(No Model.)

# E. CAPITAINE.

## FUEL INJECTOR FOR EXPLOSIVE ENGINES.

No. 408,461. Patented Aug. 6, 1889.

Fig. 1

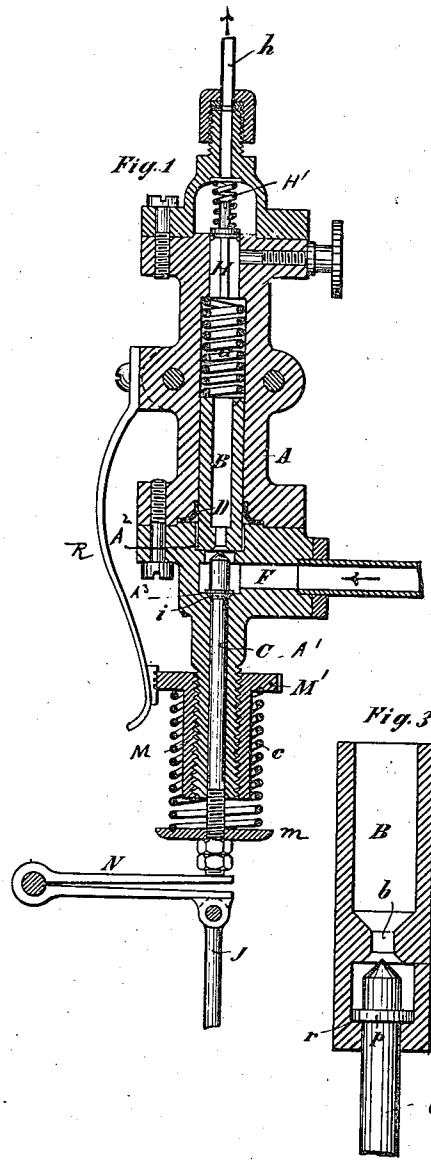



Fig. 2

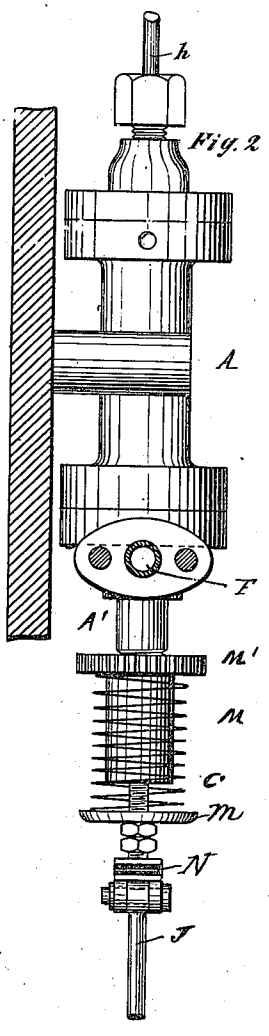



Fig. 3




Fig. 4

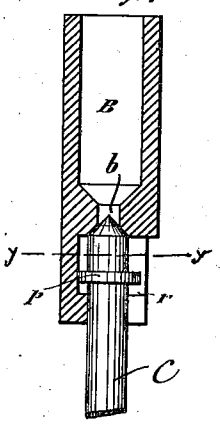
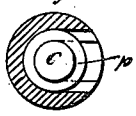



Fig. 5




Witnesses:
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# UNITED STATES PATENT OFFICE.

EMIL CAPITAINE, OF BERLIN, GERMANY.

## FUEL-INJECTOR FOR EXPLOSIVE ENGINES.

SPECIFICATION forming part of Letters Patent No. 408,461, dated August 6, 1889.

Application filed November 14, 1888. Serial No. 290,792. (No model.)

*To all whom it may concern:*

Be it known that I, EMIL CAPITAINE, a subject of the German Emperor, residing at Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Pumps for Liquids of Small Quantities and Quick Change of Lifting, (in brief, a fuel-injector for explosive engines,) of which the following is a specification.

This invention relates to a new and improved pump to be used for supplying small quantities of petroleum or other oil or like liquids to the atomizers of petroleum-engines.

The invention consists in the combination, with a cylinder, of a tubular piston working in the same and having a port in its lower end, of a rod mounted to move in the direction of the length of the piston and move said piston, the upper end of said rod being shaped to close the port in the lower end of the piston.

The invention also consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of my improved pump. Fig. 2 is a side view of the same. Figs. 3 and 4 are longitudinal sectional views of the pistons, showing a modification. Fig. 5 is a horizontal sectional view on the line *y y*, Fig. 4.

Similar letters of reference indicate corresponding parts.

The cylinder A contains the tubular piston B, open at the upper end and provided at its lower end with an aperture *b*, the bottom part of which is flared to form a seat for the beveled upper end of the spindle C, mounted to move longitudinally in the casing A′, connected with the cylinder A. The piston B can only descend to the shoulder $A^2$, and the spindle C can descend until its collar rests upon the shoulder $A^3$, the spindle being lowered more than the piston, so as to open the port *b*. The packing-ring D, held in the lower end of the cylinder, rests against the outer surface of the piston B. The spring *a* in the upper part of the cylinder bears on the upper part of the piston B and presses said piston downward. The valve H, pressed upon its seat by a spring H′, closes the top outlet-aperture of the cylinder. The pipe *h* serves to carry off the liquid elevated by the pump. The sleeve M, provided at its upper end with a flange M′, is screwed on the downwardly-projecting part of the casing A′, and is surrounded by a spring *c*, bearing against said flange and against a disk *m*, resting on nuts on the lower end of the spindle C. The lower end of the spindle C rests upon one shank of the forked spring-lever N, the other shank of which is connected with the operating-rod J. A spring R, secured on the cylinder A, is provided on its free end with a plate engaging the serrations of the flange M′ of the sleeve, and serves to prevent the sleeve from turning. The pipe F conducts the liquid to the cylinder. The liquid passes from the pipe F through the bottom opening *b*, the tubular piston B in the spindle C being lowered. When the rod J moves upward, the spindle C is moved upward and its conical end pressed against the seat formed in the bottom of the piston B, whereby the said piston is closed. The spindle C also presses the piston upward and compresses the spring *a*, and thereby the liquid in the upper part of the cylinder forces up the valve H and then passes up through the pipe *h*. When the rod J descends, the spring *c* presses down the spindle C, whereby the bottom of the piston is opened, permitting a fresh supply of liquid to pass into it, and so on.

The capacity of the pump can be regulated by adjusting the sleeve M in such a manner as to cause the spring *c* to exert a greater or less pressure. By tightening said spring the stroke of the piston is decreased and by slacking it it is increased. If desired, the spring *a* can be dispensed with and the tubular piston B provided at its lower end with an extension *r* for receiving the upper end of the spindle C, said spindle carrying a collar *p*, that rests on the bottom of said extension *r*. When the spindle C descends, the collar *p* pulls down the piston.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a pump, the combination, with a cyl-

inder, of a tubular piston having a port in its lower end and a rod movable in the direction of the length of the piston and serving to move said piston and close the port in the lower end of the same, substantially as set forth.

2. The combination, with a cylinder, of a tubular piston mounted to work in the same and provided with a port in its lower end, a longitudinally-movable rod for moving said piston and closing the port in the lower end of the same, and a spring pressing said spindle downward and a lever for pressing it upward, substantially as set forth.

3. The combination, with the cylinder A, of the tubular piston B, provided with the port *b* in its lower end, the spindle C, having its upper end shaped to close the port *b*, the adjustable sleeve M, the spring *c*, the plate *m* on the spindle C, and the lever N, acting on said spindle, substantially as set forth.

4. The combination, with the cylinder A, of the piston B, having the bottom port *b*, the spring *a*, and the spindle C, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EMIL CAPITAINE.

Witnesses:

CARL BORNGRAEBER,

BERNH. POERSCHMANN.