

(No Model.)

E. L. ZALINSKI.
METHOD OF REGULATING FIRING FLUID DELIVERY TO PNEUMATIC GUNS.
No. 430,101.

Patented June 10, 1890.

Fig. 1.

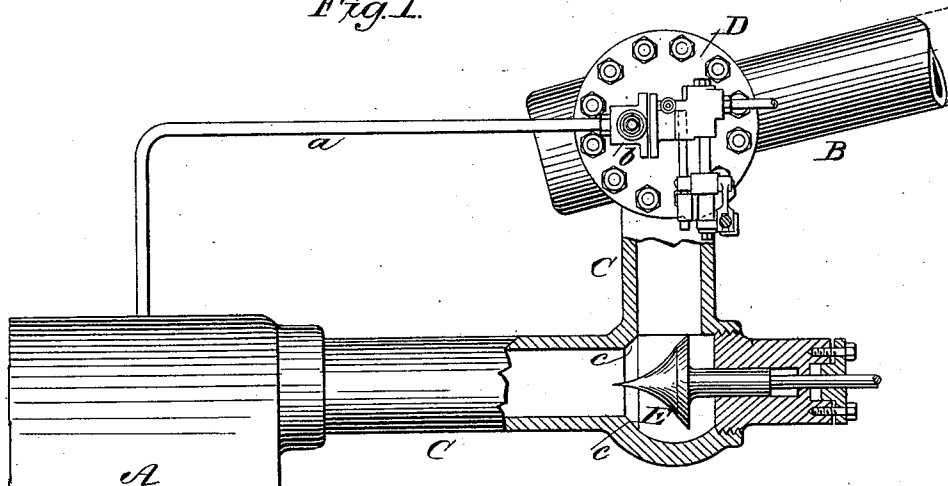
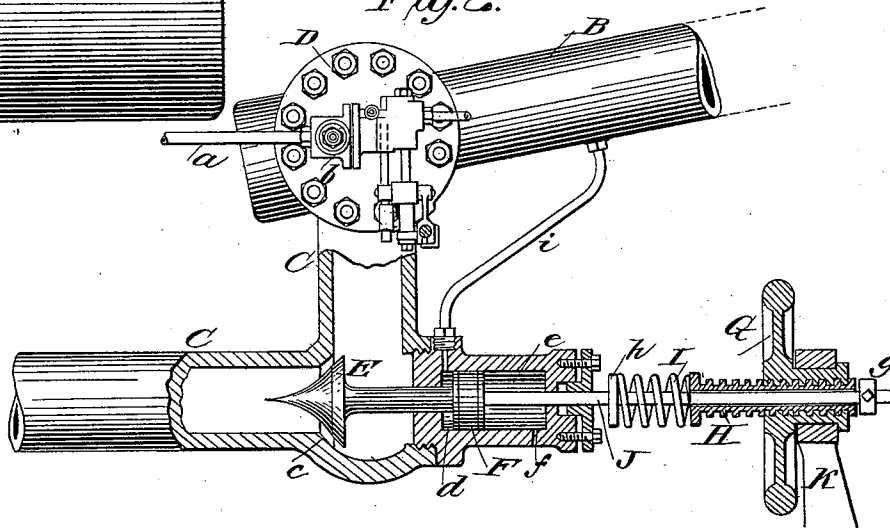


Fig. 2.



WITNESSES.

H. P. Parker.

J. R. Van Leamben Jr.

INVENTOR.

Edmund L. Zalinski

Chas. M. Forbes

ATTORNEY.

UNITED STATES PATENT OFFICE.

EDMUND L. ZALINSKI, OF FORT HAMILTON, NEW YORK.

METHOD OF REGULATING FIRING-FLUID DELIVERY TO PNEUMATIC GUNS.

SPECIFICATION forming part of Letters Patent No. 430,101, dated June 10, 1890.

Application filed December 11, 1888. Serial No. 293,301. (No model.)

To all whom it may concern:

Be it known that I, EDMUND L. ZALINSKI, a citizen of the United States, residing at Fort Hamilton, county of Kings, State of New York, have invented new and useful Improvements in the Method of Regulating Firing-Fluid Delivery to Pneumatic Guns, of which the following is a specification.

This invention relates to the delivery of compressed elastic fluid from the reservoir to the gun-barrel of a pneumatic gun in controlled quantities for determining the range of the projectile at a given angle of gun elevation. The variability of the firing-valve capacity has heretofore been limited within the scope attainable by the variable period of its opening; and the object of this invention is to extend the said variability by varying the capacity of the firing-valve at its maximum open position.

The invention therefore consists in throttling the firing-fluid passage or pipe controlled by the firing-valve and conducting from the compressed-fluid storage-reservoir to the gun-barrel by means of an adjustable throttle-valve adapted therefor.

The invention also consists in throttling the said passage or pipe variably during the period of firing-valve opening, namely: so as to admit a moderate charge of the firing-fluid at the initial opening of the firing-valve and the full normal charge after the inertia of the projectile has been partly overcome. The opening of the throttle-valve is retained by any suitable means at various points permanently or variably during the act of firing.

In order to enable others skilled in the art to which my invention appertains to understand and use the same, I will proceed to describe one form of apparatus by which the method herein may be carried into practice, and to point out in the appended claims that which I claim as new.

Referring to the accompanying drawings, Figure 1 is a side elevation of a part of the gun-barrel, the firing-valve casing, one form of throttle-valve applicable to the invention, and the reservoir of a pneumatic gun; and Fig. 2, a similar view comprising additional appliances to show one means of carrying out the method of variable throttling.

A is the firing-fluid reservoir, B the gun-

barrel, and C the connecting-pipe, of a pneumatic gun.

D represents the firing-valve casing in end view. The firing-valve may be any valve used in this class of guns. The valve controls the passage of air from the pipe C to the gun-barrel B in usual manner.

E, Fig. 1, is the throttle-valve for throttling the pipe C, and is operated and retained at any point by such form of mechanism as may be found suitable to hold it securely in position—as, for instance, a screw connected to or forming a part of the valve-stem.

The end of the valve E exposed to the inflowing current is preferably constructed of cone form, whereby the force of the fluid is received upon inclined surfaces and divided, and also whereby the different adjusted distances of the valve from its seat *c* may the more gradually govern its amount of opening at different points. The valve E may be entirely closed upon said seat *c* to serve the function of a stop-valve when the gun is out of action.

F, Fig. 2, is an actuating-piston connected to the valve E to thrust it to the maximum opening, to which it may be limited for throttling when pressure is applied in chamber *d*, the chamber *e* being free from pressure by the opening *f*.

G is an adjusting-wheel longitudinally stationary in the bearing K, determining the position of the sleeve H, to which the wheel is threaded, and I a spring of sufficient strength to resist the pressure against the valve E of the fluid-current in the pipe C. The valve-stem J slides loose in the sleeve H, and is held longitudinally therein (subject to movement on compression of the spring I) by the collars *g* and *h* affixed thereto.

Pressure is applied to chamber *d* through pipe *i* automatically, when the usual gas-check at the butt of the projectile in the barrel B has reached the point of said pipe's connection. This admits the firing-fluid pressure to the piston F, and, overcoming the spring I, forces open the throttle-valve E from a partly-open position, as indicated in Fig. 2, to the extent of the spring compression, or the point of maximum opening given, which latter may be adjusted by the screw H. The firing-fluid will therefore be applied moder-

ately to the projectile at its initial movement, and the full force of said fluid be imparted gradually, obviating the danger arising from a too sudden blow of pressure upon the projectile when highly-sensitive explosives are used in the latter for subsequent explosion.

It is to be understood that I do not confine myself to the specific means shown for carrying the methods into practice, said means being reserved for the subject of future applications, and whereas the methods herein may be accomplished by various forms of throttling-valves or valve-operating appliances; but

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

1. The method of controlling the delivering capacity of a pneumatic firing-valve, which consists in throttling the passage leading to said valve, and opening the throttle automatically by means of gas-pressure from that side of the firing-valve which is toward the gun after said firing-valve is open.

2. The method of controlling the gas-supply to the firing-valve of a pneumatic gun,

which consists in reducing the supply of gas to the firing-valve until said valve is fully open, then increasing the gas-supply while the firing-valve remains open by means of a pressure from the gun-barrel, substantially as described.

3. The method of regulating firing-fluid delivery to pneumatic guns, consisting of timing the period of said fluid-delivery by means of an automatic pressure-actuated firing-valve, determining the volume of said fluid delivered during said period by throttling the passage controlled by said firing-valve, and partly (or wholly) releasing the throttling action during the said period of delivery by applying an opening actuating-pressure of the firing-fluid to a throttling-valve intercepting the said passage at a period subsequent to the initial movement of the projectile, as by a pipe connecting to an intermediate point of the gun-barrel.

EDMUND L. ZALINSKI.

Witnesses:

CHAS. W. FORBES,
JOHN A. ELLIS.