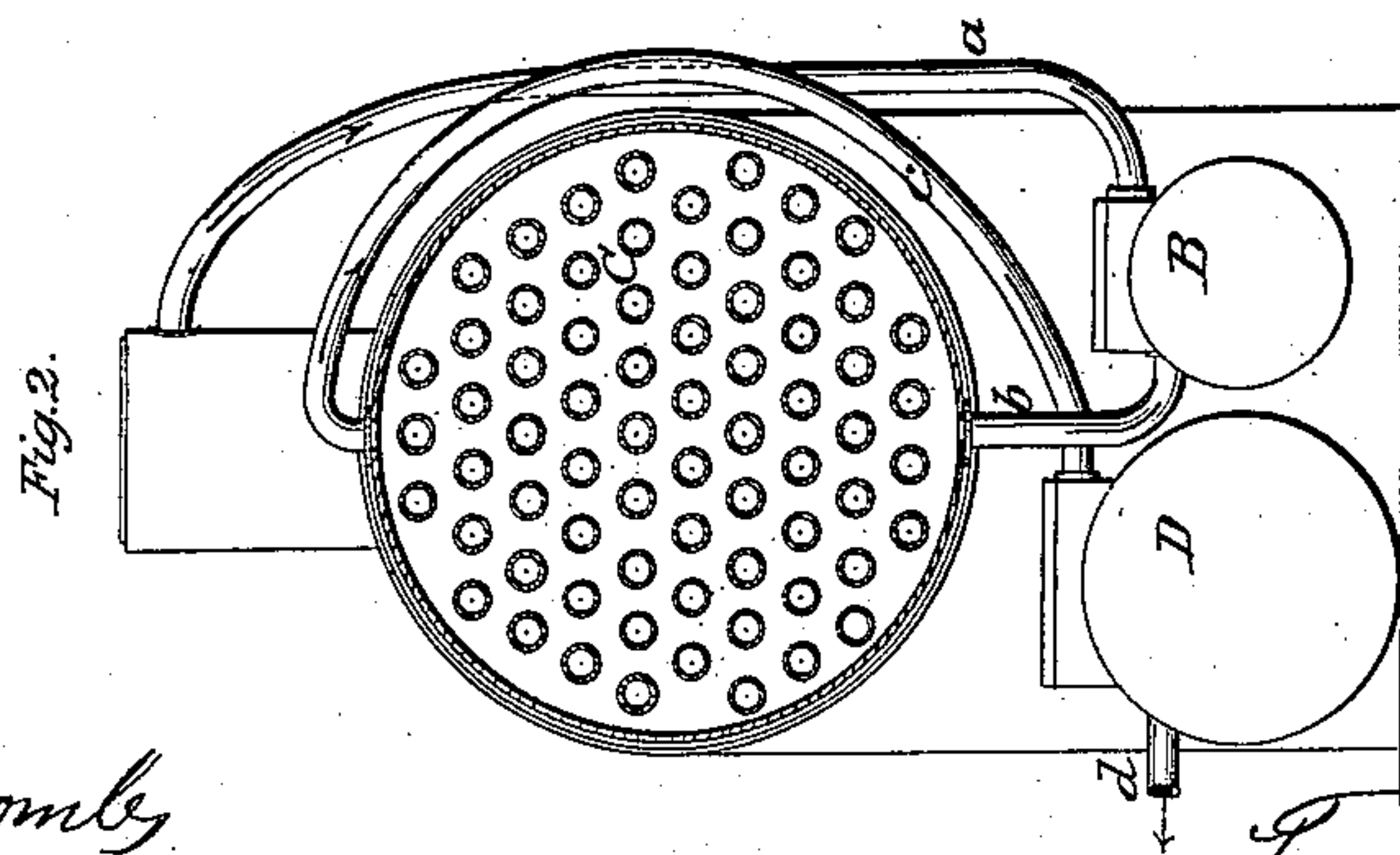
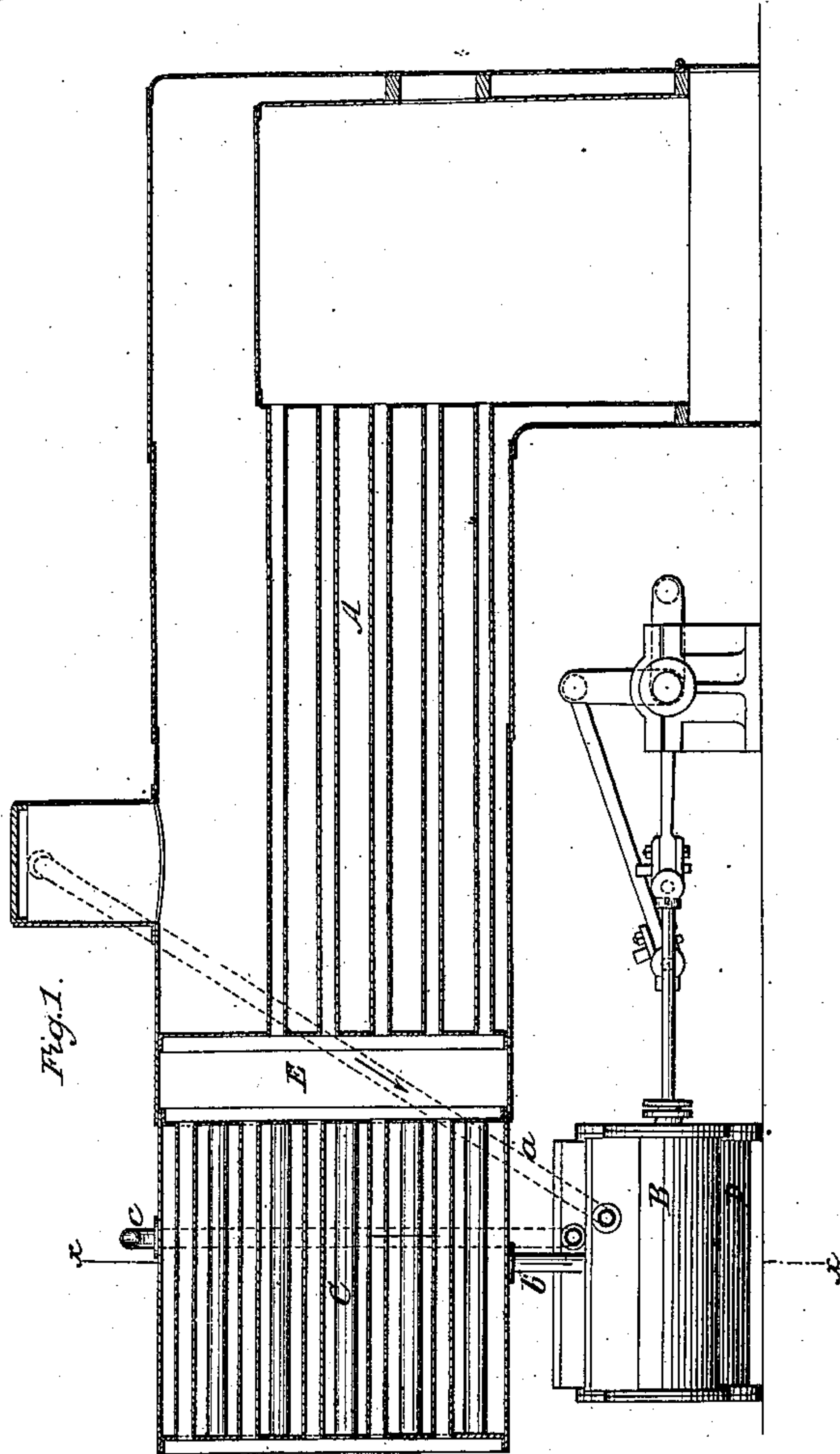


F. B. Blanchard,

Steam Engine Boiler and Super-Heater
N^o 100,359. Patented Mar. 1, 1870



Witnesses.

J. M. Coombs
Fred Haynes.

Inventor

F. B. Blanchard.

United States Patent Office.

F. B. BLANCHARD, OF SPUYTEN DUYVIL, NEW YORK.

Letters Patent No. 100,359, dated March 1, 1870; antedated February 18, 1870.

IMPROVED COMBINED ENGINE-BOILER AND SUPER-HEATER.

The Schedule referred to in these Letters Patent and making part of the same

To all whom it may concern:

Be it known that I, FRANCIS B. BLANCHARD, of Spuyten Duyvil, in the county of Westchester, and State of New York, have invented a new and useful Improvement in devices for Operating Steam-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a longitudinal section of a steam-boiler and super-heater, with a combined engine (shown in part) connected therewith, by way of illustrating my invention, and

Figure 2, a transverse section through the line xx in fig. 1.

Similar letters of reference indicate corresponding parts.

My invention relates to the operation of "combined engines," in which the steam is first used in one cylinder at a high pressure and afterward expansively in another cylinder to work at a low pressure with or without a vacuum, as obtained from condensation of the steam after it has performed its duty in the second cylinder.

In thus using steam, the loss which has heretofore ensued from condensation of the expanded and expanding steam in the second working cylinder, owing to the reduction in its temperature, has largely militated against the effect to be obtained from working combined engines in the manner described. This my invention obviates; and

Said improvement consists in the devices for passing the high pressure steam, after it has performed its duty in the first cylinder, to a super-heater from whence it is drawn to supply the second cylinder, and whereby it is so charged with heat as that, though expanded to many times its original bulk, it is free from that excessive condensation which takes place when worked expansively without being super-heated, and whereby its elastic force or pressure is increased.

Referring to the accompanying drawing—

A represents a steam generator, from which steam of a high pressure is taken by a pipe, a , to supply the one cylinder B of a combined engine.

From this first cylinder the spent or exhaust high-pressure steam is conveyed by a pipe, b , to a super-heater, C, from whence it is passed by a pipe, c , to work expansively, under a superheated condition, within the second or low-pressure cylinder, D, of the engine, after which it is permitted to escape by a pipe, d , or passed off to a condenser to establish a vacuum in connection with the second cylinder for the purpose of increasing the power of the engine.

The timely admission and exhaust of the steam, under its two conditions of high and low pressure to and from the cylinders, is controlled by separate valves to the two cylinders.

The super heater C may be worked by passing the heated gases from the boiler into a distributing chamber, E, and from thence to or through the super-heater.

From this description it will be seen that the high-pressure steam, when expanded to work under a low pressure in a second cylinder, after it has performed its duty in a previous cylinder, is so charged with heat by the super-heater, as an intermediate device, that the usual loss of power by condensation is prevented, and that there is an increase in its elastic force or pressure.

What is here claimed, and desired to be secured by Letters Patent, is—

The combination of the high and low-pressure steam cylinders B D, with a steam generator and super-heater, as herein described, whereby steam at a high pressure may be exhausted from the one cylinder into the super-heater, prior to its introduction into and operation in an expanded condition in the second or low-pressure cylinder, substantially as set forth.

F. B. BLANCHARD.

Witnesses:

HENRY T. BROWN,
HENRY PALMER.