.

D. DONAHUE.

SEPARATING OIL FROM FEED WATER.

No. 386,114. Patented July 17, 1888.

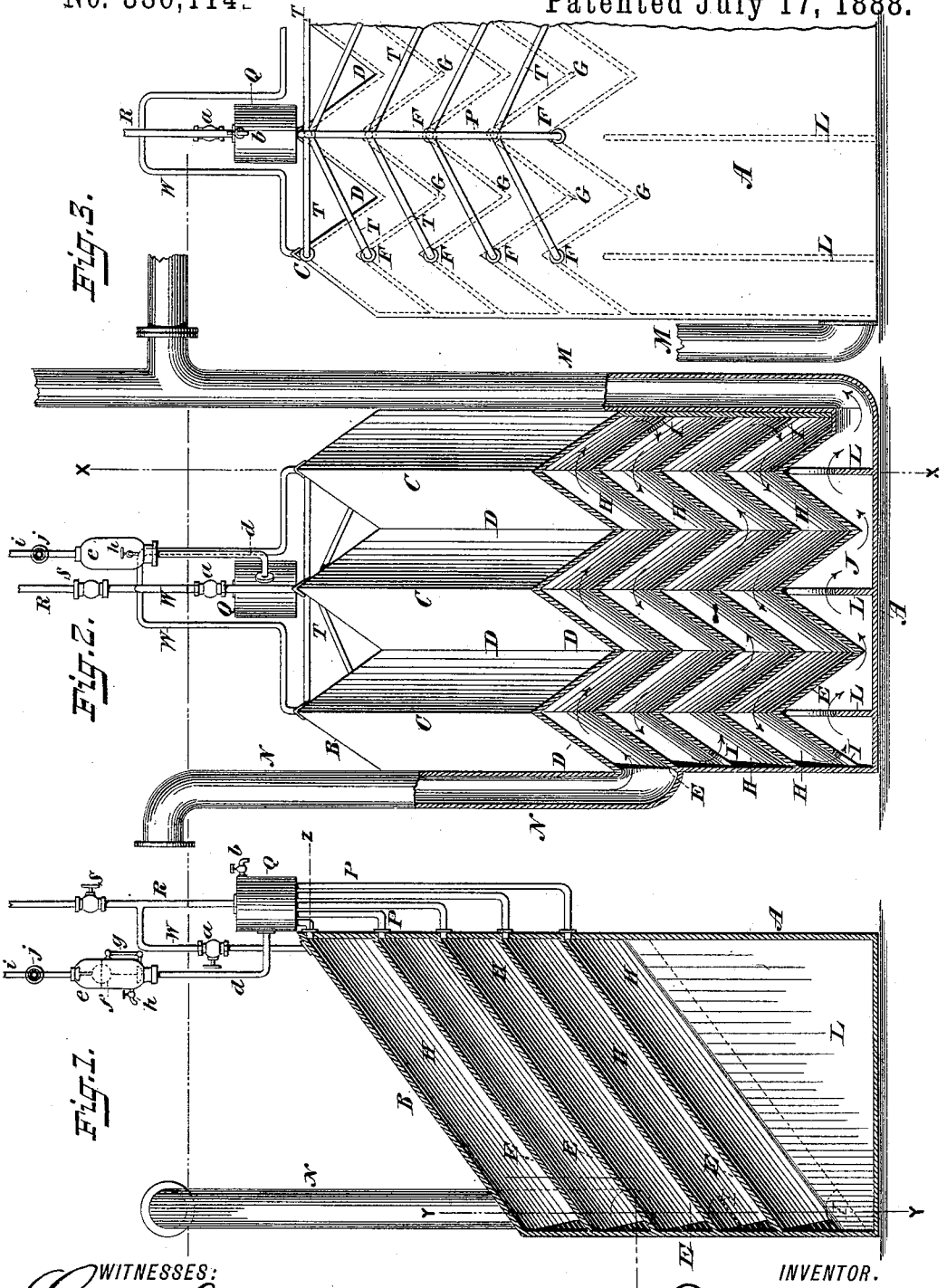

Fig. 3.

Fig. 2.

Fig. 1.

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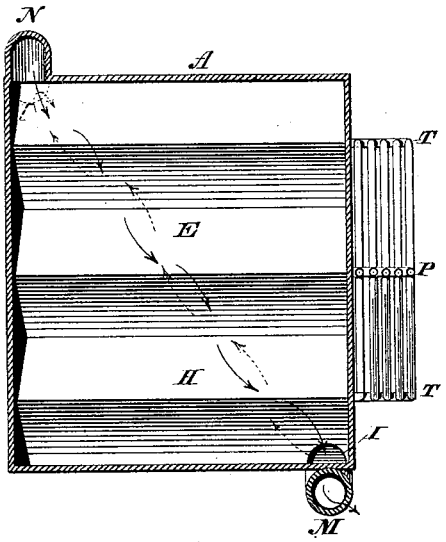
Fig. 4.



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UNITED STATES PATENT OFFICE.

DANIEL DONAHUE, OF NEW YORK, N. Y.

SEPARATING OIL FROM FEED-WATER.

SPECIFICATION forming part of Letters Patent No. 386,114, dated July 17, 1888.

Application filed May 24, 1888. Serial No. 274,893. (No model.)

To all whom it may concern:

Be it known that I, DANIEL DONAHUE, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Separating Oil from Feed-Water for Condensing-Engines, of which the following is a specification.

The invention relates to improvements in apparatus for separating oil from feed-water for condensing-engines, and will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section through an apparatus embodying the invention, the section being taken on the dotted line X X of Fig. 2, which is a front view of same, partly in section, on the dotted line Y Y of Fig. 1. Fig. 3 is a back view, partly broken away, of same; and Fig. 4 is a sectional view taken on the dotted line Z Z of Fig. 1.

In the drawings, A designates a box or receptacle having plain sides and bottom and an inclined top, B, which is formed of a series of corrugations or elevations, C, and depressions D, as shown in Fig. 2. Within the box or receptacle A are provided the inclined partitions E, which correspond in form with the top B and are parallel with the same and with each other, each of the partitions consisting of alternating elevations or domes F and depressions G, whereby between the partitions are formed spaces H, extending in serpentine lines transversely across the receptacle. The partitions E, any desired number of which may be used, are solid throughout, with the exception of an opening, I, provided in each one, the opening in each alternate partition being at one side of the receptacle and adjacent to the lower end of the spaces H, and the opening in the other partitions being diagonally opposite to the first-mentioned openings and located at the higher portion of the spaces H, as indicated in Fig. 4. The alternating openings I are shown in Fig. 2, for the purpose of clearly indicating by arrows the passage of the water downward through the spaces H, the outlet-openings, which preferably should be at the upper end of the partitions, being in this instance, for clearness of illustration, shown at the lower end of the partitions. In the lower portion of the receptacle is the water-space J, wherein are provided the vertical plates L, which extend upward into the domes F of the lower partition E, and cause the water, before escaping into the vertical pipe M, to pursue a serpentine course. The pipe N, for supplying the water to the receptacle, is in connection with the usual "hot well" and enters the upper space, H, between the top B and upper partition E, as more clearly shown in Fig. 2. The outlet-pipe M connects with the usual pumps for supplying the boiler of the engine.

From the highest points of the serpentine spaces H and space J small pipes P lead to a tank, Q, which is located above the spaces H, but below the level of the water-line, which is denoted by a transverse dotted line in Figs. 1, 2, and 3. One pipe, P, passes from each of the middle domes, C and F, and enters the bottom of the tank Q, from which a pipe, R, having a valve, S, leads to the open air.

From the side domes C and F are branch pipes T, leading to the pipes P, above mentioned, the branch pipes in the upper domes C F leading to the inner pipe P, those from the second row of domes F leading to the second pipe P, and those from the other domes F in succession leading to the outer pipes P. From the high points or domes C of the upper space H air-pipes W, having valves *a*, pass to the air-pipe R, as shown in Figs. 1, 2, and 3. The tank Q is provided adjacent to its upper end with the discharge-valve *b* and connected by the pipe *d* with the reservoir *e*, containing a float-valve, *f*, (shown by dotted lines in Fig. 1,) and provided with a gage, *g*, and discharge-valve *h*. The reservoir *e* is connected with the condenser by the pipe *i*, having the valve *j*.

In the operation of the apparatus above described the water from the hot well is led through the pipe N into the upper space, H, (see Fig. 2,) whence it passes diagonally across the upper partition E, as shown by solid arrows in Fig. 4, to the opening I, through which it passes to the next lower space H and traverses the same in a diagonal direction, as indicated by the dotted arrows in Fig. 4, to the opening I, leading to the next lower space H. The water traverses the partitions E in a diagonal direction and in a serpentine course

until it issues into the space J, whence it ascends over the first vertical plate L, thence downward and upward over the second vertical plate L, after which it is caused to flow upward over the third vertical plate L, and finally enters the vertical pipe M, which, as aforesaid, is in connection with the pumps for supplying the feed-water to the boiler of the engine. The water entering the pipe N contains oil, and the purpose of the apparatus described is to cause the separation of this oil from the water prior to the latter entering the vertical pipe M, the vertical extension at the upper end of which opens to the air, while the horizontal branch of same leads to the pumps.

The operation of the apparatus may be successfully accomplished without the aid of the reservoir *e* with its connections, although, if desired, the said reservoir may be made use of. During the passage of the water back and forth along the partitions E the air escapes through the pipes P, T, and W, and the pipes P and T will at first become filled with water, which will rise into the tank Q and pipe R to the water-level of the pipes N M. In the further operation the globules of oil in the water will congregate in the highest points of the domes C and F and enter the pipes P and T, rising through the same to the tank Q. Each globule of oil will ascend through the pipes P and T and displace a corresponding quantity of water, which will back into the spaces H. During the continued operation of the apparatus the water, which at first filled the pipes P T, will be entirely displaced and the oil will gradually accumulate in the high points of the domes C F and fill the tank Q, which may then be emptied through the valve *b*, the water in the meantime flowing into the pipe M, entirely free from the oil previously in it, and being in suitable condition for being supplied as feed-water to the boilers. When the reservoir *e* is made use of, the oil ascends through the pipes P and T, and, entering the tank Q, will ascend through the pipe *d* and enter the receiver *e* until the same has become filled, after which the oil may be discharged therefrom through the valve *h*. The vacuum in the condenser will aid in moving the oil upward into the reservoir *e* and in holding it there in suspension. The small valve suspended by the float at the top of pipe *d* will give way at the pressure of the ascending oil, and the small valve supported by the float *f* at the lower end of pipe *i* will prevent the full force of the vacuum from sucking the oil and water through the pipe *i*. As the reservoir *e* is gradually filling, the valve supported by the float will become more firmly held against the pipe *i*, so that as the oil approaches the pipe *i* the latter becomes more firmly closed against it and only a sufficient force of the vacuum is permitted in the reservoir to suspend the oil therein.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The apparatus herein described, having the inlet supply-pipe and the delivery-pipe, combined with the receptacle having the series of partitions with alternating elevations and depressions, and pipes leading from the elevations to a tank for collecting the oil.

2. The receptacle having the partitions provided with alternating elevations and depressions and forming spaces H between them, combined with the supply-pipe, alternating openings I between the said spaces, the delivery-pipe, and the series of pipes leading from the higher points of the spaces to a tank, substantially as set forth.

3. The receptacle having the partitions provided with alternating elevations and depressions and alternating openings I, combined with the supply-pipe, the delivery-pipe, the water-compartment J, plates L, and a series of pipes leading from the higher points of the spaces to a receiving-tank in communication with the air, substantially as set forth.

4. The receptacle having the supply and delivery and subdivided by partitions whose surfaces have elevations and depressions, and openings I, combined with pipes leading from the said elevations to a receiver for oil containing a float and being in connection with the condenser, substantially as set forth.

5. The receptacle having the supply and delivery and subdivided by inclined partitions forming inclined spaces between them, alternating openings being provided in the partitions, combined with pipes leading from the higher points of said spaces to a tank for collecting the oil, said tank being in communication with the atmosphere, substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 22d day of May, A. D. 1888.

DANIEL DONAHUE.

Witnesses:

CHAS. C. GILL,

ROBERT A. PORTEOUS.