

(No Model.)

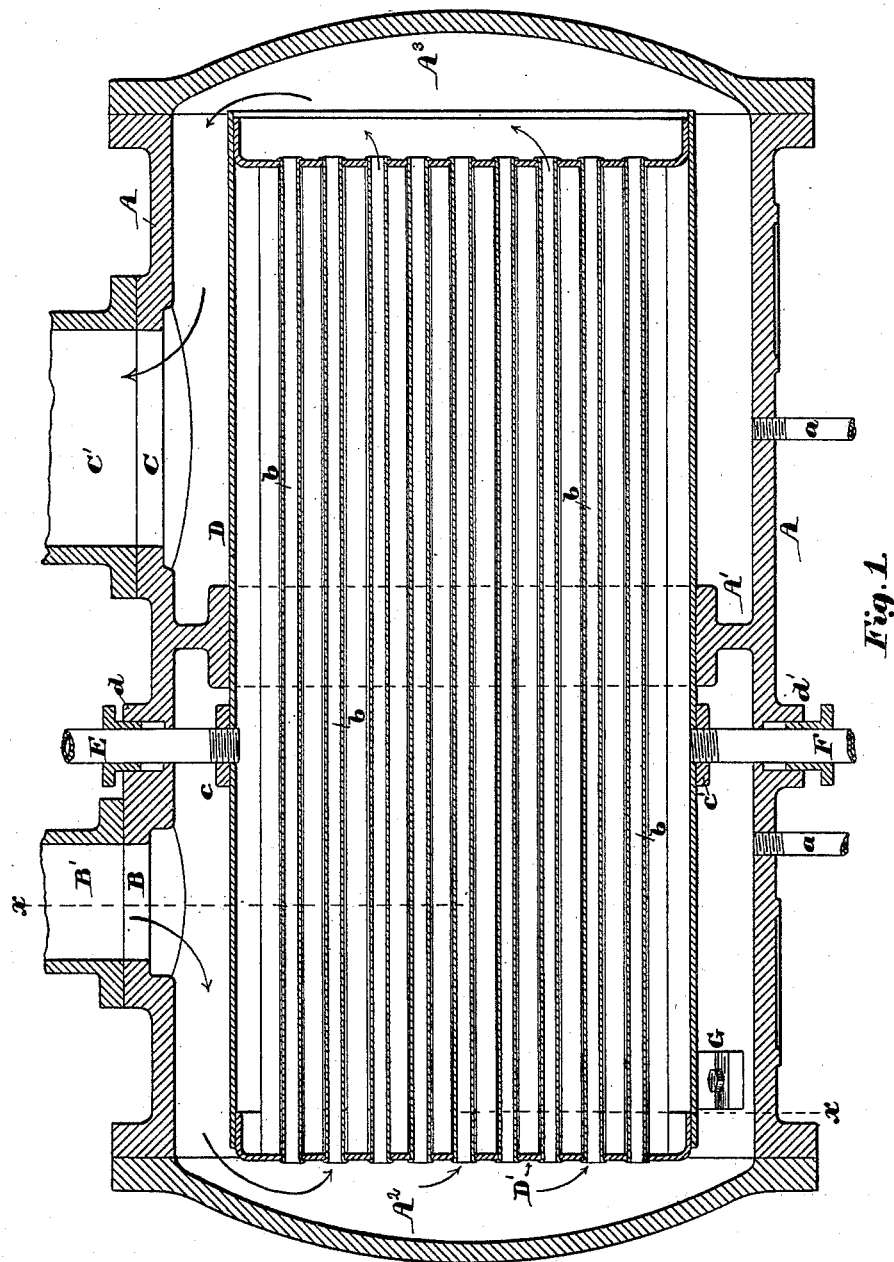
2 Sheets—Sheet 1.

F. W. DEAN.

REHEATER FOR COMPOUND ENGINES.

No. 457,078.

Patented Aug. 4, 1891.



**Witnesses:**  
Walter E. Lombard  
Orvil K. Chaplin.

**Inventor:**  
Francis Winthrop Dean,  
by N. E. Lombard  
Attorney.

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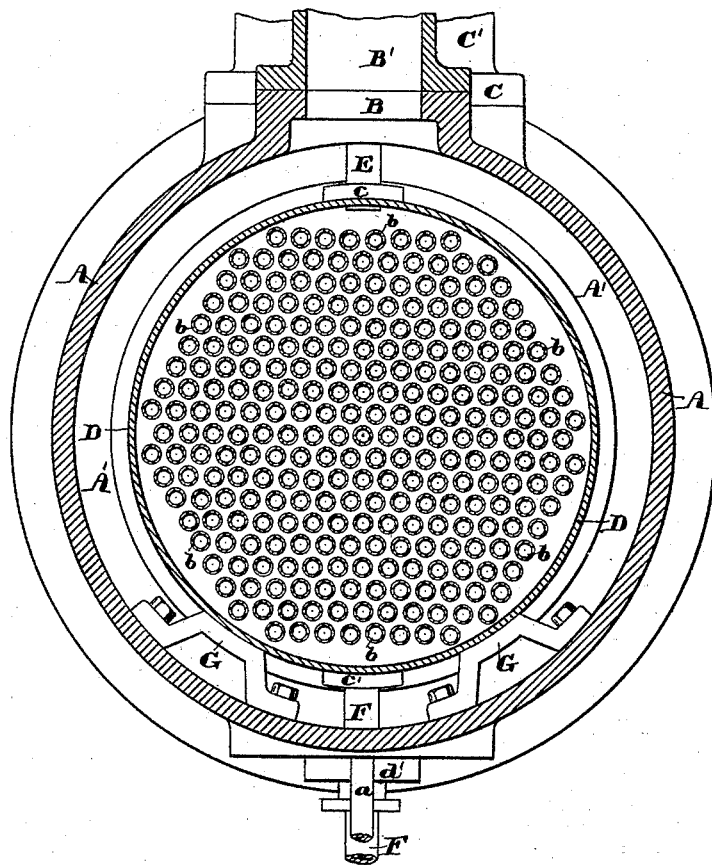
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*Fig. 2.*

*Witnesses:*

*Walter E. Lombard.*  
*Orvil A. Chaplin.*

*Inventor:*

*Francis Winthrop Dean,*  
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# UNITED STATES PATENT OFFICE.

FRANCIS W. DEAN, OF CAMBRIDGE, MASSACHUSETTS.

## REHEATER FOR COMPOUND ENGINES.

SPECIFICATION forming part of Letters Patent No. 457,078, dated August 4, 1891.

Application filed February 4, 1891. Serial No. 380,152. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS W. DEAN, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Reheaters for Compound Engines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to reheaters for use in connection with compound engines for the purpose of superheating the exhaust-steam from the high-pressure cylinder before it enters the low-pressure cylinder; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the drawings, and to the claims hereinafter given, and in which my invention is clearly pointed out.

Figure 1 of the drawings is a central longitudinal section of my improved reheater, and Fig. 2 is a transverse section of the same on line *x x* on Fig. 1.

In the drawings, A is the cylinder, of cast-iron, provided at the center of its length with the inwardly-projecting T-shaped annular rib A' and having formed in one side thereof the passage B, communicating with the exhaust-pipe B' of the high-pressure cylinder and the passage C, through which and the pipe C' the steam exhausted from said high-pressure cylinder after having been reheated escapes into the valve-chest of the low-pressure cylinder. The ends of the cylinder A are closed by the heads A<sup>2</sup> and A<sup>3</sup>, and it has screwed into its underside the two drain-pipes *a a*, one upon each side of the T-shaped rib A', as shown in Fig. 1.

D is a cylinder, made, preferably, of copper or steel and having its ends closed steam-tight by the heads D' and D<sup>2</sup>, which serve as tube-sheets to support the series of tubes *b b* set therein in the usual way of setting boiler-tubes—that is, by expanding their ends. The cylinder D has riveted thereto upon opposite sides thereof the two re-enforcing disks *c c'*, through which and the shell of said cylinder are formed threaded holes to receive the threaded ends of the live-steam-supply pipe E and the discharge-pipe F, which pass through packing-boxes *d* and *d'*, respectively, formed in opposite sides of the cylinder A, as shown. The cylinder D, when completed, is inserted

within the cylinder A at the end to which the head A<sup>2</sup> is secured, fitting loosely within the T-shaped ring or partition A, by which and the stands G G, secured within the cylinder near the head A<sup>2</sup>, it is supported in a position substantially concentric with the axis of the cylinder A, as shown.

The construction of the cylinders A and D and the heads A<sup>2</sup> and A<sup>3</sup> are such that the exhaust-steam from the high-pressure cylinder, entering the cylinder through the pipe B', surrounds the periphery of the cylinder D at the left of the partition-rib A', fills the space at the left of tube-sheet D', passes through the tubes *b b*, surrounds the right-hand half of said cylinder D, and then passes through the pipe C' to the valve-chest of the low-pressure cylinder, and in the meantime the interior of the cylinder D has been filled with live steam from the boiler, which enters through the pipe E, surrounds all the pipes *b b*, imparting a portion of its heat thereto and to the shell of the cylinder D, which is taken up and absorbed by the exhaust-steam in contact with said cylinder and tubes, thereby considerably increasing the efficiency of the low-pressure cylinder. By this construction and arrangement of the several parts of the heater a very effective reheater is produced for increasing the pressure, and consequently the efficiency of the steam exhausted from the high-pressure cylinder preparatory to performing further service in the low-pressure cylinder of a compound engine.

The heater can be built at a comparatively small cost, is easily accessible for cleaning, and the inner cylinder can be readily removed from the outer casing by simply removing the head A<sup>2</sup> and unscrewing the pipes E and F, if it should be necessary to do so for any purpose.

Another advantage is that the inner cylinder is not subject to unequal expansion, because all parts thereof are heated substantially alike.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A reheater comprising an outer casing provided with a central inwardly-projecting partition-rib, an inlet-passage on one side of said partition-rib, and a discharge-passage on the other side of said rib, a second cylinder

having closed ends and a series of longitudinal tubes extending through said closed ends, said second cylinder being supported within said partition-rib concentric with the axis of the outer casing and with its ends removed from contact with the heads of said outer casing, a pipe extending through said outer shell and communicating with the interior of said second cylinder for the admission of live steam to the interior of said inner cylinder, and a similar pipe for the escape of said steam.

2. The combination of the cylinder A, provided with the annular partition-rib A', the heads A<sup>2</sup> and A<sup>3</sup>, the inlet-passage B, and the discharge-passage C, the cylinder D, having closed ends and provided with the series of

tubes *b b*, said cylinder D being inclosed in the cylinder A, with its ends removed from contact with the heads of said cylinder and surrounded by the partition-rib A', the steam-inlet pipe E, the discharge-pipe F, and the stands G G, all constructed, arranged, and operating substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 31st day of January, A D. 1891.

FRANCIS W. DEAN.

Witnesses:

N. C. LOMBARD,  
WALTER E. LOMBARD.