There is absolutely no shock. The shell is projected by the rotary motion of a revolving carriage, which begins with a slow motion, gradually increasing in rapidity. There is, therefore, no shock or jar until after the projectile has left the gun and come in contact with some object. The four shells may be discharged in rapid succession, and the trajectory of each being practially identical, each successive shot will add to the destruction done by the preceding one. One peculiarity of the gun—or engine, as it might perhaps more properly be called—is its comparative noiselessness. There being no expansion of gases, and no vacuum, there is no report of any kind, the only sound being the whiz of the shell as it passes through the air. There is neither flash nor smoke, report nor recoil, and there is nothing to apprise an enemy of the whereabouts of the gun, and the destroyer might come in the midst of an enemy unseen and unheard.

The whole apparatus is set, as will be seen, upon a turntable, so that the gun can be trained in any desired direction.

The carriers are so arranged as to fly upwards at the instant of discharge, and thus counteract the centripetal tendency of the curvilinear trajectory. The initial velocity is, of course, limited by the tensile strength of the steel firing chambers. A simple calculation will show that to secure initial velocity of 2,000 feet a second, would require a wheel having a diameter at the point where the shells are placed, of 10 feet, and revolving 4,000 times in a minute.

There would seem to be no objections of a theoretical character to make a gun of this description, and it is to be hoped the inventor may have an early opportunity of making such practical trials of it as may furnish the necessary data to determine its efficiency.—*Manufacturer and Builder.*

EXTEMPORIZED SCAFFOLDING IN CANADA.

BY OWEN B. MAGINNIS.

Builders throughout the country in their daily practice, find it necessary to erect temporary scaffolding, and in doing so usually employ scrap-stuff or some of the material they intend using in the building. These scaffolds require to be handy, take little time in constructing, and must at the same time be strong and suitable for safely sustaining men and material. With a view to assist builders to a rapidly formed system of scaffolding the following is submitted :—

The handiest, though not always the most applicable form, is the bracket scaffold, which consists of a number of permanently framed timber brackets, placed on a line, at a convenient distance apart, on which to rest the planks. Each bracket measures about 4 ft. by 4 ft., and is framed together of 1½ in., or 2 in. by 3 in. sound spruce, for lightness and strength. It is held in its place on the frame wall by a ¾ in. round iron bolt, which is forged long enough to pass through the boarding and studding, and a 2 in. block, which spans two studs inside. The end of the bolt is tapped and the bracket can be screwed tight against the boarding by a screw, key, and washer. The bolt is fastened to the bracket under the horizontal arm, after passing through a hole in the vertical arm, by being forged flat and bored and bolted to it with ¼ in. bolts which are countersunk on the upper side of the arm, to permit the planks to rest level on it.

All that is required to affix these brackets to the building is to bore a hole for the bolt, and they hang quite safe and will sustain the weight of any ordinary quantity of boards or siding. They can also be put up for boarding, and taken down as each strip of covering is finished.

In the absence of the above, a good safe scaffold can be quickly made of joists and ⅞ in. covering or roofing boards. Cleats gained out the thickness of the bracket board are first got out, and to the gain a bracket piece is well nailed; the outer end of the bracket piece is next nailed square to the side of a sound joist at the required height, and the three together are then nailed by the cleat through the wall boarding into a stud. If much weight is to be put on the scaffold, blocks should be nailed under the bracket piece on the vertical joist to take the strain off the nails, especially when hemlock joists are used for uprights.

A very simple way of gaining a strong scaffold is to lay joists on their edges across brackets no more than 10 ft. apart, with ledgers placed across their upper edges, on which the planks rest. It is also very convenient when the scaffolding planks are not forthcoming, and boards are substituted, and it saves a double thickness of boards. This scaffold is braced diagonally, and in order to increase its height, another joist can be placed on the top end of the bottom one, and the joist secured by nailing a ⅞ cleat across it.

A useful and easily removed scaffold for putting on roof boarding consists of simple brackets nailed through the roof boarding into the rafters beneath, with a plank laid across them to stand on.

When the boarding is all on, and the window frames and cornice set, one of the next accessories is a handy shingling stage. After the first courses have been laid, it is usual to form a scaffold out of joists laid against the roof on their edge, and fastened by shingles. The best way, however, is to shingle the joist in, by nailing the shingles to it, and fastening them in a course of shingles, keeping those nailed on the joist down, so that the joist will come below the butts of those in the course. These can be cut off when the scaffold is no longer needed, and the roof will not have been in any way injured.

The handiest scaffold which a carpenter and builder can adopt for setting cornices over store fronts, consists of a piece of 8 in. or 9 in. by 1 in. spruce board nailed square across near the ends of two joists at the desired height, far enough apart to permit each joist to stand respectively, allowing for the difference in their levels on the store floor and sidewalk. When the number of these frames needed is nailed together, they are placed in position, braced diagonally, and the plank laid across them. This method makes a very convenient, firm scaffold, and costs very little time.—*Builders' Reporter.*

FOR THE FIREMAN.

A man may become a good fireman without having any knowledge of the laws of nature which control combustion; but he attains his skill by long practice and groping in the dark for the right way.

The fireman who has learned his calling in this manner is not, however, perfect master of the art of firing, for any change of furnace arrangement is likely to bewilder him, and he finds himself compelled to repeat his first experience in experimenting until he *happens* to hit the best method. This entails a waste of fuel and repeated delays for want of steam.

The nature of fuel, the composition of the air that fans the fire, the character of the gases formed by the burning fuel, and *the proper proportions of air and fuel required to produce the greatest degree of heat,* are the principal points in the laws of combustion which should be studied in this connection. Oxygen and carbon are the two most important elements of combustion in the fire-box.

These elements unite freely and combine very rapidly, when