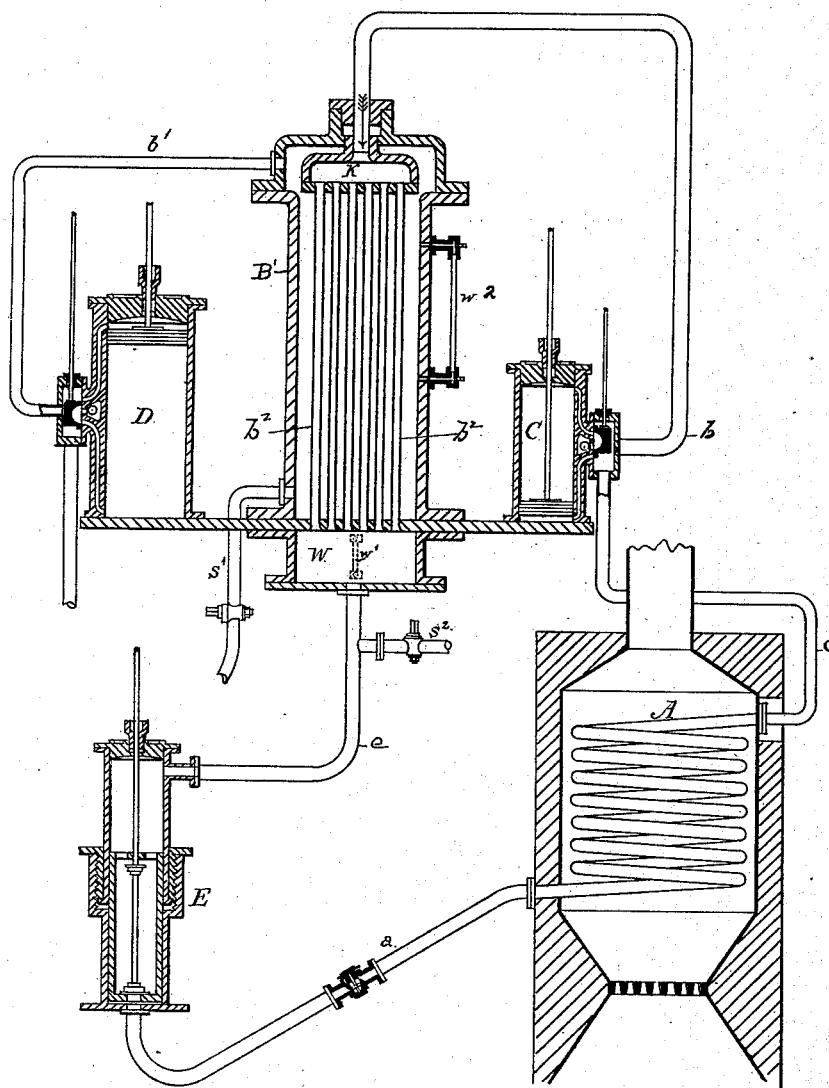


(No Model.)

S. WOLFSON.  
MEANS FOR UTILIZING EXHAUST.

No. 384,733.

Patented June 19, 1888.



Witnesses.  
Mortimer Redman.  
J. Henry Kaiser-

Inventor.  
Samuel Wolfson.  
by L. Deane  
his atty.

# UNITED STATES PATENT OFFICE.

SAMUL WOLFSON, OF ZASCHNICK, RUSSIA.

## MEANS FOR UTILIZING EXHAUST.

SPECIFICATION forming part of Letters Patent No. 384,733, dated June 19, 1888.

Application filed October 7, 1887. Serial No. 251,724. (No model.) Patented in Germany February 3, 1886, No. 36,570, and in France February 26, 1886, No. 174,417.

*To all whom it may concern:*

Be it known that I, SAMUL WOLFSON, residing at Zasnich, Empire of Russia, have invented certain new and useful Improvements in Means for Utilizing Exhaust, of which the following is a specification, reference being had therein to the accompanying drawing, which shows the construction in vertical section.

10 As the steam coming from the steam-boiler contains a great part of water which is conducted to the steam-engine, a great quantity of warmth will be consumed by heating this water to the temperature of the steam. To  
15 remedy this inconvenience I have made an arrangement by which the feeding-water gained by the condensation (which contains, consequently, the above-mentioned water) is reconducted, under a temperature as high as possible, to the generator. For that purpose, the  
20 steam coming from the engine leaves the cylinder not with the pressure of the atmosphere, but with half the pressure of the fresh steam. This steam will pass through a series of tubes  
25 placed in a closed vessel filled with water. The water then will condense the steam passing through the tubes, and a continually-acting feeding-pump in communication with the tubes presses the steam-water again into the  
30 boiler or generator. The cold water in the vessel or low-pressure boiler will by-and-by be heated over the boiling-point and produce a certain tension a little under the pressure in the tubes. As soon as the tension has reached  
35 a certain degree, a second cylinder may be driven by the steam thus formed, and so I obtain a kind of compound engine. The stroke intervals of both cylinders are quite independent of each other, and therefore one can construct in this manner a system of engines working  
40 with two cranks mounted under a right angle against each other. Thus I obtain a perfect utilization of the heat. The temperature of the fresh steam does not much differ from  
45 that of the steam coming from the first cylinder, and the water is pressed by the feeding-pump into the generator with a temperature corresponding to the tension of the steam only partly used. The generator, heated directly  
50 by the fire, is continually fed with water pro-

duced by distillation. One can employ, therefore, generators with narrow winding tubes without fearing any danger or inconvenience from the furs. The evaporating water in the vessel or low-pressure boiler must also be completed by cold water through a feeding apparatus, and therefore furs will be formed in this vessel. However, the sediment will be deposited on the outside of the tubes, and can be easily taken away. In the low-pressure boiler the steam is formed by the heat of the steam passing through the tubes. The difference between the tension in the low-pressure boiler and the tension of the steam passing through the tubes is dependent on the heating-surface represented by the tubes in proportion to the quantity of the condensed steam. The full heat of the steam coming from the first cylinder being employed in the formation of steam in the low-pressure boiler, while the tension in this boiler is a little lower, the quantity of this steam is therefore larger.

The low-pressure boiler is acting here in the place of a receiver of a compound engine, with the advantage that it furnishes besides a feeding-water of high temperature for the generator.

On the accompanying drawing, A is a winding-tube generator heated by fire. The steam is conducted by the tube *b* to the cylinder C. The steam coming from this cylinder passes through the tube *b* into the chamber K, and thence into the tubes *b'*, placed in the condenser or low-pressure boiler B', heating the water in it. The condensed-steam water is collected in the vessel W, where it is taken through the tube *e* by the feeding-pump E and reconducted to the generator A through the tube *a*. The steam formed in the low-pressure boiler B' is conducted by the tube *b'* into the second cylinder, D, where it is acting like the steam coming directly from the first cylinder.

*w* and *w'* are water-glasses, to indicate the height of the water in the vessels W and B'. *s* is a feeding-tube for the low-pressure boiler, and *s'* is a reserve feeding-tube for the vessel W.

I claim—

1. The combination of the generator A, the rec

tube *c*, the cylinder C, connecting therewith, the tube *b*, the low-pressure boiler B', connecting therewith, the water-vessel W at the lower end of the boiler, the tubes *e* and *a*, and the  
5 pump E, connected therewith to return the condensed water to the generator, all substantially as described.

2. The combination of the cylinders C and D and their connecting-tubes with the gener-

ator A, the low-pressure boiler B', having a water vessel or chamber, as described, and the tubes and pump to return the condensed water to the generator, and the generator, substantially as described.

SAMUL WOLFSON.

Witnesses:

B. ROI,

TH. LORENZ.