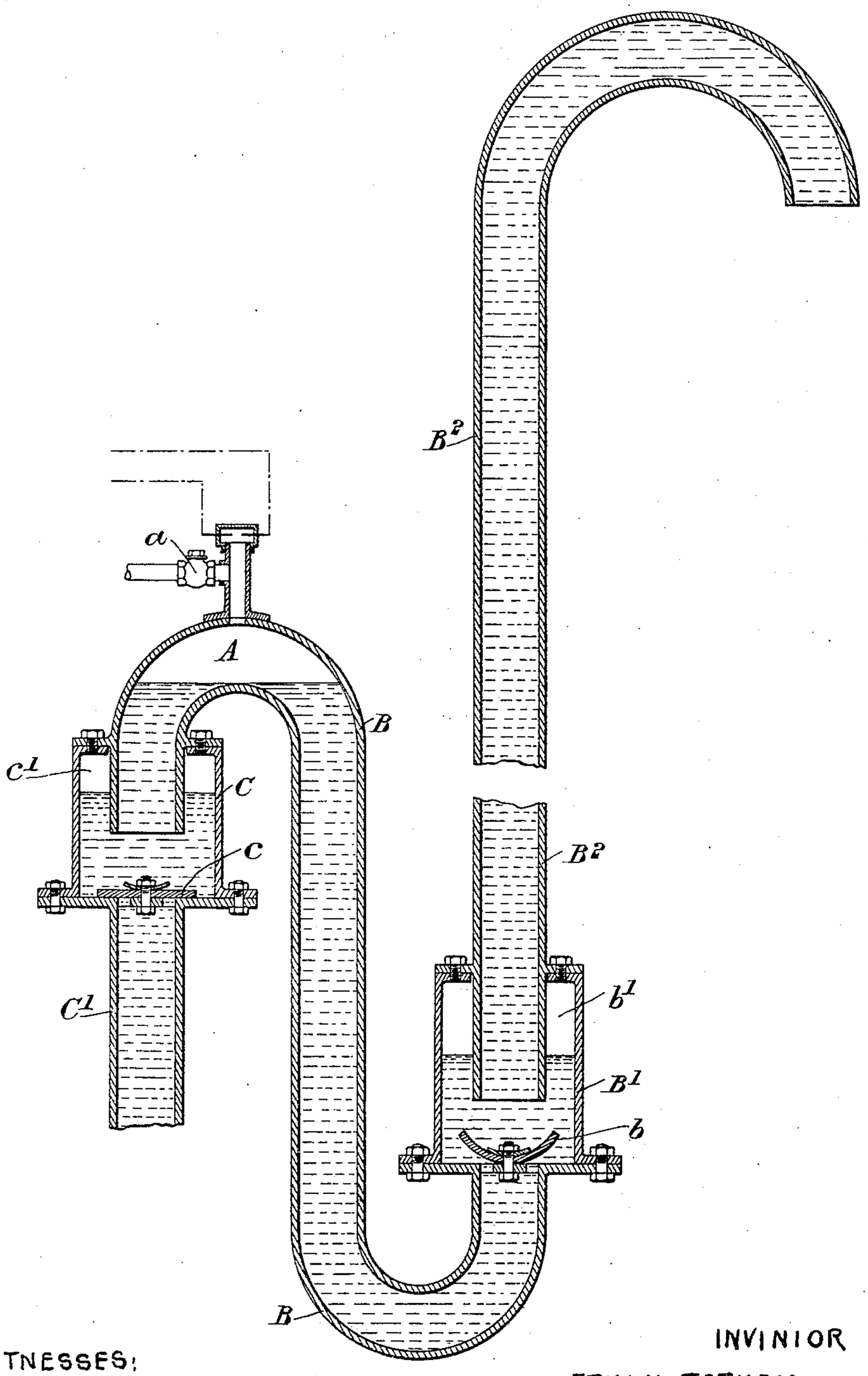
No. 632,663. Patented Sept. 5, 1899.

E. TATHAM.

APPARATUS FOR PUMPING LIQUIDS.

(Application filed June 6, 1899.)

(No Model.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

EDWIN TATHAM, OF LONDON, ENGLAND.

APPARATUS FOR PUMPING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 632,663, dated September 5, 1899.

Application filed June 6, 1899. Serial No. 719,579. (No model.)

To all whom it may concern:

Be it known that I, EDWIN TATHAM, gas engineer, a subject of the Queen of Great Britain and Ireland, and a resident of Colfe Lodge, Lewisham Hill, London, in the county of Kent, England, have invented certain new and useful Improvements in Apparatus for Pumping Liquids, which invention is fully set forth in the following specification.

This invention has for its object to effect the pumping of liquids by force due to the expansion generated by the ignition of combustible gases acting directly upon the liquid to be displaced, fresh charges or supplies of the liquid entering the space from which liquid has been expelled, these fresh charges or supplies being in turn expelled by the expansion due to the ignition of succeeding charges of combustible gases.

I will describe the invention by reference to the accompanying drawing, which shows one of my improved pumping apparatus in vertical section.

The charges of combustible gases are forced through a non-return valve *a* into a combustion-chamber A, situated at the top bend of an **S**-shaped pipe B. The open end of the upper bend of the **S**-pipe B dips into liquid contained in a box C, fitted with the suction-valve *c* and connected to the suction-pipe C′, while the lower bend of the said **S**-pipe communicates with a box B′, fitted with the delivery-valve *b*. The delivery-pipe B^2 dips into the liquid contained in the box B′, and the liquid in the boxes B′ and C only partly fills the said boxes, so that spaces *b′* and *c′* are left for containing air to act as cushions to produce a continuous flow. At each ignition of a charge of combustible gases in the combustion-chamber A liquid is forced up the delivery-pipe B^2, and after each ignition a fresh charge of liquid is, by the partial vacuum thus produced in the **S**-pipe B, caused to pass up the pipe C′ into the space from which the liquid was expelled, to be in its turn expelled on the ignition of the next charge of combustible gases, and so on while the apparatus is in use.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In apparatus for pumping liquid the combination with an **S**-shaped pipe of means for admitting an explosive mixture into the upper bend of the said pipe, an igniter for the explosive charge, suction and delivery pipes, valve-boxes connecting the suction, delivery and **S**-shaped pipes together and only partly filled with liquid, and into the liquid in which valve-boxes the inlet ends of the delivery and **S**-shaped pipes dip whereby cushioning-chambers are formed in the upper portions of said boxes, substantially as hereinbefore described.

2. In apparatus for pumping liquid, the combination with a combustion-chamber, of means for admitting explosive mixture thereto, an igniter, suction and delivery pipes to the chamber and air-cushioning means interposed between the suction and the delivery to produce a continuous flow, substantially as described.

3. In apparatus for pumping liquid, the combination with a combustion-chamber, of means for admitting explosive mixture thereto, an igniter, suction and delivery pipes to the chamber, and valve-boxes in which the pipes dip so as to allow them to only partially fill with liquid whereby cushioning-chambers are formed in the upper portion of said boxes, as and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

E. TATHAM.

Witnesses:
WILLIAM FREDERICK UPTON,
JOHN EDWARD NEWTON.