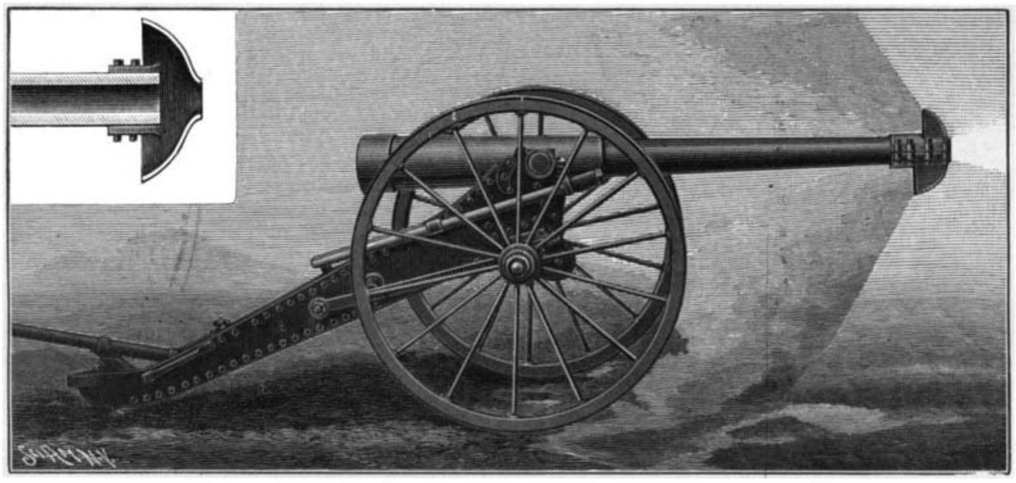
CANET GUN WITH GAS-RECOIL-CHECK.

The device shown in our illustration of a Canet field-gun, is of that generic kind which at first sight suggests the criticism that "it is impossible to lift one's self by one's boot-straps." On closer inspection, however, it will be found that the principles of the gas-recoil-check are perfectly sound, and that part of the energy of the explosion which causes the gun to recoil may be utilized to check that recoil. The device consists of a funnel-shaped, steel casting, which is bolted to the muzzle of the gun, as shown in the small detail view, and is provided at its apex with a hole which is in line with the axis of the gun, and is made slightly larger than the bore of the gun so as to allow the shot to pass through freely. The instant the base of the projectile has passed clear of the muzzle of the gun, the gases spread out in mushroom shape and strike against the inside of the recoil-check-plate. Here they are deflected to the rear, as shown in the engraving. The impact of the gases upon the plate tends to move the gun forward in the direction of the fire line, thus serving to check, to a certain extent, the recoil. The trail of the gun ends in a fixed spade attached to the trail-plate, which is forced into the ground as the carriage is driven to the rear, and cooperates with the gas-recoil-check in preventing the recoil.



Powder gases strike the inside face of dished plate and assist in checking recoil.

CANET GUN WITH GAS-RECOIL-CHECK.

In the experiments carried out by the Schneider-Canet firm at the proving ground it was found that, while the device acted favorably, there was a certain disadvantage in the fact that the gunners had to stand outside the wheels in order to avoid the hot gases which were deflected to the rear by the recoil-check. We are of the opinion that while this invention provides a cheap substitute for the expensive recoil springs and hydraulic cylinders commonly in use, it is not likely to be adopted very largely in modern batteries.

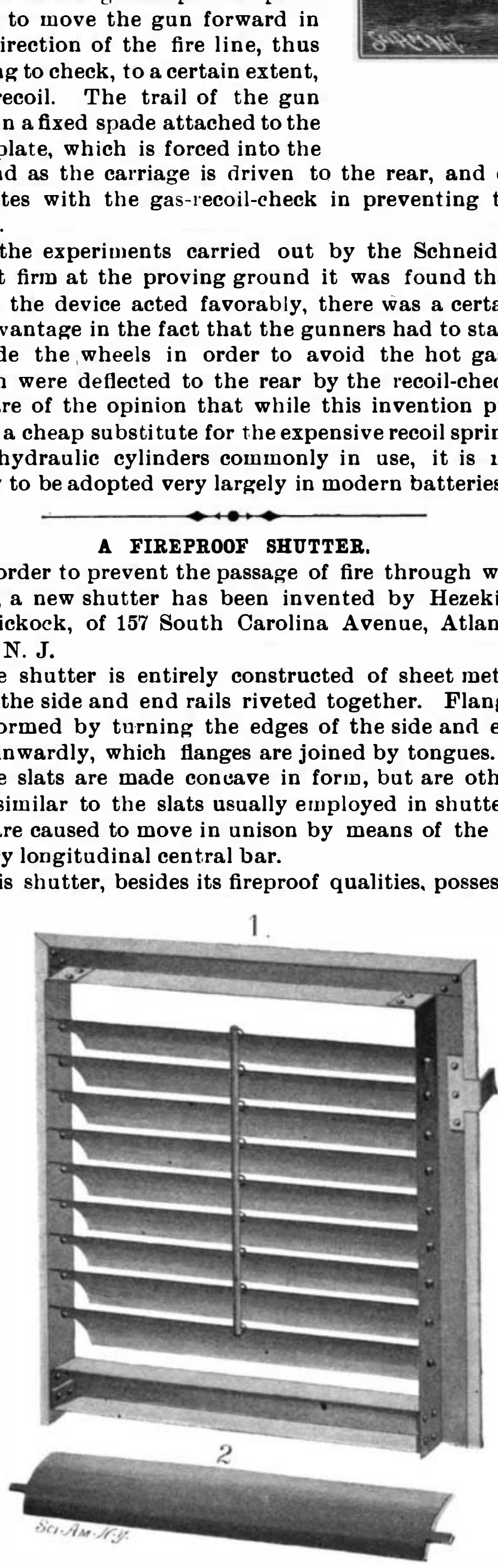
A FIREPROOF SHUTTER.

In order to prevent the passage of fire through windows, a new shutter has been invented by Hezekiah A. Hickock, of 157 South Carolina Avenue, Atlantic City, N. J.

The shutter is entirely constructed of sheet metal, with the side and end rails riveted together. Flanges are formed by turning the edges of the side and end rails inwardly, which flanges are joined by tongues.

The slats are made concave in form, but are otherwise similar to the slats usually employed in shutters, and are caused to move in unison by means of the ordinary longitudinal central bar.

This shutter, besides its fireproof qualities, possesses the merit of being lighter than a wooden shutter. By joining the several parts of the framing, as described, a rigid and serviceable construction is provided.



HICKOCK'S FIREPROOF SHUTTER.

Foundry Coke.

That there is considerable difference between furnace and foundry fuel coke is quite well known, but as there are some things concerning the preparation and composition of these two fuels which are little known, a few words relative to foundry coke may be of interest here. In these days when the demand for all coke fuels is in excess of the production, and when important advances in the methods of coke-making are being urged and in many cases adopted, economy and excellence in fuel supplies is a most important question with foundrymen.

The cradle of the coke industry is in the Connellsville region of Southwestern Pennsylvania. This coal district is a detached portion of the Pittsburg coal seam, and extends along the western slope of the Chestnut Ridge range of the Alleghanies from Latrobe, on the main line of the Pennsylvania Railroad, forty miles east of Pittsburg, southward to the Maryland and West Virginia line. The average width of this coking coal field is only four or five miles, and while the original Connellsville region included some 100,000 acres, to-day its limits have been widened considerably, owing to the fact that the profits of the industry have caused capitalists to engage extensively in this departure in fuel-making. Much of the coal area, being controlled by the H. C. Frick Coke Company and other allied concerns, the later operators in the field were compelled to take up adjacent lands, where more or less difficulty is experienced in producing a first-class article.

In the Connellsville region the coal is a natural coking one. When coke was first made in the early days of the century, the coal was heaped in open ricks, built on the ground, and a good article of coke thus produced. Later the bee hive oven, the type now in general use, was introduced. This oven takes its name from its shape, and really makes no provision for the chemical enrichment of the product. But in a strictly coking coal, such as the Connellsville coal, there is little need for such provision.

In the bee-hive type of oven the difference in composition between a furnace and a foundry coke is obtained through a variation in charging the ovens and in the time consumed in the coking process. Thus, for producing a foundry coke, a heavier charge of coal is required, and, while forty-eight hours is considered the proper time for furnace coke, the time for foundry coke is fixed at seventy-two hours. The consequence of these provisions observed, when a good foundry coke is desired, is a harder and purer product, the time and manner of charging accomplishing the proper results as to the distribution of cell space through the proper combustion of the coal coked.

However, where the bee-hive type of oven is used it is not possible to get a perfect uniform product. But the general introduction of the various retort and by-product oven systems now being urged will accomplish this result. As ordinary foundry coke is superior to anthracite coal, so too will be the by-product oven coke be superior to the ordinary bee-hive oven product. Already this has been proven, for the by-product oven is no longer an experiment, being in successful operation in many localities.

For foundry purposes it has been conclusively proven that the by-product oven coke is at least 20 per cent superior to the bee-hive oven product. Tests of by-product oven coke produced from Connellsville coal, made in Pittsburg foundries, have shown even a higher percentage in favor of the new method coke. It requires less blast, gives a smaller amount of slag, does not clinker, will carry more scrap, and will melt more iron with the same quantity of coke.

As to the saving of ordinary bee-hive oven coke over anthracite coal, I have the figures of a large foundryman. In substance they state that, for a day's work in his foundry, under anthracite, 3,000 lb. of fuel were used at a cost of $10.50. The loss of time to molders amounted to $12, and the extra power to drive the blower cost $1. Using coke but 2,250 lb. were required, costing about $7.25, which left a balance in favor of the ordinary of $16.25 for the day's operation, with the further economy of 20 per cent. to 25 per cent. A considerable enconomy will follow the general introduction of by-product coke for foundry purposes. But as these figures were compiled some time ago, when all kinds of fuel were much lower than at present, the prices of to-day would raise them considerably.

Another phase of the by-product coke oven development is that it will have the effect of shifting the coke plants to the foundries. The profit to be reaped from the utilization of the gas, tar, ammonia and other products which are utilized by these ovens, will more than meet the cost of transporting the coal to the ovens thus located. Then, too, the gas can be utilized for foundry purposes. To-day millions of dollars are being wasted annually through the general use of the old bee-hive type of ovens. In this age of economy and fuel reforms, manufacturers are coming to a realization of these wasteful methods. Furnace and foundry operators are already operating by-product oven coking plants in Pittsburg and elsewhere, with flattering success. A number of such plants are in operation in New England. At Wheeling, W. Va., Syracuse, N. Y., Sharon, Johnstown, Dunbar, and Latrobe, Pa., plants of these systems are in successful operation.

The requisites for foundry, as well as for all other branches of iron and steel manufacturing, is a fuel which is absolutely uniform. While anthracite coal, in a large degree, met these requirements, yet the porosity of this form of fuel was not sufficient to make it a desideratum.

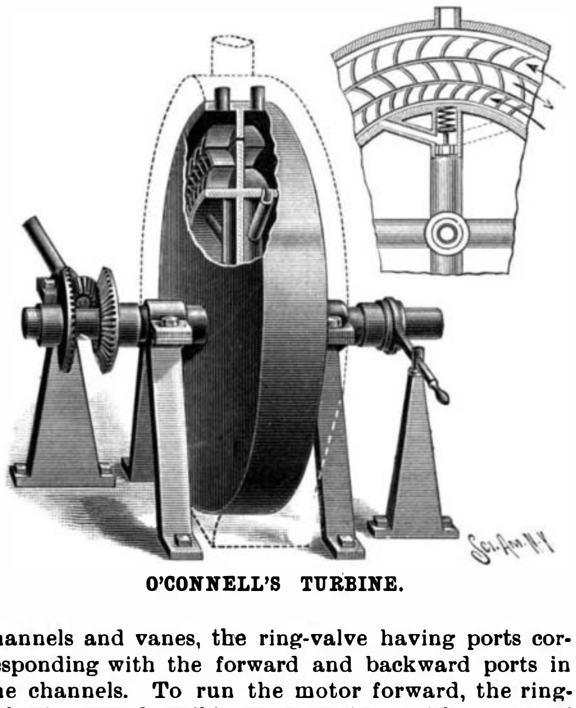
That the by-product coke fills this and other requirements has been proven beyond contention, although this departure in fuel-making is yet in its infancy.

A NEW STEAM TURBINE.

An improvement in reaction and radial flow turbines has been devised by Mr. Michael O'Connell, of Cappoquin, County Waterford, Ireland, which improvement embodies a reaction-wheel and an impact-wheel, provided with steam-deflecting vanes, whereby it is possible to drive the wheels together or independently.

Mounted on a hollow shaft communicating with a steam supply is a central reaction-wheel provided with two sets of radial channels leading in opposite directions to the periphery of the wheel. Upon the outside are double ring sets of vanes, divided by a partition, these vanes being disposed in opposite directions and constituting an impact-wheel. When the steam is passed through one set of channels and vanes, the central wheel rotates in one direction; and when the steam is passed through the other set of channels and vanes the central wheel rotates in the opposite direction. After issuing from the channels, the steam is conducted through stationary vanes, constituting a deflector, and thence acts on vanes attached to the central wheel. The stationary vanes (deflector), which are fixed to a casing, can be made to rotate in an opposite direction to the central wheel (see diagram), so that the steam, after passing through one wheel, acts directly on the second wheel.

To cut off the steam from the channels, a ring-valve in the form of a spoked wheel is mounted between the channels and vanes, the ring-valve having ports corresponding with the forward and backward ports in the channels. To run the motor forward, the ring-valve is rotated until its ports register with one set of channels; to reverse the motor, the valve is moved until the opposite ports open; to stop the motor, the valve is moved to an intermediate position, so that all ports are closed. The valve is operated by a lever connected with a sliding sleeve on the shaft, the sleeve having a spiral groove engaging a pin on the hub of the ring-valve. To regulate the speed of the motor, a governor in the form of a spring-pressed valve is placed in each channel. When the speed becomes excessive the governors press against their springs and partially close the ports.



O'CONNELL'S TURBINE.