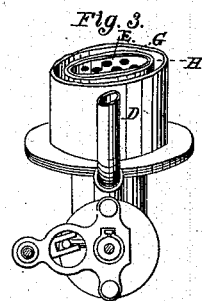
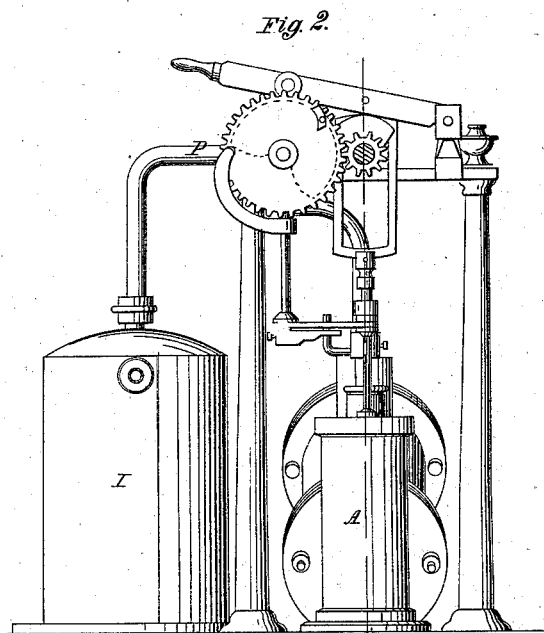
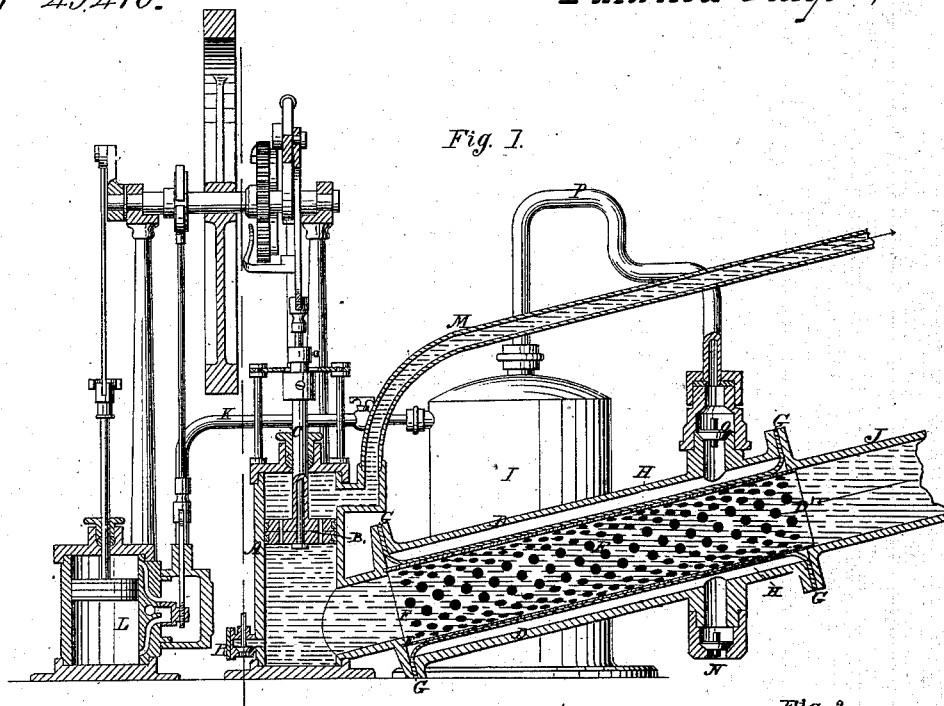


*J. A. Huss,*  
*Compressing Air,*

*N<sup>o</sup> 49,410.*

*Patented Aug. 15, 1865.*



*Witnesses:*  
*Bynn & Bacon*  
*Edward Knight*

*Inventor:*  
*John Adam Huss*  
*by C. Munn & Co. atty*

# UNITED STATES PATENT OFFICE.

JOHN ADAM HUSS, OF ST. LOUIS, MISSOURI.

## IMPROVED HYDROPNEUMATIC ENGINE.

Specification forming part of Letters Patent No. 49,410, dated August 15, 1865.

### *To all whom it may concern:*

Be it known that I, JOHN ADAM HUSS, of the city of St. Louis, in the county of St. Louis and State of Missouri, have invented a new and useful machine which I have styled the "Hydraulic Air-Engine," and which is for the introduction and condensation, by hydraulic pressure acting on the principle of the hydraulic ram, of air in an air-reservoir to a degree of intensity sufficient to serve as a motive power; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawing, and to the letters of reference thereon.

A signifies a pump; B, a plunger, consisting of two disks or plates, the upper one of which disks is turned by means of the double stem or piston C, whereby apertures are formed in the plunger when it descends and closed when it rises.

D E is a cylinder, diverging at an angle of twenty-five degrees (more or less) indifferently from the horizontal, and opening into the lower part of the pump A, and consists of an outer tube, D, and an inner tube, E, which inner tube is perforated throughout its entire surface with holes F F, and incased with a closely-fitting gum-elastic tube or jacket, G.

H is a space between the outer and inner tube of cylinder D E, forming an air-chamber filled with air, and communicating through tube P with an air-reservoir, I.

J is a long tube, with the upper end opening into the lower part of a water-reservoir, and the lower end joining and fitted to the perforated inner tube, E, of the cylinder, and lying in the same direction, and being a continuation or prolongation of said inner tube.

K is a supply-pipe connecting air-reservoir I with an engine, L, such as is driven by steam.

M is a conduit-pipe from the upper part of the pump A to the upper part of the water-reservoir.

N and O are valves in cylinder, N, the lower valve, being for the introduction of air into the air-chamber H, and the upper valve, O, for its expulsion through the pipe P into air-reservoir I.

The operation of the machine is as follows: Let the water-reservoir I be filled with water, and the same will flow through the tube J and cylinder E under and to the plunger B, the apertures of the plunger being closed and

the plunger down and at rest. If the plunger B be now raised and suddenly stopped, then the water, following in obedience to gravitation and atmospheric pressure, will also be suddenly stopped and a concussion produced, and the mechanical effect therefrom will be as follows: The water will press through the apertures F of the tube E against the gum-elastic tube or jacket G, distending it, and thereby compressing the air in air-chamber H, and forcing it through valve O into air-reservoir I, feeding the engine L. The concussion of the water having spent its force, the gum-elastic jacket contracts and the pressure of the atmosphere opens valve N, resupplying the partially-exhausted air-chamber H. By this time the apertures of plunger B are opened by a rotary motion imparted to the upper disk of the same by the double piston C, and the plunger descends, and the apertures in it then close, and, by the combined force of the engine from above and the water pressure beneath, it again rises, lifting the water above it through the conduit-pipe M back to the reservoir, and coming again to a sudden rest, as before, produces another concussion of the water and pressure on the gum-elastic tube, followed by similar effects, and so on continuously. A valve, R, permits the outflow of the water when required.

The whole machine can be constructed according to the appended drawing and this specification, by any good practical machinist, out of the ordinary material and combinations of metal employed in the construction of the steam-engine. The air in the air-reservoir I may be condensed sufficiently to raise the plunger for the first concussions by an air-pump.

The ordinary length of the cylinder D E and pipe J is about twenty-five feet, of which the cylinder D E constitutes one-half, and the diameter twelve inches. An increase of power can be obtained by increasing the length or elevation of said cylinder and pipe.

What I claim as my invention is—

The compression, by hydraulic pressure acting on the principle of the hydraulic ram, of air into an air-reservoir to a sufficient degree of intensity to serve as a motive power.

JOHN ADAM HUSS.

Witnesses:

OCTAVIUS KNIGHT,  
EDWARD H. KNIGHT.