

**THE GIFFARD GUN.**

There is much talk just now about a gun invented by Mr. Paul Giffard, in which liquefied gas is used, and which may possibly make a new revolution in munitions of war. We have consequently thought that it would prove interesting to our readers if we gave a description of this weapon, from the inventor's patents. The charge of liquefied gas, which replaces powder, is inclosed in a steel capsule, *f*, made fast to the barrel and screwed at *m* into the butt. This capsule terminates behind in a valve, *g*, pressed by a spring and the gas against a hard rubber seat, *h*, and provided with a rod, *j*, that traverses, at *j'*, a tight packing, *l*, of soft leather. A rubber packing, *l*, secures, on another hand, the tightness of the threading, *m*.

As soon as the trigger is pressed, the hammer strikes the extremity, *p*, of the rod, *j*, and, through its impact, thrusts the valve, *g*, to a distance regulated by the stop, *e*. There then escapes through *c* a certain quantity of liquefied gas, which expels the projectile that has previously been introduced into the barrel through a sort of cock, *d*. As for the valve, *g*, that is at once closed by the pressure of the liquid.

According to Mr. Giffard, the reservoir *f* might, with liquefied carbonic acid, serve for from 300 to 500 consecutive shots, "owing to the formidable power that it develops on passing from zero to 300°," and further on, in another passage of his patent, he adds that "the mild and gradual action of the liquefied gas upon the projectile, with a previous expansion of from

**Electrolysis of the Muscles.**

In a recent number of the *Bulletin de la Societe Belge d'Electriciens*, Dr. G. Weiss contributes a brief account of some interesting electro-medical investigations undertaken by him. That electrolytic effects take place at the electrodes where an electric current enters and leaves the human body is, says Dr. Weiss, universally admitted; but is the electrolytic action confined to those points? Dr. Weiss then points out how, when intermittent currents of the same size are sent along the gastronemian muscles of a frog's leg, the contractions rapidly cease, and no amount of rest restores the muscles to their primitive condition. On the other hand, the duration of an alternating current does not perceptibly affect the contractions. This phenomenon points, therefore, to electrolysis of the muscle along the entire path of the current. Dr. Weiss then tested this theory as follows: He took two vessels containing a 1 per cent solution of chloride of sodium, connected them by a siphon filled with the same liquid, and passed a given current from vessel to vessel, using platinum electrodes. The experiment was then repeated with the two hind legs of a frog as connecting piece. The E. M. F. of polarization was considerably greater in the latter case than in the former. Dr. Weiss is of opinion that an electric current traversing a muscle gives rise along the whole length of its path to chemical decompositions, and that the products of these give rise in their turn to powerful secondary actions upon the substance of

a mere pinhole puncture in the right arm and right breast. A headman died within an hour and a quarter after being shot; a woman died during the time that she was carried a distance of a hundred paces; others, in varying spaces of time up to a hundred hours. The activity of the poison seemed to depend on its freshness. The treatment adopted was to administer an emetic, to suck the wound, syringe it, and inject a strong solution of carbonate of ammonia. This carbonate of ammonia injection seems to have proved a wonderful antidote if it could be administered promptly.

One of the poisons with which the weapons are smeared is a dark substance like pitch. According to the native women, it is prepared from a local species of arum. Its smell, when fresh, recalls the old blister plaster. It is strong enough to kill elephants. This poison is not permitted to be prepared in the village. It is manufactured and smeared on the arrows in the bush. All these phenomena are certainly wonderful and unexplainable; but, for that matter, there is hardly any action taking place in the living body of which we can form any satisfactory conception of the true nature.—*Popular Science News.*

**Disinfecting Candles.**

Of late, owing to its proved germicidal power, the vapor of bromine has come to the front as a disinfectant. According to *Industries*, the bromine is converted into the organic bromine compound dibromonaphthalene, an almost inodorous substance, and this

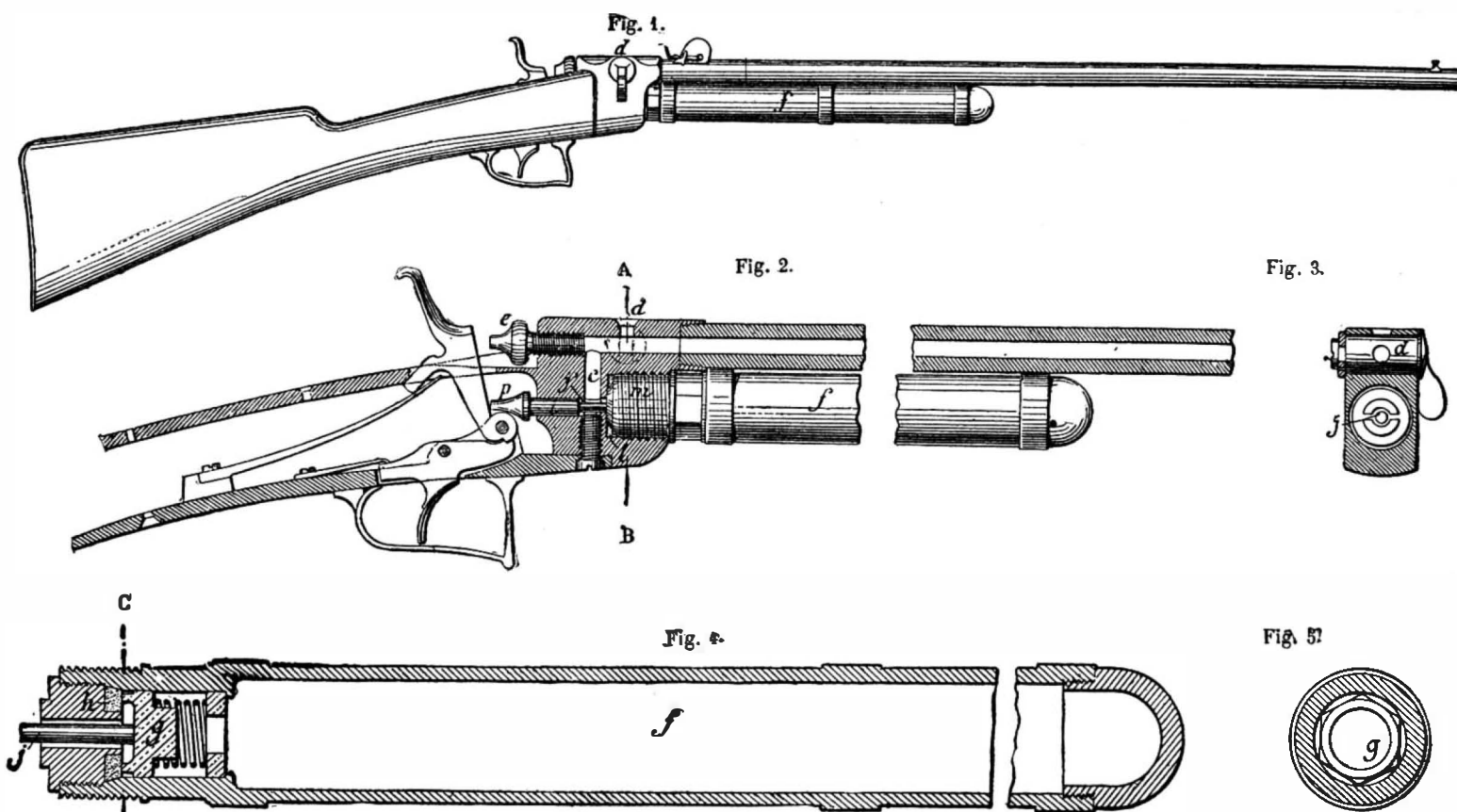


Fig. 1.—Side Elevation. Fig. 2.—Longitudinal Section. Fig. 3.—Cross Section at A B. Fig. 4.—Section of the Carbonic Acid Receiver. Fig. 5.—Section at C D.

**THE NEW CARBONIC ACID GUN OF M. GIFFARD.**

100° to 300°, brings about ballistic effects that are essentially new."

These considerations do not appear to us very clear. We do not see how, in this application of liquefied gases, temperatures of 100° to 300° that Mr. Giffard speaks of would be produced. In the capsule, *f*, we see merely carbonic acid at a temperature of 30° at the most, that is to say, under a pressure of about ten atmospheres. Now, although we do not know exactly the total work necessary to liquefy one gramme of carbonic acid, we can nevertheless assert that the total potential energy of one gramme of liquid carbonic acid ought not to exceed one-thirtieth of a kilogramme. That of one gramme of gunpowder is about 200 kilogrammes, of which we can scarcely utilize, at the most, more than 1/10, or 90 kilogrammes. We do not see, then, *a priori*, how the liquid carbonic acid can exert a power greater than that of ordinary powder, as Mr. Giffard supposes, and it is permissible to have a little doubt upon this subject, while at the same time wishing the invention a most brilliant success.

Mr. Giffard proposes also, for blasting in mines, to replace the ordinary cartridges by capsules of liquid carbonic acid, that would be exploded by the detonation of an explosive cartridge in the interior of the capsule. It seems as if these capsules might, in mines subject to the presence of fire damp, offer guarantees of security that are worthy of attracting attention.—*Revue Industrielle.*

A FLOATING saw mill is in use in Florence, Wis. The boat is 40 x 80 feet in size, and draws 17 inches of water. The mill hands live aboard, and the boat is moved along the river to wherever there is a fine lot of timber near the banks.

the muscles, which are rapidly attacked and destroyed. Microscopic examinations showed that the entire structure of a muscle was gradually altered by the passage of a current. Dr. Weiss then poured a strongly saline solution of gelatine, colored with well neutralized turnsol, into a U tube, and when the gelatine had solidified, he poured in water colored in a similar manner. The turnsol not only changed color at the platinum electrodes, but also at surface, separating the gelatine and the water. With albuminous water the albumen was coagulated at the positive, and completely dissolved at the negative, surface of separation.

**Effects of Poisons.**

One of the most mysterious of physiological phenomena is the influence of minute quantities of certain substances when introduced into the circulatory system. The wonderful effect of vaccination is familiar to all, and even more remarkable are the terrible results produced by a mere trace of saliva from a hydrophobic animal—a poison which, apparently, remains dormant in the body for days or weeks, and then suddenly springs into fatal activity. Similar effects follow from inoculation with the venom of serpents, but in such cases the poisonous effects occur almost immediately.

Even more powerful are the poisons used by the natives of Africa to render fatal the wounds made by their arrows, as described by Mr. Stanley in his recent work on Africa. These, when fresh, are of most extraordinary power. Faintness, palpitation of the heart, nausea, pallor, and beads of perspiration break out over the body with extraordinary promptness, and death ensues. One man died within one minute from

is dissolved in any desired quantity in the fat or wax, before it is run into the moulds. The result is a candle or night light which in shape and appearance resembles an ordinary candle or night light, but differs from it in this respect, that when burnt it produces free bromine vapor, at the same time emitting the usual amount of light. The night lights are put up in various strengths, so as to give little or much bromine as required, and they are consequently suitable for disinfecting either a sick room, a closet, or any inclosed space where sulphureted hydrogen, mercaptan, or disease germs exist. The liberation of the bromine is easily explained, the halogen compound being first converted into hydrogen bromide, which at the temperature of the flame, and in presence of a large excess of atmospheric oxygen, is converted into free bromine and water. The use of the night lights and candles will undoubtedly prove an efficient means of preventing the spread of the malignant germs producing small-pox, scarlet fever, and other infectious diseases, and should, owing to the ease with which they may be utilized, come into general use in the wards of fever hospitals and in private houses as a substitute for those disinfectants which, on account of their being non-volatile, place very little or no obstacle in the way of the spread of disease germs.

Hygienic iodine night lights and candles which, on burning, liberate iodine vapor in any required quantity, in the same manner as the bromine night lights liberate bromine, and which are made in a similar way, promise to render considerable service in the treatment of throat and chest complaints. They are, in fact, the first means introduced of successfully dispersing a gentle and regular flow of the vapor of iodine through the air of a room.