

(Model.)

L. B. FULTON.
EJECTOR.

No. 440,803.

Patented Nov. 18, 1890.

Fig. 1.

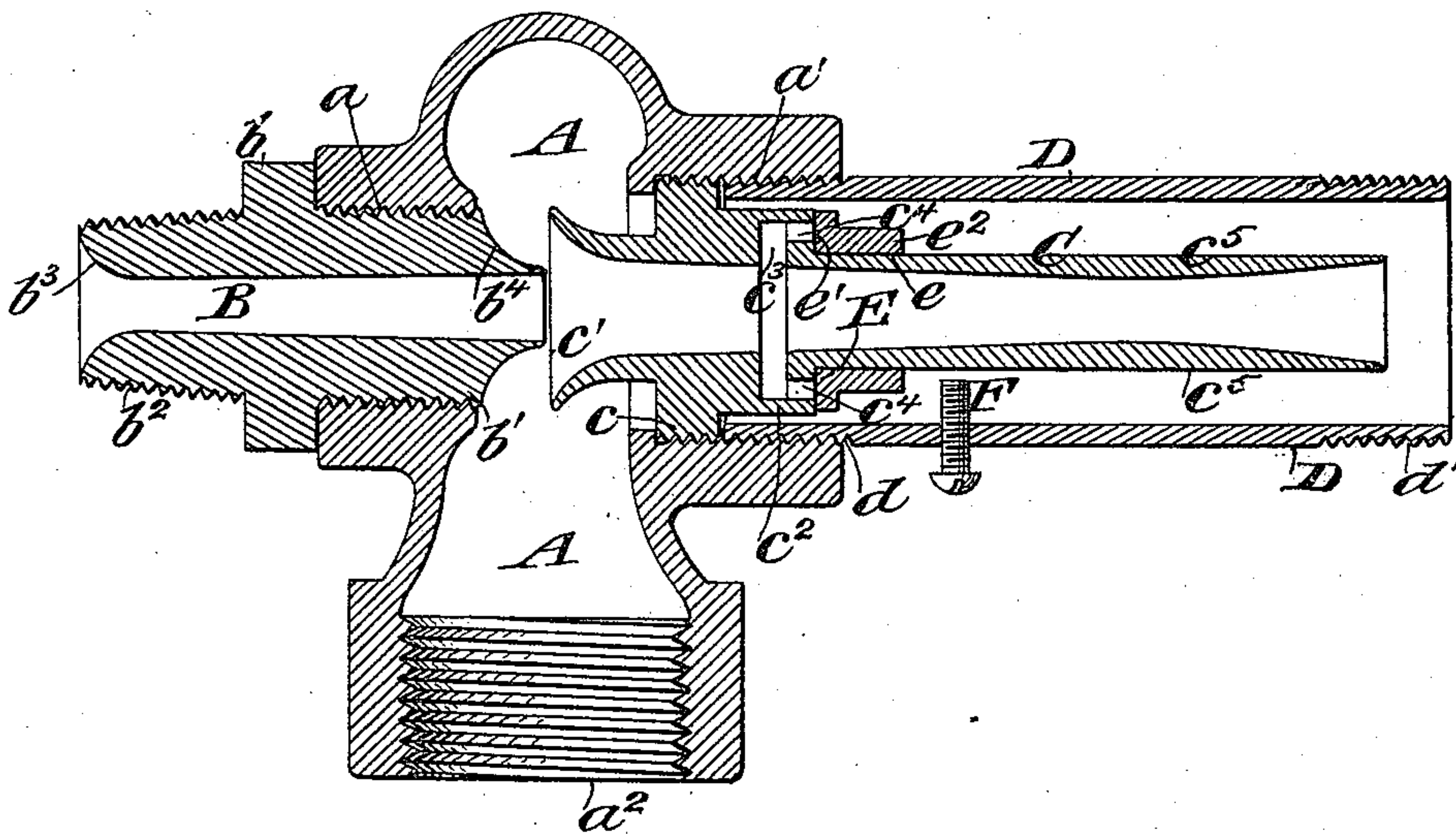


Fig. 2.

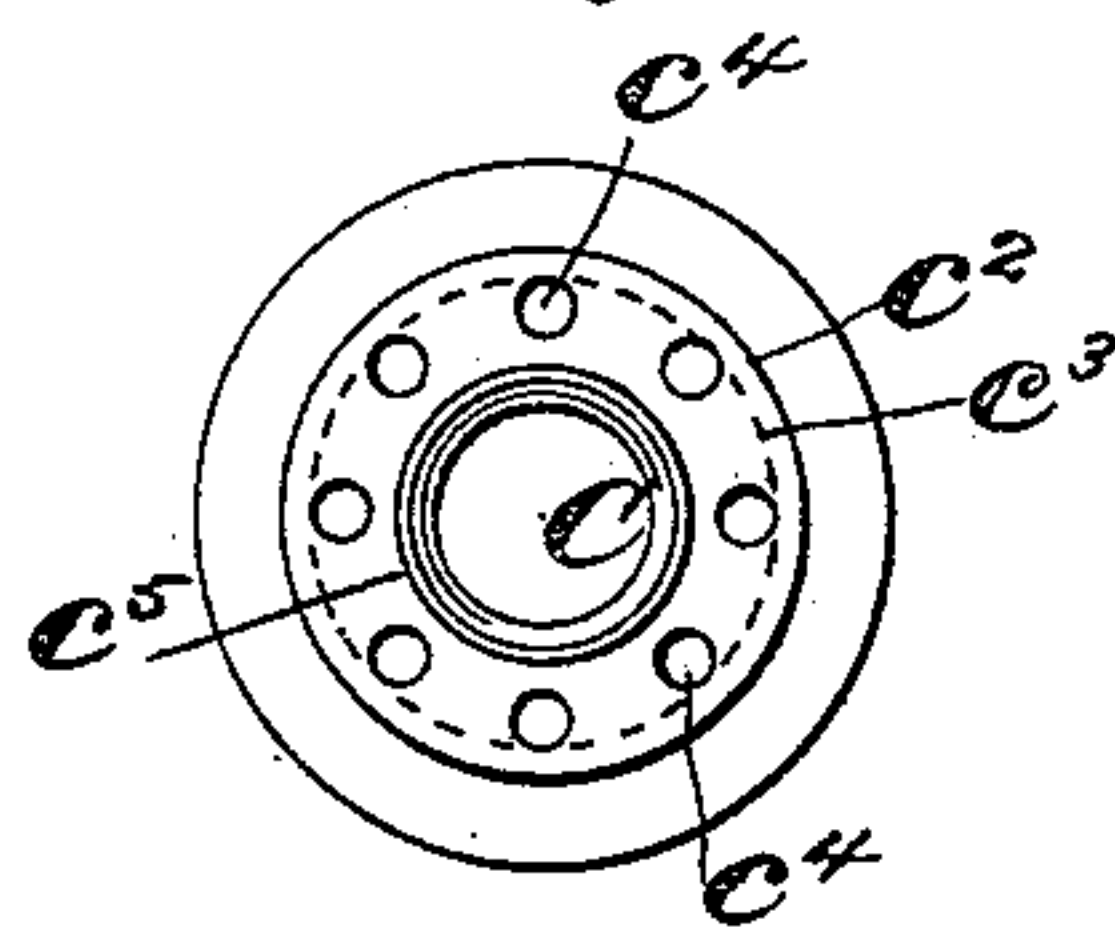
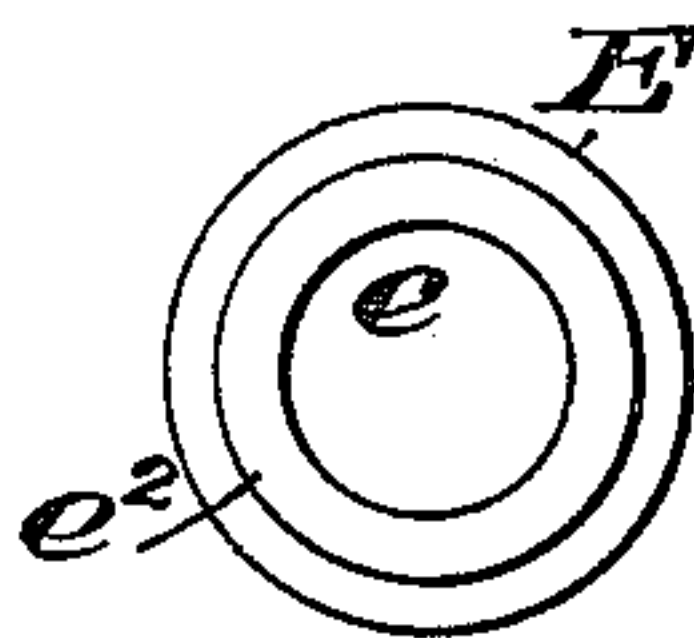


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

LOUIS B. FULTON, OF PITTSBURG, PENNSYLVANIA.

EJECTOR.

SPECIFICATION forming part of Letters Patent No. 440,803, dated November 18, 1890.

Application filed April 26, 1890. Serial No. 349,659. (Model.)

To all whom it may concern:

Be it known that I, LOUIS B. FULTON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Ejectors, of which the following is a specification.

My invention relates to an improvement in ejectors in which a fluid under pressure is employed to force or raise a liquid or gaseous body against the force of gravity or other opposing pressure.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of the ejector, showing the parts in position for use. Fig. 2 is an end view of the combining-tube and valve-seat, and Fig. 3 is a detached view of the valve.

Hitherto when steam has been employed as the ejector force for the purpose of forcing or raising a column of liquid it has been necessary to regulate the amount of steam admitted to the ejector in starting with the greatest nicety for the reason that if more were admitted than could well pass through the smallest portion of the combining-tube there would be no vacuum formed in front of the liquid-inlet, and hence the ejector would fail to operate.

One of the important objects of my present improvement is to overcome the necessity for such care and hinderance in admitting the steam force to the ejector, and to this end I have provided an outlet for steam through the wall of the combining-tube into the discharge-pipe, and, in connection therewith, have provided a valve for automatically opening and closing said outlet.

A represents a chamber provided with openings, three in number, two of said openings being placed with their axes in the same line and the other opening into the chamber from a point at one side of the said axial line. The form of the chamber which I have herein shown as being well adapted to the purpose is ovoidal, the axial openings a a' extending in opposite directions from its flattened sides and the opening in a direction lateral to the

said axially-aligned openings extending from the periphery of the ovoidal portion and represented by a^2 . The several openings a a' a^2 are conveniently provided with internal screw-threads for the purpose of attaching thereto inlet and discharge pipes.

The steam-inlet pipe B is provided with a centrally squared or polygonal portion b for convenience in turning the pipe to screw and unscrew it and with end portions, both exteriorly screw-threaded, the one b' being threaded to register with the threaded opening a of the chamber A, and the other b^2 being threaded and preferably slightly tapered for the attachment thereto of a pipe leading from the boiler. (Not shown herein.) The end b^2 , into which the steam under pressure from the boiler is admitted, is formed funnel-shaped, as shown at b^3 , and the opposite end, through which the steam is discharged into the combining-tube, is tapered, as shown at b^4 . When secured in position, the nozzle b^4 is intended to occupy a position about centrally within the chamber A.

What I call the "combining-tube" C is provided with an enlarged exteriorly-screw-threaded portion c , adapted to register with the threaded opening a' and be screwed therein into a position to bring the inner end c' of the combining-tube into proximity to the nozzle b^4 of the steam-inlet tube, but leaving a sufficient space between the nozzle and the end c' for the admission of the liquid to be forced or lifted into the combining-tube.

The liquid to be forced or lifted is fed from the source of supply, through the opening a^2 , into the chamber surrounding the adjacent ends of the steam-inlet pipe and the combining-tube within the chamber. The end c' of the combining-tube is made flaring to substantially correspond with the taper of the nozzle b^4 . Adjacent to and on the opposite side of the threaded portion c from the flaring end c' the combining-tube is provided with an enlarged portion c^2 , within which there is formed a narrow annular slit or chamber c^3 , in communication with the interior of the tube, and openings c^4 lead from said annular slit or chamber outwardly through the

end of the enlarged portion c^2 around the margin of the smaller prolonged portion c^5 of said combining-tube. The purpose of the annular slit or chamber and the openings leading through the end of the portion c^2 will be hereinafter more particularly referred to. The portion c^5 of the combining-tube projects for a suitable distance centrally within the discharge-tube D. The discharge-tube D has a greater interior diameter than the outside diameter of the tube portion c^5 , so that a free space is left between the exterior of the tube portion c^5 and the interior of the said discharge-tube. One end of the discharge-tube D is provided with an exterior screw-thread d , adapted to be screwed into the screw-threaded opening a' of the chamber A around the portion c^2 of the combining-tube, and the opposite end of the discharge-tube D is provided with a screw-thread d' , for convenience in attaching thereto a pipe or other device for the further passage of the forced liquid. A valve E, provided with a central opening e of such size as to allow the valve to slide freely on the portion c^5 of the combining-tube, has an enlarged annular portion e' faced to seat snugly against the perforated end of the portion c^2 of the combining-tube, and when so seated closes the several openings leading from the chamber c^3 therethrough. The reduced portion e^2 serves to prevent the valve from binding on the portion c^5 of the combining-tube as it slides back and forth thereon by affording the valve a more extended bearing. The outward movement of the valve away from the openings is conveniently determined by means of a stop F, projecting from the interior wall of the discharge-tube into a position to engage the valve. In the present instance such stop is formed by a screw inserted through the wall of the discharge-tube.

The operation of the ejector is as follows: Steam being admitted under full pressure into the steam-inlet tube issues in jet form from the nozzle b^4 of said tube into the combining-tube, and if the jet be more than can readily pass through the combining-tube into the discharge-tube the effect will be to pass into the slit or chamber c^3 , thence through the openings c^4 against the valve, sliding the latter back against the stop and allowing the steam to escape freely into the discharge-tube. This will prevent a backset of steam into the chamber A, a vacuum will be formed, and the liquid to be forced or lifted will be drawn into the end c' of the combining-tube into contact with the steam-jet and will be forced thereby through the combining-tube into the discharge-tube. As soon as the liquid is set in motion by the steam-jet its back-pressure around the combining-tube within the discharge-tube will again seat the valve E, closing the openings c^4 , and the ejector will continue to operate.

By this device I am enabled to use steam

enough to force water to a height greater than heretofore under a given steam-pressure and the device acts with great promptness.

It is evident that slight changes might be resorted to in the formation and arrangement of the several parts described without departing from the spirit and scope of my invention. Hence, I do not wish to limit myself strictly to the construction herein set forth; but

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

1. In an ejector, the combining-tube open at one end to receive a charge and inclosed at its opposite end within a discharge-pipe, the said combining-tube being provided with a steam-discharge opening intermediate of its receiving and discharging ends within said discharge-pipe, substantially as set forth.

2. In an ejector, the combination, with a combining-tube and means for injecting a fluid into its receiving end, of a discharge-pipe inclosing the discharge end of the said pipe, a discharge-opening intermediate of its receiving and discharging ends within the discharge-pipe, and a valve for opening and closing said intermediate discharge-opening, the said combining-tube being wholly closed intermediate of its receiving end and the portion inclosed by the discharge-pipe, whereby all of the fluid entering the receiving end of the combining-tube is discharged within the discharge-pipe which incloses the discharge end of the tube, substantially as set forth.

3. In an ejector, the combination, with a combining-tube and means for injecting a fluid into the receiving end of the tube, of a discharge-pipe inclosing the discharge end of the tube, a discharge-opening intermediate of the receiving and discharging ends of the tube and located within the discharge-pipe, and a valve supported on the tube and having an automatic movement to open and close the said intermediate discharge-opening, substantially as set forth.

4. In an ejector, the combination, with a combining-tube provided with a discharge-opening intermediate of its receiving and discharging ends, of a discharge-tube surrounding a portion of the combining-tube, the said discharge-opening being in communication with the discharge-tube, a valve for automatically opening and closing said discharge-opening, and a stop to limit the movement of the valve, substantially as set forth.

5. The combination, with the chamber for the reception of the liquid to be forced or lifted, the steam-inlet tube, and the combining-tube, having their adjacent ends in proximity within the chamber, the combining-tube forming a tight joint with the wall of the chamber, of a discharge-tube surrounding a portion of the combining-tube outside of the said chamber, the said combining-tube being provided outside of the chamber and within the discharge-tube with a discharge-opening intermediate of its receiving and discharging ends, and a

valve for opening and closing said discharge-opening, substantially as set forth.

6. The herein-described combining-tube for an ejector, the same being provided with an
5 annular slit or chamber intermediate of its ends and in communication with its interior, the said slit or chamber having openings lead-

ing therefrom through to the exterior of the tube, substantially as set forth.

LOUIS B. FULTON.

Witnesses:

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