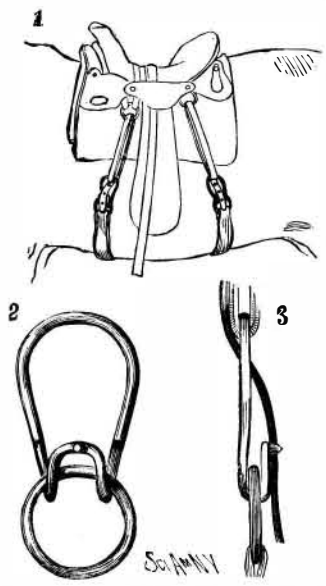
ful polish. These wheels make 3,000 revolutions per minute.

After polishing the buttons are placed on cards and ready for sale. Fifty hands can turn out about 150 gross per day of buttons. The shells cost from 40 to 50 cents per pound. The buttons when finished cost from 40 cents to $25 per gross wholesale. The annual consumption of pearl buttons in the United States amounts to about $3,500,000.

The sketches of this subject were taken from the plant of E. Huebner & Son, Newark, N. J.

AN IMPROVED SADDLE ATTACHMENT.

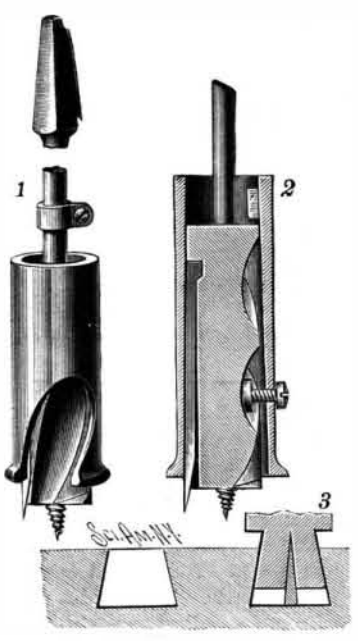
A combined loop and hook, for quickly and easily forming the connection between the saddle straps and belly girths, and securely fastening them in position, is shown in the accompanying illustration, Fig. 1 showing the loop and hook in use on a saddle, Fig. 3 being a side view, and Fig. 2 showing the attachment to a girth ring. This improvement has been patented by Mr. John F. Kohler, No. 906 Columbus Avenue, New York City. The elongated metallic loop is slightly larger at its upper end, so that a strap may be passed through it several times if desired, and at the lower end it is doubled upon itself to form a hook adapted to engage the girth ring, a portion of the hook surface being flattened and having an outwardly extending stud to engage perforations in the saddle strap. The tension of the girth and straps is designed to hold the saddle in place so that it cannot accidentally get loose, and the strap is easily and quickly fastened to the stud.



KOHLER'S SADDLE ATTACHMENT.

A TOOL TO DRILL CONICAL RECESSES.

Fig. 1 shows a perspective and Fig. 2 a sectional view of an improved tool, patented by Mr. Charles A. Cutting, of Middletown, Va., and which may be used to conveniently drill conical recesses to receive posts, dowels, etc., as indicated in Fig. 3. At the lower end of the bit, between the twists, is held a removable cutter, an offset on its upper end fitting into a recess in the upper end of the bit and forming a pivot for the cutter to swing outward on, so that it will stand at angles to the axis of the bit. A shell or sleeve, slightly enlarged at its lower end, fits loosely over the cutter and bit, the lower end of the sleeve having a recess through which shavings may escape. A clamp on the shank of the tool regulates the depth of the cut, which is limited by the clamp coming in contact with the upper end of the sleeve. The space formed by the twist in the bit is engaged by a plate on a screw screwing in the shell, so that in revolving the tool the shell revolves with it, while the tool is free to move downward in the shell as the latter rests on the material being bored. A lug in the upper end of the shell prevents the bit from being accidentally withdrawn therefrom. In operation, as the tool cuts into the material, and its lower end moves out of the shell, the point of the cutter is pushed outward to assume an angular position relative to the bit, thus forming conical recesses, as shown in Fig. 3. A wedge set in the bottom of this recess is adapted to engage the bottom of a post or dowel, splitting it and wedging its sides in contact with the walls of the recess.



CUTTING'S RECESS BORING TOOL.

PITCH pine beams will shrink in thickness from 18⅜ inches to 18¼; spruce from 8½ to 8¼; white pine, from 12 inches to 11⅞; yellow pine, a trifle less. Cedar beams will shrink from a width of 14 inches to 13¼; elm from 11¾ to 10¾; and oak from 12 to 11⅜ inches.

The Wire Gun.

The first public test of the Brown segmental wire-wound gun was made at Birdsboro, Pa., April 15, and was attended with much success. Government exprts, representatives of foreign powers and a number of invited guests from New York, Philadelphia, and other cities were present. Three shots were fired, and the gun successfully withstood a pressure which the experts declared would blow any other gun in the world to atoms. The tests broke all records, and one of the enthusiasts declared they placed the United States in the van in gun making.

On the third and final test the charge was thirty pounds of powder, the projectile sixty pounds weight. The gun recoiled about 15 feet, and a section of the stone quarry rose in the air as the projectile struck.

The test gauges were set to show a pressure of between 40,000 and 60,000 pounds; it was found that the pressure had gone beyond the larger figure and exceeded the means at hand for measurement. The pressure was declared by experts to be something above 70,000 pounds. The standard army requirements are only 37,000 pounds.

The gun has just been finished as a sample for the United States government. It was built at the Diamond Drill Works at Birdsboro, under the personal supervision of John Hamilton Brown, the inventor. It is built on a new system, which is the winding of a steel wire around a segmental core of steel. The core is made of twelve pieces of steel 19 feet long, and with a cross section like the key of an arch. The core is 3 inches in thickness at the breech, and three-quarters of an inch at the muzzle.

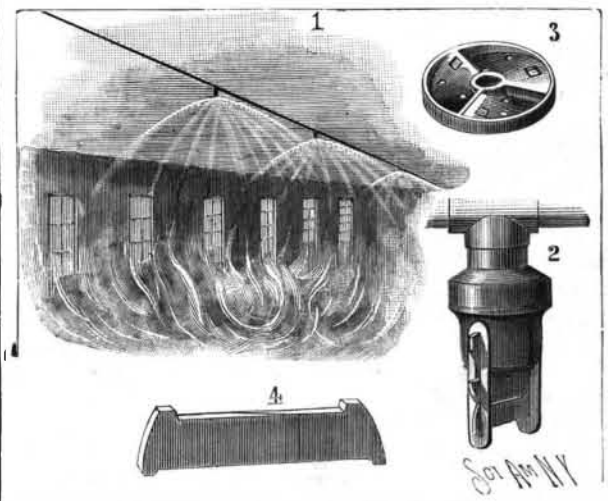
This is wound with thirty-three layers of steel wire seven one-hundredths of an inch in thickness. The gun is about 15 inches in diameter at the breech and 10 inches at the muzzle. The gun is 1⅘ feet in length and weighs three and one-third tons.

Venetian Mosaics for the Fair.

The British vice-consul at Venice says that the splendid mosaics now produced there continue to take the first place in the artistic markets of the world. Among the important works recently executed by the Venice and Murano Company, a well-known mosaic manufactory, is a large mosaic panel representing Columbus being received by Queen Isabella and King Ferdinand of Spain, after his return from America. This panel, measuring about 200 square feet, shows Columbus when kneeling before the sovereigns, presenting to them the natives of the newly discovered land and some products of the soil. The persons represented are about thirty-eight in number, many of them of the natural size, formed in three principal groups. In the most important is Columbus, having at his side the Crown Prince, and the sovereigns surrounded by the dignitaries of the court, ladies and nobles, and pages holding the standards. In the middle group, but more to the left, are the native Indians, and near the entrance of the hall other Spanish nobles, and the companions of Columbus. The gorgeous and various attires of all the figures, their warlike implements, the splendid stuffs of all sorts and tints, the rich decoration of the hall, the pageantry of the court, the strange costumes of the natives in full contrast with the others, and the various attitudes of all these personages, form a whole in perfect harmony with the details of the scene, owing to the excellent distribution of the figures and the perfect fusion of tints. The work is so delicately executed, says the vice-consul, that no one can believe that the panel is not painted until on touching it he discovers that it is entirely composed of small enamel cubes, put together without any aid of color or cement, and worked according to the mode of the old Venetian mosaic school. This panel is to form the pendant of another, representing Columbus landing in America, and which will shortly be executed by the Venice and Murano Company. These mosaic works are executed for Mr. H. Furber, of Chicago, who is now building a palace near the Exhibition, which is to be called Columbus Palace, and will, it is said, be the largest in America. The two panels are to be placed in the entrance hall. The author of the cartoons is Prof. Chev E. Paoletti, an artist well known in Venice, and affirmed to be one of the best painters who still maintain the traditions of the great Venetian school. As a work of art, the mosaic is said to be the most remarkable modern specimen ever exhibited.

AN AUTOMATIC SPRINKLER TO PUT OUT FIRES.

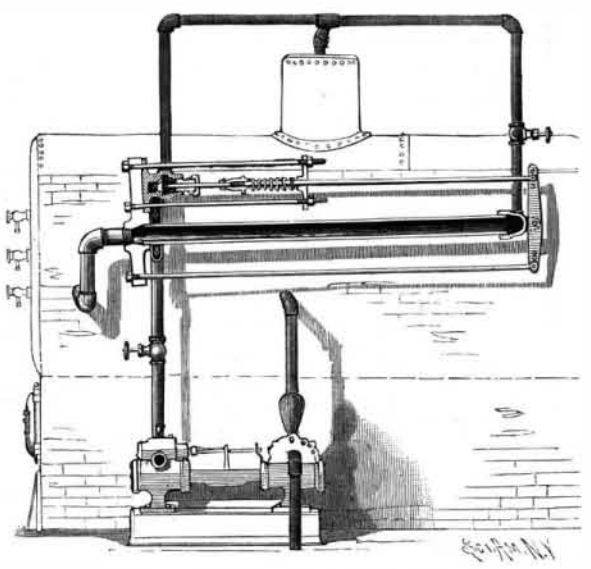
Many of the insurance companies now stipulate for the employment of automatic sprinklers in manufacturing establishments which they underwrite, or, in the absence of such sprinklers, charge a higher rate for insurance. A sprinkler of this kind, which has been patented by Mr. Thomas Holmes, of Chicago, Ill., is shown in the accompanying picture, Fig. 1 representing the operation of these sprinklers in a room, and Fig. 2 being a larger perspective view of the device attached to a pipe by which water is supplied under pressure. Within the body of the sprinkler a valve is held to close the water supply opening, and to have a limited fall as the valve opens, the stem of the valve extending below the body and having on its lower end a disk-like turbine water sprinkler, shown in Fig. 3. It may have any number of spray perforations, and is adapted to rotate freely, the perforations being so inclined that the water pressure causes its rapid rotary movement. Within two pendent links supported from lugs on opposite sides of the body of the sprinkler is held a saddle bar, on which the head of the valve stem rests, and this bar rests upon a coupling bar, shown in Fig. 4, whose outer ends have lips which lock over the lower edges of the pendent links. This coupling bar may be made entirely of fusible metal, but preferably consists of two pieces of brass or other metal, lap-folded and united, as shown, by a solder which will fuse at a temperature below that of boiling water. The fusing of this solder, when a fire starts in the vicinity of the sprinkler, causes the two pieces of the coupling bar to be separated, lets down the saddle bar, pushing the pendent links outwardly, and allows the valve with its turbine disk to drop, the force of the escaping water then causing its widespread spraying distribution. Further information relative to this improvement may be obtained of Mr. C. H. Matthiessen, P. O. box 655, Chicago, Ill.



HOLMES' AUTOMATIC SPRINKLER.

AN IMPROVED FEED-WATER REGULATOR.

An automatically operating regulator of the feeding of water to a steam boiler, designed to hold the water in the boiler at all times at about its normal level, is shown in the picture, and forms the subject of a patent issued to Mr. Emory M. Carr, of New Castle, Ind. A slightly inclined pipe arranged alongside the boiler, with its upper end at about the normal water level, is connected by a pipe at its lower end with the water space of the boiler, and a pipe connects its other end with the steam space. Both ends of the longitudinal pipe are secured in heads, and on the head on its higher end is fulcrumed a lever, the lower end of which is connected by a longitudinal rod with the other head, while its upper end is connected by a rod with a valve in the steam pipe connecting the boiler with the feed-water pump. On the latter rod also is a coiled spring, normally holding the valve to its seat. With the water at its normal height, it fills the longitudinal pipe, and the feed pump is still, but as the water falls the pipe becomes filled with steam, the heat of which causes an expansion of the pipe and an outward movement of the lever fulcrumed on its upper end, thus pulling the rod connected with the valve in the steam pipe leading to the feed pump, and setting the latter in motion. As the boiler is filled by the incoming water the longitudinal pipe is also filled, and by its contraction as it cools the lever fulcrumed at one end is moved to close the valve in the steam pipe leading to the feed pump, the spring on the rod also assisting to close the valve.



CARR'S FEED-WATER REGULATOR.