(No Model.)

E. STERN.

METHOD OF CLOSING RECEIVERS CHARGED WITH COMPRESSED OR LIQUEFIED GASES.

No. 528,820. Patented Nov. 6, 1894.

Fig.1. *Fig.4.* *Fig.5.* *Fig.6.*

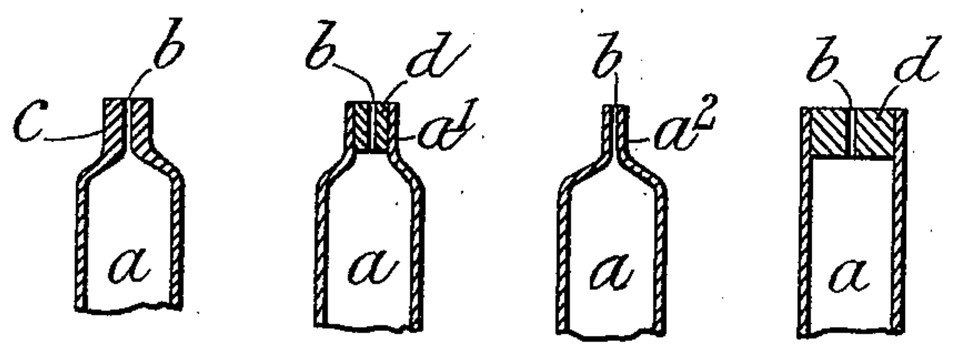
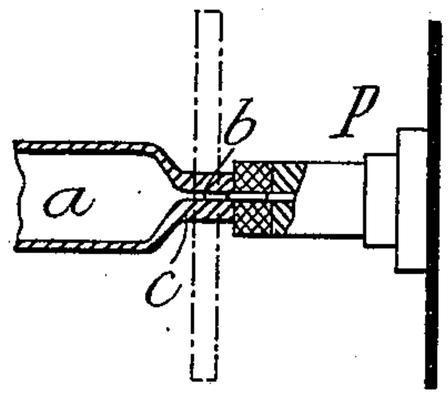


Fig.2.

Fig.3.



Witnesses:-
Walter E. Allen.
S. Allen.

Inventor:-
Emile Stern.
By Knight Bros.
Attorneys.

UNITED STATES PATENT OFFICE.

EMILE STERN, OF PARIS, FRANCE.

METHOD OF CLOSING RECEIVERS CHARGED WITH COMPRESSED OR LIQUEFIED GASES.

SPECIFICATION forming part of Letters Patent No. 528,820, dated November 6, 1894.

Application filed December 28, 1893. Serial No. 495,004. (No model.) Patented in Switzerland December 9, 1893, No. 7,823; in England December 15, 1893, No. 24,165, and in Germany July 2, 1894, No. 75,907.

To all whom it may concern:

Be it known that I, EMILE STERN, a subject of the Emperor of Austria-Hungary, residing at Paris, in the Republic of France, have invented a new Method of Closing Receivers Charged with Compressed or Liquefied Gases, (patented in Switzerland December 9, 1893, No. 7,823; in England December 15, 1893, No. 24,165, and in Germany July 2, 1894, No. 75,907,) of which the following is a specification.

Hitherto, for the purpose of storing or transporting compressed or liquefied gases under great internal pressure, receivers have been employed which are closed by a valve by means of which these receivers were charged or emptied. The manufacture of these valve closed receivers is expensive in proportion as the pressure of the gas is increased, which explains the very high prices charged for receivers to contain these compressed gases.

My invention has for its object a very simple process for effecting the closing of metallic receivers charged with compressed or liquefied gases under great pressure without the use of any kind of valve.

In carrying my invention into effect it is necessary that the filling neck or nozzle of the receiver be such that the metal around the minute inlet orifice be susceptible of being compressed and of retaining by itself such compression, so that a closure shall be effected having an efficiency capable of resisting the greatest internal pressure. In this way receivers of all dimensions and forms can be closed hermetically.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 represents the upper parts of a metal receiver having the neck or nozzle of stouter material than that forming the body thereof and with the filling orifice open. Fig. 2 represents the same receiver after the filling orifice has been closed. Fig. 3 shows the same receiver in the act of being filled. Fig. 4 represents a receiver in which the neck or nozzle is of like thickness to the body of the same, but in which a centrally perforated metal piece is inserted. Fig. 5 represents a metal receiver in which the neck or nozzle is of the same thickness as the body but is so contracted as to form the required small inlet passage without the insertion of a perforated metal piece therein, and Fig. 6 represents a cylindrical receiver provided at one end with a centrally perforated metal piece to form the required small inlet orifice.

In all cases it is necessary that the receiver *a* be provided with an inlet opening *b* of small diameter. This inlet orifice will be formed by means of the filling neck or nozzle *c* itself of the receiver, or by means of a piece arranged for this purpose and inserted in the neck or nozzle or connected to the receiver in any convenient manner and place. When the receiver has to be filled it will be applied in any convenient way to the charging apparatus P, as indicated at Fig. 3.

In the accompanying drawings the formation of the inlet orifice is produced sometimes by contracting directly the sides a^2 of the neck or nozzle of the receiver *a* as shown at Fig. 5, sometimes by thickening the sides *c* of the neck or nozzle as shown at Fig. 1, or again, as shown at Figs. 4 and 6, the neck or nozzle of the receiver is furnished with a piece *d* of any suitable compressible material having the inlet or charging orifice *b* formed therein. The object, in each form, is to have the part through which the opening or orifice is made, of material capable of being compressed to close the opening or orifice and of maintaining said closure against the internal pressure of the gas.

A receiver of this kind, when applied to the charging apparatus P and charged by it, has the inlet orifice closed by compressing the neck or nozzle of the receiver in which the inlet orifice is formed by means of any appropriate tool or instrument indicated by dotted lines in Fig. 3. This tool or instrument may be grooved and produce in this case a closing, such as that shown in Fig. 2, with corrugations or ribs around the neck or nozzle, which may be in any desired direction or form. The tool used may also produce a torsional movement and have in this case an action quite as effective.

The method of closing above described does not necessitate in any way a large development of force or of labor, it being understood that the dimensions or diameter of the inlet orifice may be made so small that the resistance of the compressed gas, which is there

produced during the closing, is quite insignificant. If, for example, there is in the receiver a pressure of two hundred and fifty atmospheres, and if the inlet orifice has a diameter of one millimeter, there will be, when closing it, a resistance of only two and one-half kilograms.

The inlet orifice closed in the manner above described, presents, without any extraneous aid, against an opening force coming from the interior, a resistance which, according to experiments made, is found to be much greater than the pressure of the compressed gases, so that in this manner a complete and absolute closure is obtained. Thus, as I have already indicated, this kind of closing is applicable to all kinds of high pressure receivers and renders possible the selling, at a low price and for all purposes, any kind of compressed or liquefied gases in large or small quantities and inclosed in receivers which are pierced at the moment of being used by any means, the small receivers consequently becoming useless.

Compressed gas receivers or cartridges may be made by my process for guns as well as for fire extinguishers, or for any other purpose where compressed gases are employed.

Having fully described my invention, what I desire to claim and secure by Letters Patent is—

The process of confining compressed or liquefied gases in metallic receivers, which consists in providing a metallic receiver capable of withstanding great internal pressure and having an opening of very small cross-section with the part through which said opening is made, of material capable of being compressed to close the opening and of maintaining said closure under the internal pressure of the gas, then applying said receiver to the charging apparatus and introducing the desired quantity of gas therein, then closing the minute opening by compressing the material around it and while the pressure of the gas is maintained by the apparatus; substantially as described.

EMILE STERN.

Witnesses:

CLAUDE K. MILLS,

23 *Southampton Buildings, London, Patent Agent.*

H. SEYMOUR MILLS,

23 *Southampton Buildings, London.*