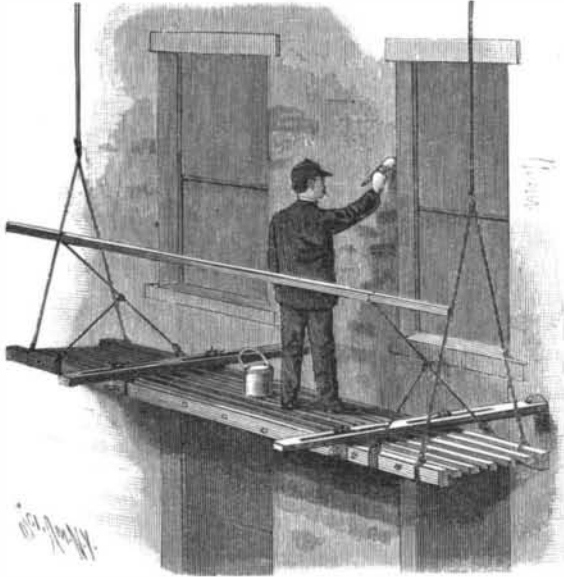


A SWINGING SCAFFOLD IMPROVEMENT.

In using swinging scaffolds it is generally necessary to provide cross-bars which project inward from the inner edge of the scaffold to engage the surface of the building, and hold the scaffold out at a convenient working distance. The invention illustrated herewith represents an improved spacing and guiding device of this description, in which the cross-bar is made adjustable upon the scaffold, both lengthwise and also to vary the projection of the bar, regulating the distance at which the scaffold is held away from the building.



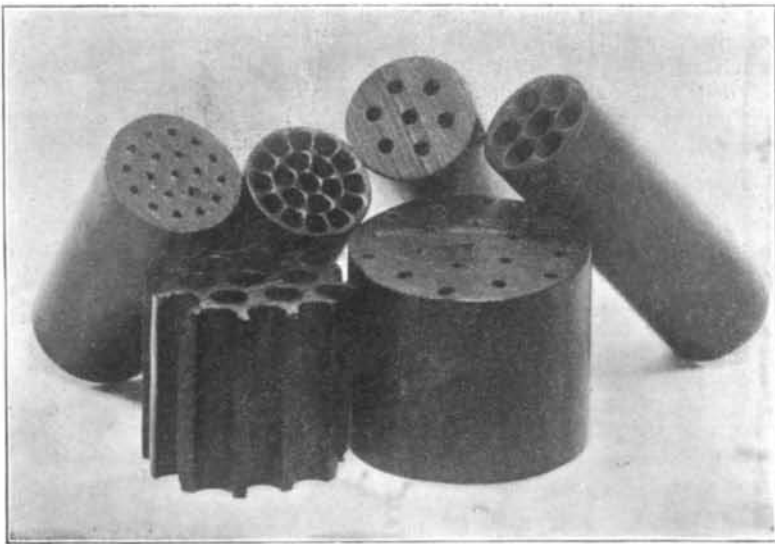
CODY'S SCAFFOLD.

The improvement has been patented by Martin Cody, No. 106 East 109th Street, New York City. It comprises a cross-bar in which are longitudinal slots and a clamp having U-shaped arms adapted to embrace the side-bars of the scaffold, a bolt passing through one of the arms being adapted to engage the side-bars, while a bolt secured to the bend of the clamps passes through the slots in the cross-bars, whereby the cross-bars may be adjusted upon the scaffold without loosening the attachment of the clamps to the side-bars. Two of these U-shaped clevises or yokes are provided for each cross-bar, and the inner ends of the bars are provided with rollers to engage the building. Any required adjustment is easily effected as the scaffold is shifted to different places upon a building, or as it may be necessary to have the cross-bars in contact with the building and not projected opposite a window.

THE COMBUSTION OF SMOKELESS POWDER.

The popular idea of an explosive is a substance which is capable of instantaneous combustion in a confined space to which no air is admitted. Although the term burning is freely used in speaking of powders, it is little understood that the various explosives have different rates of combustion, entitling them to be termed either slow burning or quick burning or detonating, as the case may be. As far as our senses are able to inform us, all explosives are instantaneous, and it would seem as though the solids were converted into gases in a literal instant of time.

As a matter of fact, however, there is a difference in the rate of combustion which is sufficient to divide ex-



MAXIM-SCHUPPHAUS POWDER BEFORE AND AFTER FIRING.

plosives broadly into two classes, those which are detonated and those which are quick burning and slow burning. Detonating explosives are those in which the explosive is consumed simultaneously, or practically so, throughout its entire mass by what is called a wave action. The generation of gas is so complete and instant as to produce a disruptive or shattering effect, which renders such explosives useful for blasting purposes, but unfits them for use in rifles or artillery.

In the gunpowders as distinguished from detonating

explosives, the combustion takes place upon the surface of the solid particles composing the powder, and an appreciable period of time is consumed in their combustion. At the moment the powder is ignited, the consuming flame attacks the whole surface of each grain, whether the grain measures a cubical inch in bulk, as in the powders of heavy guns, or whether it be the size of a pinhead, as in the common black powder.

The early black powder, though it was not a detonating powder, was consumed with such rapidity that the whole of it was converted into gas before the shell had moved forward twelve inches in the gun, and the expansive force of the gas then served to further accelerate the shell during its travel through the remainder of the bore. This brought a very high initial pressure upon the gun and prevented the use of sufficiently large charges of powder to give high velocities.

It was found, however, that by compressing the powder into cakes the total area exposed to the flame was reduced, and hence the time of combustion was prolonged. The result was that the pressure was produced gradually during the travel of the shell toward the muzzle, the pressure being spread out, as it were, over a larger area of the bore. The resulting velocity of the shell was the same, the difference in the action of the powder being the same as that between a blow and a push, but there was the added advantage that the initial or maximum strain on the gun was less. The ideal powder would burn at such a rate that sufficient gas would be generated to maintain a constant pressure behind the shell throughout the whole length of its travel through the gun. At the same time it should be consumed at such a rate that no unburnt powder should escape with the gases.

The smokeless powders, because of the small quantity of solid products of combustion and the great volume and high temperature of the gases, enabled the artillerist to secure velocities far in excess of those obtained by the use of the old powders. Moreover, smokeless powders lent themselves to the formation of powder grains which would insure the very best control of the combustion of the powder. We present illustrations of the Maxim-Schupphaus smokeless powder, which is formed into multi-perforated grains, whereby the burning area is regulated so that only a desired initial pressure is obtained, and the powder is consumed with such increase of burning area as to maintain a practically equal pressure behind the projectile throughout the gun.

It is evident that solid cylinders of powder would decrease in area as they burned, and there would be a corresponding decrease in the amount of gas given off. If, however, the cylinder burns up on the interior by means of suitable perforations, the burning area and therefore the volume of gases produced will increase.

The accompanying engraving is from a photograph of some unburned and partially burned grains of Maxim-Schupphaus smokeless cannon powder. The partially burned grains were picked up in front of the gun after some experiments in firing powder from a gun too small for the grain of powder employed. They illustrate the action of the combustion of this powder in the gun and demonstrate that the powder is consumed with the effects claimed by Mr. Hudson Maxim.

It will be seen that two kinds of perforations are employed, those in the cylinder to the right being circular and those of the opposite cylinder being quadrilateral in section, with two sides radial to the center of the cylinder. The latter form was adopted to secure a more even and complete combustion of the powder. That this is done is shown by comparing the bulk of the solid

sections which remain in the two types of powder grain.

We subjoin the results of tests carried out by the United States Navy at Sandy Hook and Indian Head proving grounds. With 11.75 pounds of this powder fired in a 5-inch rifle of the United States Navy a velocity of 2,556 feet per second was obtained with an initial powder pressure of 34,900 pounds per square inch. With 11 pounds of the same powder fired in a 4.7 inch breech-loading field gun the high velocity of 2,839 feet per second was obtained with a powder pressure of

37,756 pounds per square inch. The powder consists almost wholly of guncotton and contains about 9 per cent of nitroglycerine.

THE GREENVILLE TREATY.

One of the most interesting publications which the Bureau of Ethnology has ever published is Mr. Mooney's monograph entitled "The Ghost Dance Religion and the Sioux Outbreak of 1890." Even the layman when he examines this splendid volume cannot but feel proud of the Bureau of Ethnology, and, after considering this and other publications of the government, it is little wonder that foreign scientific journals speak of them in the highest terms. One of the illustrations of Mr. Mooney's monograph is the Greenville Treaty Medal, of which, by the courtesy of the director, we are enabled to present an engraving showing the obverse and the reverse of the medal.

By treaties made in 1768 with the Iroquois and Cherokee Indians, the two leading confederacies in the East, the Ohio and the Kanawha had been fixed as the boundary between the two races, the Indians renouncing their claims to the seaboard of the Delaware and the Susquehanna, while they were confirmed in their pos-



GREENVILLE TREATY MEDAL, OBTVERSE AND REVERSE.

session of the Alleghany, the Ohio and the great Northwest; but the restless borderer would not be limited, and encroachments on the natives' domains were constantly being made, resulting in a chronic warfare which kept alive the spirit of resentment. The consequence was that, in the final struggle of the Revolution, the Indians ranged themselves on the British side. When the war ended, and a treaty of peace was made between the new government and the old, no provision was made for the red allies of the king and they were left to continue the struggle single handed. The Indians claimed the Ohio country as theirs by virtue of solemn treaties, but pioneers had already occupied Western Pennsylvania, Western Virginia and Kentucky and were listening with eager attention to the reports brought back by adventurous hunters from the fertile lands of the Muskingum and the Scioto. They refused to be bound by the treaties of a government they repudiated, and the tribes of the Northwest were obliged to fight to maintain their territories. Under the able leadership of Little Turtle, they twice rolled back the tide of white invasion, defeating two of the finest armies ever sent into the Western country, until, after twenty years of unceasing warfare, crushed and broken by the decisive victory of Wayne at Fallen Timbers, their villages in ashes and their cornfields cut down, the dispirited chiefs met their conqueror at Greenville in 1795 and signed away the rights for which they had so long contended.

By this treaty, which marks the beginning of the end with the Western tribes, the Indians renounced their claim to all territory east of a line running in a general way from the mouth of the Cuyahoga, on Lake Erie, to the mouth of the Kentucky, on the Ohio, leaving to the whites the better portion of the Ohio Valley, including the hunting ground of Kentucky. The Delaware, the Wyandotte and the Shawana, three of the red tribes, were almost completely shorn of their ancient inheritance and driven back as refugees among the Miami. Our engraving shows the Greenville Treaty Medal of 1795.

The original silver medal presented by George Washington to Red Jacket was recently sold in New York. It closely resembles the medal shown in our engraving, only the date is 1792. It was presented to Red Jacket during Gen. Washington's third visit to Philadelphia. Upon the death of the Indian chief it fell into the hands of James Johnson, his successor, and it finally came into the possession of E. S. Parker, an educated Seneca Indian, and at his death it was sold by his widow.