

*E. Cope,*

## Oscillating Steam Engine.

*N<sup>o</sup> 21,873.*

*Patented Oct. 26, 1858.*

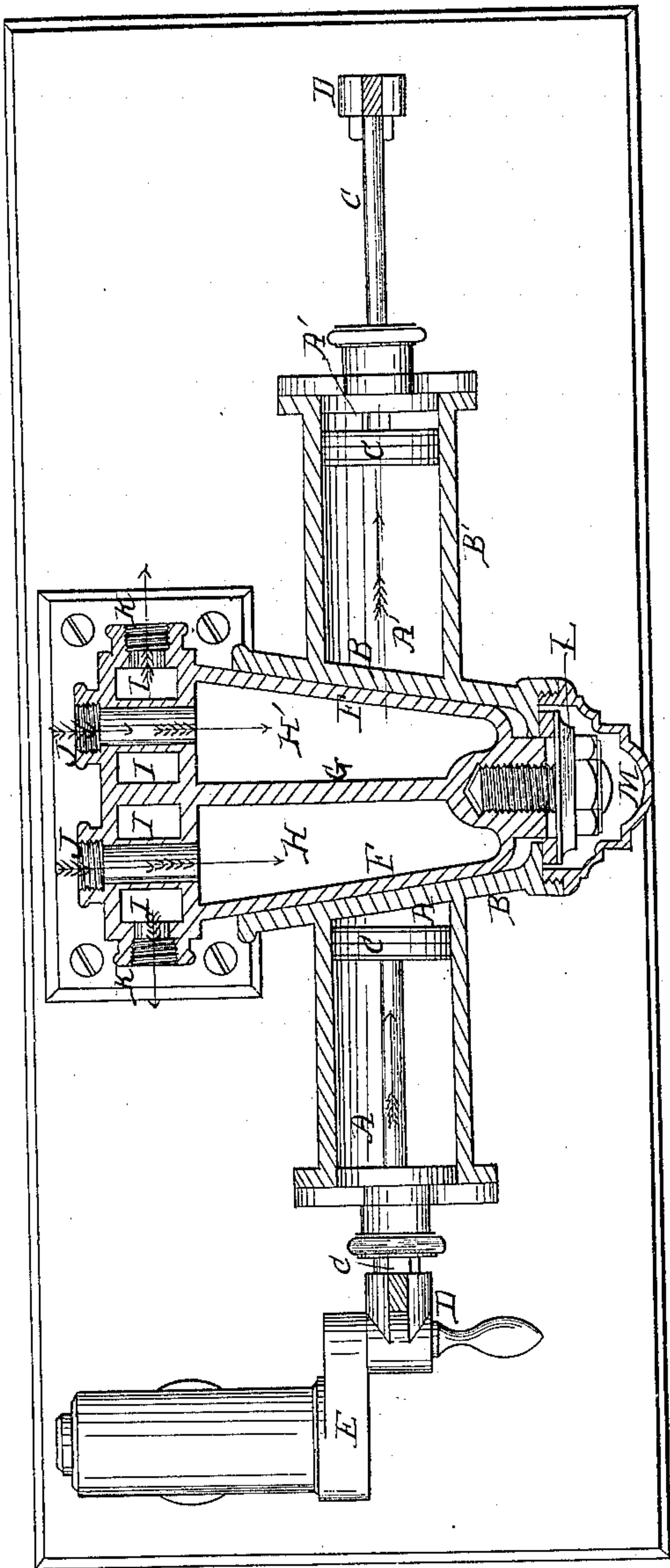
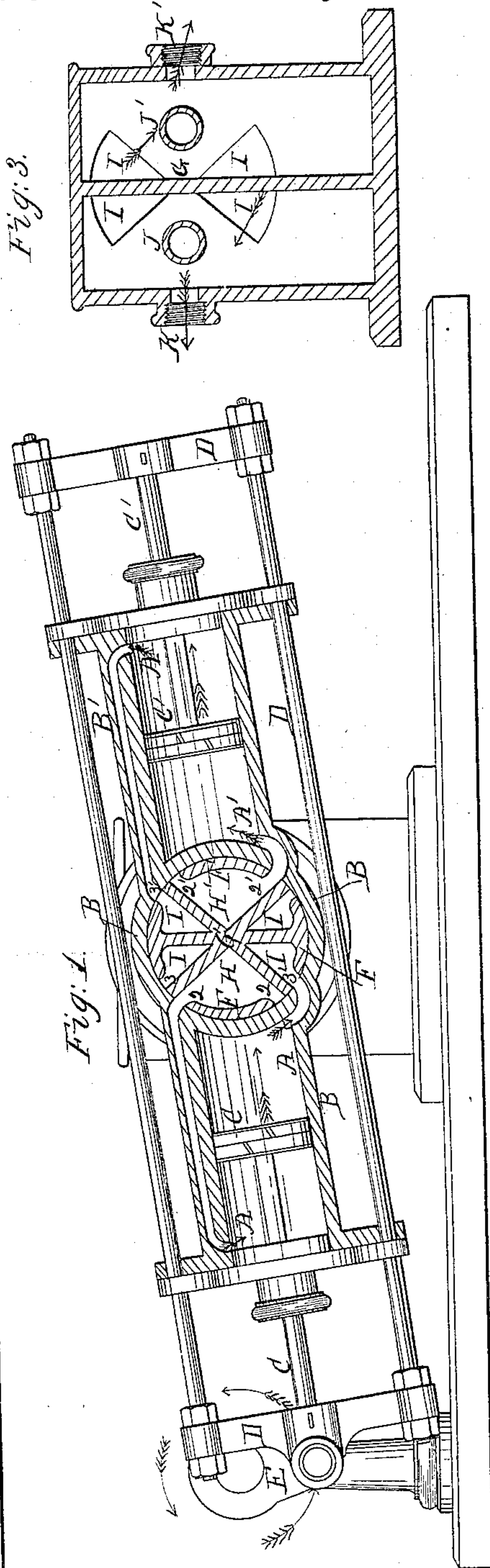


Fig: 3.





# UNITED STATES PATENT OFFICE.

EZRA COPE, OF CINCINNATI, OHIO.

## STEAM PUMPING-ENGINE.

Specification of Letters Patent No. 21,873, dated October 26, 1858.

*To all whom it may concern:*

Be it known that I, EZRA COPE, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Steam Pumping-Engines.

The nature of my improvement consists in the arrangement of a single trunnion having both steam and water passages therein; and guide rods to connect the piston rods of two cylinders to oscillate thereon; and the arrangement of the escape steam passages to intervene and separate the steam and water passages to prevent condensation of the supply steam.

To enable others skilled in the art to make and use my improvement I will proceed to describe its construction and operation referring direct to the accompanying drawings.

Figure 1 shows a longitudinal section of the working parts and cross section of the trunnion, bisected vertically. Fig. 2 shows another longitudinal section of the working parts, and longitudinal section of the trunnion, with a view of the standard, the whole bisected horizontally as shown at line through K, J, J' K' in Fig. 3 which represents a hollow standard upon which is formed or secured the trunnion.

Like letters refer to like parts.

A, A, represents the interior of the steam cylinder, and side pipe to make it double acting. B B represents the shell. A', A', represents the interior of the pump cylinder and side pipe to make it double acting. B' B' represents the shell. These two cylinders are cast separate, or together. In either case they are fitted to be seated on the trunnion.

C, C, represent the piston rod and piston of the steam cylinder.

C', C' represent the piston rod and piston of the pump.

D, D, D, D, represent the guide rods to connect the piston rods of the engine and pump as shown.

E represents the crank to control the amount of throw or oscillation and length of stroke of the piston.

F, F, F, F, represent the hollow partitioned trunnion whose chambers I, I' extend into the interior of the standard and whose chambers H, H' by means of the pipes J, J', extend through the standard.

K, K' represent exit apertures.

J J' and K, K', are suited for attaching any extension to sources of supply or more remote delivery.

L represents a set screw to adjust the seating of the parts upon the trunnion, and compensate for wear.

M represents a cap that covers the set screw, and serves to prevent leakage.

G represents the partitions as shown.

2, 2, in chamber H, represent the induction ports for steam.

3 3 in chamber I, represent the eduction ports for steam.

As in all double acting steam cylinders there are two openings provided and arranged so that when either such opening is in correspondence with an induction port the other opening is in correspondence with an eduction port as shown in Fig. 1, where the openings of the steam cylinder are in correspondence with one set of ports, 2, 3 and 2, 3 form the two sets of ports, with which the openings in the steam cylinder, alternately correspond when in operation.

The steam cylinder and pump cylinder and all their parts are of precisely similar construction, and similar letters are employed to describe both.

To operate, steam is made to flow through pipe J into chamber H through port 2, opening, and side pipe, into the cylinder against the piston causing it to move in the direction of the arrow expelling the contents of the cylinder from the exhaust side of the piston direct into chamber I, thence to the exit K, the crank in moving in the direction shown by the arrows causing the completion of the stroke in that direction and the oscillation of the cylinders until the one set of ports are closed, and another opened causing the return stroke by the flow of steam from chamber H into the cylinder direct and exhausting contents from the exhaust side of the piston through side pipe into chamber I, thence to exit K. The chamber or water passage H' has been put in communication with the source of supply by means of the pipe J' and its extension, when simultaneously with the flow of steam through the passage into the cylinder and the consequent movements, is, the movement of the pump piston causing vacuum, and flow of liquid through pipe J' chamber or passage H' through induction port 2', and opening into the cylinder direct as shown and, expelling from the delivery side of piston while the



stroke is in that direction, through, side pipe  
eduction port 3' into chamber or passage I',  
thence to exit K'. Oscillation governed by  
the crank changes the set of ports for return  
5 stroke and the liquid flows through cham-  
ber H, induction port 2', opening and side  
pipe into the cylinder, while the stroke is in  
that direction, at the same time the contents  
from the delivery side of the piston is being  
10 expelled through opening, eduction port 3'.  
direct from the cylinder to chamber I'.  
thence to exit. This presents a simple, inex-  
pensive pumping engine in a compact form,  
with engine and pump valves that never fail  
15 to act, and no disadvantage from condensa-  
tion.

I am aware that steam and water passages  
have been employed in the trunnion for en-  
gine and pump, as shown in Sprenkels and  
20 Bassfords patent of Dec. 22d, 1857; also that  
guide rods have been employed to connect

the piston rods of stationary cylinders; and  
by myself and I. W. Bragg as shown in pat-  
ent of March 23d, 1858. I do not claim  
these singly.

What I claim as my invention and desire  
to secure by Letters Patent is,

1. The arrangement of steam and water  
passages both in one trunnion and guide  
rods to complete an independent pumping 30  
engine.

2. I further claim arranging the escape  
steam passage, to separate the steam supply  
and water passages to prevent condensation  
of the supply steam, all substantially as and 35  
for the purposes set forth in the foregoing  
specification.

EZRA COPE.

Attest:

SAML. H. WHITAKER,  
ISAAC W. BRAGG.