

of the end of the valve spindle. When it is desired to work the hammer by hand, the screw securing *d* to *e*, is loosed, so that the former can be moved at will, and *f* is screwed down by the handle, *g*, to the lower end of the slotted link. As *f* is then immediately between *k*, and the valve, its motion (which is just as great angularly as before, being still derived from the tap), has no appreciable effect on the valve, which is now entirely under the control of the hand lever, *d*.

The maximum stroke of this hammer is 280 mm. (11.02 in.,) and the weight of its piston and rod, &c., 70 kilogrammes (154 lb.) It is worked at a pressure of 75 lb. per square inch, and, as has been already mentioned, it is double acting, the steam being admitted above the piston to intensify the blow. The gear for working the distribution valve is of steel. The weight of the whole machine is 2200 kilos, or very nearly 44 cwt.—*Engineering*.

### THE CANADIAN RIFLE.

The Canadian rifle, known as the Duval-Macnaughten, has been tried at Wimbledon, and has elicited marked expressions of praise from the metropolitan press. The *London Post* thus refers to it, and we select this opinion from a number of others:—

During the afternoon a trial was made at the 900 yards range with a new Canadian rifle, named the Duval-Macnaughten. This weapon is constructed on the hinge-block principle, and somewhat resembles the Henry and Martini-Henry in appearance. Its action, however, differs considerably from both these, and externally the principal difference is that there is no long lever below, the only lever visible being one which rises from the side of the lock, in much the same position as that occupied by the hammer of the Snider rifle. The springs of the lock are all upon the old principle, and if any were out of order they could readily be repaired by a common blacksmith; they are, moreover, of considerable strength, and the objectionable spiral spring, one of the principal faults of the Martini-Henry, does not find a place in the lock. The extractor is of the most simple and ingenious character, being worked by a sort of double action by which a pressure outwards is slowly given during the act of cocking the rifle against the cartridge case, followed by rapid stroke against the angle of the extractor, which throws out the case at once. The facility of this action was well demonstrated by means of a tight cartridge case which, when a rapid pressure was applied to the hammer, was thrown out with a jerk that sent it a good two yards behind the manipulator. The manipulation of the gun is extremely simple, and a man lying down can load, fire, throw out the case and load again without altering the position of the rifle, a great advantage when compared with the Martini-Henry, from which the cartridge cannot be extracted without using the lever below the stock, thus rendering it necessary to lift up the gun or turn it to one side. By taking out a single screw a plate on the side of the breech-shoe can be taken off, exposing the whole mechanism of the lock, which can thus be examined, and, if needful, cleaned, while if during such an operation it became necessary to use the weapon, the plate might be dropped into the pouch, and the rifle loaded and fired without it. The hinge lock of the breech is so grooved out that the barrel can be inspected or cleaned out from the breech, so that the soldier or sportsman can clean out his rifle, both breech and barrel, without for one moment losing its value as an effective weapon. The rifle is entirely worked by the hammer and trigger, and 30 shots a minute can be readily got off from it by skilful hands. It can be half-cocked when necessary, and the barrel is constructed so as to use the ammunition supplied for the Martini-Henry. The barrel is also said to be of an improved construction, and to possess a considerably lower trajectory than the Henry barrel. It is rifled with seven shallow segmental grooves, and the recoil of the weapon is very slight compared to that of the Martini-Henry. It is said that the Canadian Government are about to supply the forces of the Dominion with this rifle, and if so they will have men armed with probably the most serviceable weapon yet provided for troops."

### STREET LIGHTING IN PARIS.

M. Maxime du Camp, in an able article in the *Revue des Deux Mondes*, gives some interesting particulars of the street-lighting of Paris. In olden times all good citizens were commanded in moments of trouble — "which, adds the author, rather quaintly, 'were of more frequent occurrence on than in our day' — to put a light in their windows and a pail of water on the threshold of their doors. These precautions were intended to prevent fires and nocturnal attacks. The first attempt at street-lighting was made in 1558, when by an ordinance of the Parliament of Paris, a *falot* was placed at the corner of every street, and in the case of very long streets, an additional one in the middle. This instrument resembled a gibbet, having suspended from it by a chain a heavy iron bowl filled with resin and tow. The *falot* did not illuminate the city very brilliantly, but they at any rate displayed a ruddy flame, which served to "guide the wanderer's steps aright;" but the Wars of the League soon put an end to them, and for the space of a century Paris was left in utter darkness. Louis the Fourteenth, who, by the way, took for his device a rising sun, ordered Nicolas de Reynie, the founder of the city police, to put an end to this state of things, and gave him as a word of command three substantives — cleanliness, light, safety. Very little time was lost, and in 1667 the edict was published prescribing the establishment of lanterns. These were simply candles, enclosed in a glass frame, and suspended by cords at the height of the first storey of the houses. Lanterns were, in 1745, succeeded by the oil lamps called *reverberes*, which remained in use till within the memory of many living persons.

Philippe Le Bon—the inventor of gas—met with a tragical fate. On the day of the coronation of the first Napoleon the unfortunate inventor was assassinated, it is said, in mistake for the emperor. Three years before this, in 1801, he had exhibited this wonderful discovery in public, but what is most remarkable—although he had shown the quality of light that he could produce either from coal or wood—the chief point which struck the minister of the First Consul was, that the distillation of wood produced cheap tar. To Philippe Le Bon was therefore granted the concession of part of the forest of Rouvray for the purpose of making tar.

The widow of Le Bon endeavored to carry out the plans of her deceased husband, but on her death the patent was suffered to lapse by her family, and was taken up by a German naturalised in England named Winsor. It was one more instance of the *sic vos non vobis*, with which the history of inventions is filled. Curiously enough the French were slow to appreciate the advantages of gas. It was not till the year 1830 that the first street in Paris, the Rue de la Paix, was lighted by gas in the teeth of a violent opposition. Every misfortune was attributed to the unpopular light. The nature of the calamity did not matter much—the death of a tree or the arrival of the cholera—it was all put down to the gas.

For some time the lighting of Paris was in the hands of several companies, but by degrees these have been fused into one great corporation, possessing ten great factories in and around the city. The Parisians, who found it so difficult to accustom themselves to the new light, are now great and increasing consumers of gas. In 1855 they consumed 53 millions, in 1865 they used 155 million-, and in 1872 no less than 196 millions of cubic yards of gas. This vast monopoly is charged heavily by the municipality of Paris, in various ingenious ways. To begin with, the company pays the city 200,000 francs per annum for the rent of the ground occupied by its pipes, and, in addition, reimburses all costs of paving, &c. In 1869 these expenses reached 179,667 francs, and are estimated at 100,000 francs in the municipal budget for 1873. It is true that the company pays no octroi duty on coal, but, on the other hand, pays a fixed duty of 2 centimes on every cubic metre (39½ inches) of gas manufactured. On this account alone the company paid 2,508,953 francs in 1872, and was also obliged to pay to the city a proportion of its profits, amounting to 5 millions of francs. The good city of Paris thus received from the gas company in 1872 no less than 7,708,91 francs, or £308,358 2s. 6d. sterling. This is truly a tremendous tax upon light.

It is always curious to investigate the meaning of the word progress as used by a distinguished foreigner. M. du Camp observes that "gas enters every day more and more into our domestic habits—before a hundred years are over, the smallest