(No Model.) 2 Sheets—Sheet 1.

# J. HAUSER & J. WHITTAKER.

## STEAM AND AIR ENGINE.

No. 489,148. Patented Jan. 3, 1893.

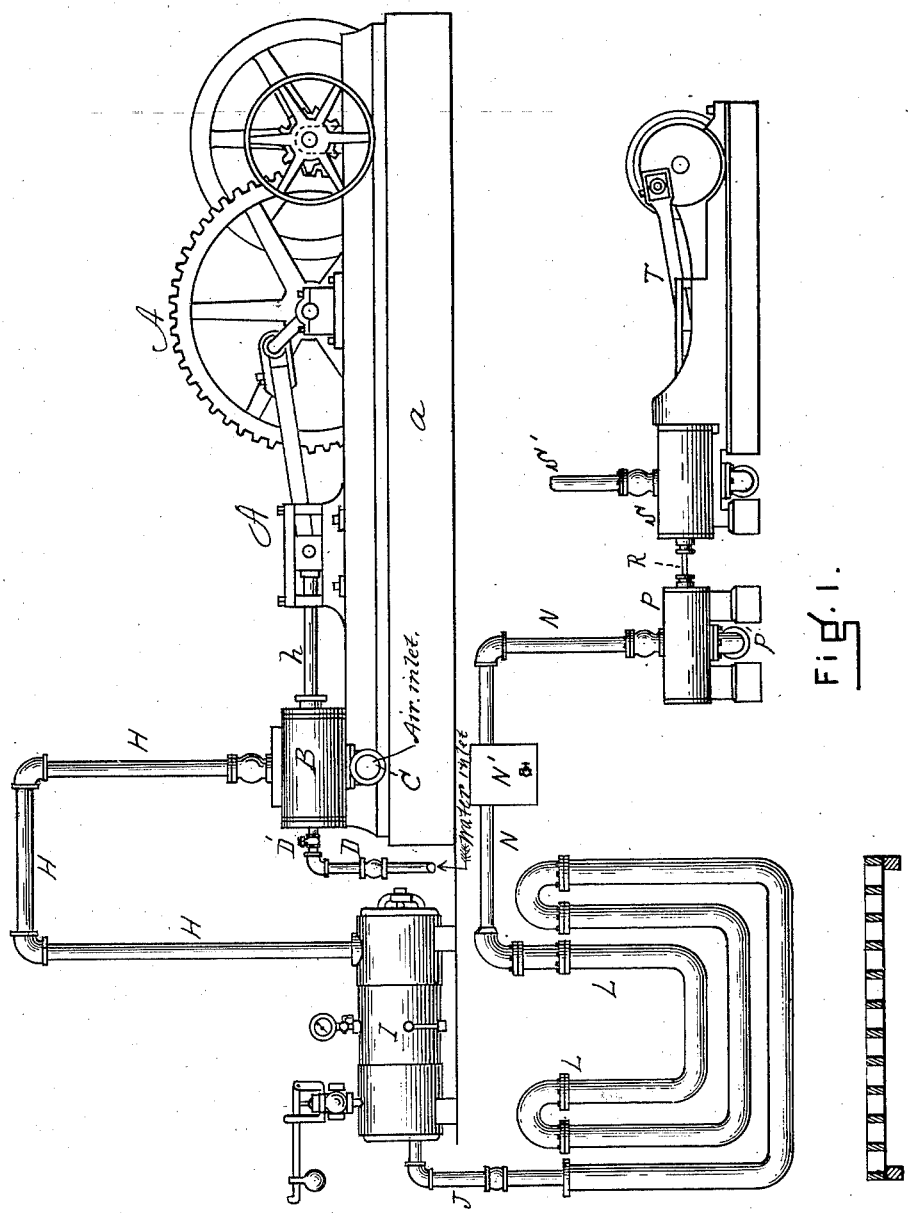


Fig. 1.

WITNESSES
L. B. Smith
L. M. Williams

INVENTORS
Jacob Hauser
John Whittaker
By their Atty
Henry M. Williams

(No Model.) 2 Sheets—Sheet 2.

# J. HAUSER & J. WHITTAKER.

## STEAM AND AIR ENGINE.

No. 489,148. Patented Jan. 3, 1893.

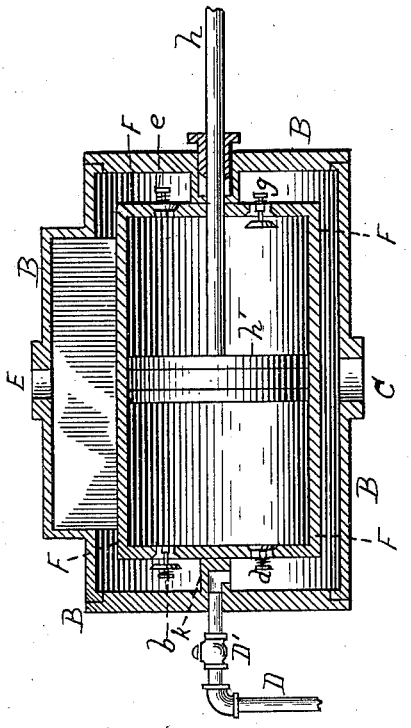


Fig. 2.

WITNESSES
L. B. Smith.
B. W. Williams

Jacob Hauser INVENTORS
John Whittaker
By their Attys.
Henry W. Williams

# UNITED STATES PATENT OFFICE.

JACOB HAUSER AND JOHN WHITTAKER, OF BOSTON, MASSACHUSETTS.

## STEAM AND AIR ENGINE.

SPECIFICATION forming part of Letters Patent No. 489,148, dated January 3, 1893.

Application filed March 24, 1892. Serial No. 426,252. (No model.)

*To all whom it may concern:*

Be it known that we, JACOB HAUSER, a citizen of the Republic of Switzerland, and JOHN WHITTAKER, a citizen of the United States, both residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Steam and Air Engines, of which the following is a specification.

This invention relates to engines in which both steam and air are employed simultaneously, and it consists in the construction and arrangement of parts hereinafter described whereby greater effectiveness and power are produced.

This device should be distinguished from engines employing either steam or air, or both steam and air, but not both simultaneously or in the same compressor-cylinder and receiver. In this improvement the steam and air are mixed in the compressor-cylinder and are conducted simultaneously to the receiver and heater and thence to a cylinder which is auxiliary to the cylinder of the engine which transmits the power.

In the accompanying drawings, in which similar letters of reference indicate like parts; Figure 1 is an elevation illustrating our invention. Fig. 2 is a longitudinal vertical section of the compressor-cylinder.

A represents a driving mechanism or engine placed upon a suitable bed *a*, and B is the compressor-cylinder set upon the same bed, the whole constituting a compressor. The outer shell of this cylinder (see Fig. 2) is lettered B and is provided with the air-inlet C, the water induction pipe D provided with the check-valve D′, and the outlet E for both water and air. Within the outer shell is an inner shell or cylinder F provided with the inlet-valves *d* and *g* on opposite sides of the piston, and outlet-valves *b* and *e* placed on opposite sides of the piston. *h* is the piston-rod which is driven by the engine A and provided with the piston *h′* within the cylinder F. As the piston is vibrated the water and air enter the cylinder B and pass down by means of the space between the two cylinders and enter the cylinder F through the valves *d* and *g* alternately, the water being conducted downward by the partition *k*. Thence the piston forces the mixed water and air out of the cylinder F through the valves *b* and *e* alternately into the upper portion of the space between the cylinders and out through the port E. Thence the water and air are conducted through the pipe H into the receiver I, thence through the pipe J into the heater L, and thence the expanded air and steam are conducted through the pipe N, provided with the box N′ for catching the condensed drippings, into the auxiliary cylinder P provided with an ordinary exhaust P′. This cylinder is connected by a piston-rod R with the cylinder S connected with the engine T which transmits the power. The pipe S′ leads from the cylinder S to the boiler. As will readily be understood, while the water is being converted into steam during its passage from the receiver to the auxiliary cylinder, the air is being quickly expanded by heat, and, by means of the piston-rod R, acts as a powerful auxiliary to the steam in running the engine.

Having thus fully described our invention what we claim and desire to secure by Letters Patent is;

In a device of the character described, the combination of the following elements, viz., the compressor-cylinder consisting essentially of the outer shell B provided with the water induction pipe D, air induction opening C and outlet E for discharging both water and air, and the inner shell F provided with the inlet-valves *d g* and outlet-valves *b e*, said inner shell being adapted to receive a piston, as *h′*, and being connected with the outer shell by the partition *k;* a receiver, as I, connected by a pipe with said cylinder; a heater, as L, connected by a pipe with said receiver, and the cylinder P, connected by a pipe with said heater and having a suitable connection whereby the mixed steam and expanded air are simultaneously conducted to an engine for transmitting power, substantially as set forth.

JACOB HAUSER.
JOHN WHITTAKER.

Witnesses:
HENRY W. WILLIAMS,
L. B. SMITH.