

and a powerful incentive to renewed effort. Nos. 1, 2, 3, 4, 5 and 6 are original designs made from 25 dots arranged in 5 rows of 5, the interlacing of the double lines indicates considerable fancy and skill combined with inventive power. Nos. 7, 8, 9, 10 and 12 are excellent and would make very pretty designs for fancy work, and for japanning. These designs were invented by boys attending the McGill Model School in this city, the oldest of whom is not over 14, and many like whom, we are confident, may be found in our public schools capable of producing similar results, from similar training.

CABMENS' RESTS.

In England and Scotland people seem to have suffered so much and so continually from the only sometimes ceasing rain that they have, at last, in very pity, been constrained to erect shelters at frequent intervals, in their large towns for cabmen. Cabmen, out at all hours of the day and night, in all weathers must undoubtedly suffer occasionally great bodily hardship. Cabmen have, moreover, in spite of these reasons for surliness and bad-temper, risen much of late in the scale of public opinion, and this mark of public favour cannot but have a further good effect upon them. Our readers will see clearly by our illustration on page 128 what the shelter consists of and will agree with us that a cup of warm coffee in such a place is better both for the Cabman and the public than a dram at the nearest bar. We are of opinion that a few shelters similar to these might with advantage be sprinkled about our Canadian towns and cities, when, in the winter with the thermometer so low as we have it sometimes, they would prove welcome havens to many besides Cabmen, and prevent many painful cases of frost-bite.

FIRE-BRIGADE SERVICE AT CONSTANTINOPLE.

Constantinople looks well at a distance, its high minarets, serais and cupolas alone show and afford a strange and pleasing view, but the interior is quite a different affair. The streets are narrow and without names, and the houses, for the most part wooden, are not numbered, the streets, moreover, are not lighted at night. Under these circumstances and with the lack of system which prevails it may be imagined that the fires, which are of frequent occurrence, are likely to spread rapidly and widely. However, with the customary Turkish indifference there seems to be a plentiful lack of proper means of extinguishing conflagrations. The touloumbadgi, as the fireman are called, never hurry to a fire, and when they arrive there with their pumps on their shoulders they often refuse to go to work until they are handsomely paid in advance. When, however, they do get to work the noise and fuss is indescribable, and the effect in an inverse ratio to the fuss. This state of affairs is said to be now passing away. The Emperor of Russia has sent to Constantinople a company of firemen who are to reorganize or rather organize the entire service. This kindness may possibly be dictated by a desire on the part of Russia to preserve as much as possible of the ancient capital for itself whenever the "manifest destiny" of Southern Europe may be worked out.

THE NEW FRENCH MILITARY RIFLE.

Through the courtesy of a Paris correspondent, says the *Scientific American*, we have lately obtained tracings of the official drawings of the new gun which a board of officers, under the presidency of Marshal Canrobert, adopted, on the 13th of August last, as the weapon with which the army is to be provided. Out of the various designs submitted to the examiners, it appears that but two were favourably regarded. One known as the Beaumont, the invention of Hollander, found support from four of the eight members of the board, while the remaining half advocated the Gras gun, a French invention. The casting vote of the president, probably influenced somewhat by a patriotic feeling, decided the question in favour of the Frenchman, and so the weapon of which Captain Gras is the reputed inventor is that of the French army of the present future. We give an engraving of the Beaumont gun, and also illustrations of the Gras arm, prepared from the tracings above referred to, to enable the reader to draw his own comparison. In the Beaumont (Fig. 1), the spring A, is contained in the lever of the movable breech piece, and its longer branch exercises a pressure in the rear of the needle B. The dog C, has beneath its lower forward portion a helicoidal projection, which at the firing, lodges in a co-respondering recess in the bolt B. The rotation thus impressed upon the latter causes a pressure against each other of the spiral surfaces, and consequently, the recoil of the dog and needle sufficient to bend the spring. All the movable portion is then drawn to the rear, so as to expose the end of the spent cartridge, in order to remove the same, and to introduce a new one. This done, the movable part is brought forward until the stop on the bottom of the dog takes against the trigger catch at D. The breech lever, which has hitherto been in a horizontal position, is then turned upward, closing the mechanism, when the parts are as shown in our illustration, and the weapon is ready to fire. From this arm the Gras gun, represented in Figs. 2 and 3—section in the latter—will be found to present much material difference. Fig. 2 shows the position of parts as the cartridge is being extracted, and Fig. 3 the mechanism just before it is closed together for firing. A, is the movable breech piece operated by the lever B. C, is the dog, at the end of which is a button, to which the rod D, of the firing pin E, is attached. F, is the coiled spring, which throws the pin forward. For loading the gun, the parts are drawn back as shown in Fig. 2. The cartridge is inserted, and the bolt A, by the lever B, is drawn forward. While this is being done, a stop G, enters a cam groove H, in the side of the bolt A, so that the latter is forced to turn as it is brought forward. In Fig. 3, it will be noticed that the notch on the dog C, is almost in contact with the spring stop I, governed by the trigger. By pulling on the latter, this stop is withdrawn, and the needle is thrown forward by its spring, striking and exploding the cartridge. At J, is the extractor, the part containing which, though drawn back, does not turn with the movable breech, so that the spring hook always grasps the rim of the cartridge case from above. With this gun, it is stated that forty-five shots can be fired in three minutes effective at a range of 5,120 ft. to 5,440 ft.

BROCKLEBANK'S PATENT RAILWAY COUPLING.

Railway couplings are a very favourite field for inventors, and there is no doubt but that a large reward awaits the man who shall devise a coupling, which shall be safe, strong and capable of being worked without requiring the presence of a porter between the carriages. We illustrate on page 120, from the *Engineer*, one of the latest improvements in this line. It will be seen that the two stirrup-hooks are so arranged that whenever two vehicles are brought together one or other hook must automatically enter a stirrup and so unite the carriages. Several schemes nearly similar have been proposed at various times, but they are all open to the objection that the coupling cannot be tightened up. This difficulty Mr. Brocklebank gets over by putting a right and left-handed screw on the tie-bar, on this works a box screw, square outside, and on this square is fitted a small spiked-wheel driven by a chain and second wheel placed at the side of the carriage and worked by a handle, as shown, by this means, while the draw-bar is free to move under the pull of the engine, the draw-wheel, which can slide in the square, is always at rest. To uncouple it is

THIS POWDER.—A French journal gives the following method of preparing tin for tinning brass, copper, and iron.—Melt the metal in a crucible which has previously been slightly warmed, and at the moment the metal begins to set and when it is very brittle, pound it up rapidly, and when quite cold pass it through a sieve to remove any large particles that may remain.