Irrigation Works in Italy.

The irrigation system of Italy is probably the most complete in the world, and still it is constantly being increased; it forms a part of the elaborate system of defense against floods necessitated by the conformation of the Northern Provinces. According to the latest official statistics, the irrigation canals of Piedmont alone give 125,550 gallons per second, distributed over 1,340,000 acres; and those of Lombardy 95,355 gallons per second, distributed over 1,680,400 acres. These great works have not been, comparatively speaking, expensive. The Cavour canal, constructed within the last few years, draws its supply from the rivers Po and Dora Baltea. It gives a flow of 29,200 gallons per second, waters nearly 40,000 acres, and cost 1,600,000*l.*, about 32,200*l.* per mile. It was constructed in four years, and measures are now under consideration for increasing its flow by 5,300 gallons per second.

A smaller canal, subsidiary to it, gives 18,540 gallons per second, and cost 24,154*l.* per mile. The largest canals are the Cavour, and its subsidiary canal just mentioned; the Muzza, Agliano, and Naviglio Grande. The smaller of these gives 13,200 gallons per second. Below this point the canals become very numerous, and interspersed all over the country. These canals are not only used for purposes of irrigation, but also to supply motive power, by which again the water is raised to districts lying upon a higher level. On the steep slope of the Dora Baltea, not far from Turin, three canals (the Torea, Agliano, and Rotho) flow parallel to each other, on different levels, while the water is used at the top of the hill, 62 ft. above the highest of them. The arrangement adopted is as follows:

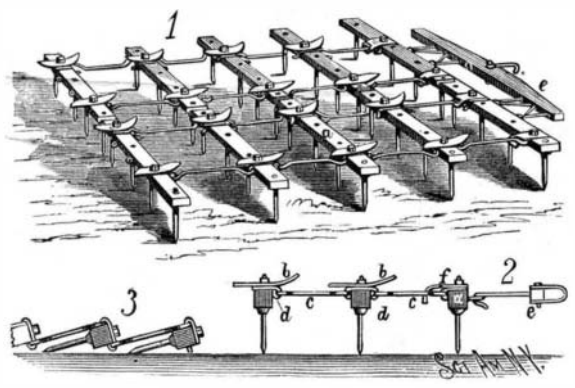
A stream of 15c gallons per second is diverted from the Torea canal, and carried down the hill in a leaden pipe, until it meets the Agliano canal. Here it is pumped up to the summit level by eight pumps, worked by four turbines, driven by a fall of water taken from the Agliano canal, and allowed to flow down into the Rotho. By joining this latter it is used for irrigation, and thus not a drop is wasted. The great principle of Italian engineers is to work on a large scale, thus attaining at the same time efficiency and economy, and avoiding constant alterations and additions; and it is by such means that the extraordinary fertility of Northern Italy is produced and maintained.

A People without Consumption.

A paper was read recently before the Tennessee Medical Society with the title "A People without Consumption, and some Account of their Country." The country in question is the Cumberland plateau. The writer, Dr. Wright, has ~~practiced~~ in the region throughout a generation, and in his assertion of fact touching the entire absence of consumption he is supported by the testimony of about twenty other physicians of standing.—*Medical and Surgical Reporter.*

HARROW.

The harrow represented in the engraving has been recently patented by Mr. William H. Myers, of Oregon, Wisconsin, and is flexible jointed so that it may be adapted for different kinds of work by the different forms in which the teeth may be set. The teeth are held by two series of bars, *a*, placed side by side and arranged transversely to the line of movement, and connected by rods, *c*, that are hinge jointed to the bars by means of plates, *d*, fitted on top of the bars and extending from side to side. The two series of bars are connected by the stretcher sweep, *e*, by means of braced hooks and eyes, which keep them apart, and to which the team is attached. The front bars, to which the sweep is connected, have hook plates, *f*, bolted on top and engaging the rods, *c*, back of the joints to make the joints rigid when the teeth stand upright, as in Figs. 1 and 2, and the other bars have plates, *b*, held by the same bolt that secures the hinge plate. These plates, *b*, are straight to one end and bent upward at the other, and when arranged as in Fig. 1 the teeth will be made to work upright. When the bent end is turned backward the teeth will incline backward, and when turned over so that the bent ends incline downward, the teeth will incline forward and operate like cultivators. With the plates turned lengthwise of the bars and the hook plates, *f*, disconnected, the teeth will lie nearly flat for smoothing and leveling the ground, as shown in Fig. 3. On the rear bars are eye studs, so that when the plates are arranged as in Figs. 1 and 2 the teeth will work upright when drawn as indicated, but will pitch backward if the stretcher be hooked on at the rear end.



MYERS' IMPROVED HARROW.

FIRE ESCAPE.

The accompanying engraving clearly represents the operation and construction of a fire escape in which the explosive force of gunpowder is used to elevate the ladder from the ground to the roof or windows of a building. A small cannon or mortar fires a suitable projectile, to which one end of an iron chain ladder is attached, to any desired point of the burning building. The projectile is made heavy and is fired with sufficient force to crush through the roof, wall, or floor of a building and thus hold the ladder against the

WATTS' FIRE ESCAPE.

weight of at least six persons. As an additional means of holding the ladder, there is a chain connecting the projectile with the ladder and with a suitable grapnel or anchor, not shown in the engraving, which will always catch upon the roof or window casing. The mortar may be placed upon a wagon, as indicated in the engraving, or swiveled upon a cross piece on a fireman's hose truck. At its side is placed the chain ladder, which is to be elevated by the ball. The ball is attached to the ladder by a short chain, having a swivel formed in it so that any revolution during the flight will not be communicated to the ladder; and attached to the chain near the ball may be the grapnel. In a box placed upon the truck is carried the powder. After the ball has found a firm lodgment in the building, the foot of the ladder is drawn away from the wall and secured in that position by iron rods driven into the ground, as shown in the right of the illustration. As no combustible material enters into the construction of the ladder, flames will have no effect upon it. With this device a ladder may be quickly raised to any part of a building, the inmates of which would thereby be provided with a means of escape.

This invention has been patented by Mr. Geo. W. Watts, of 433 Court Street, Brooklyn, N. Y.

Trials of Pumping Engines.

On September 26, Mr. M. Curry, the borough engineer of Dover, made an official trial of a pumping engine erected upon the Corporation Water Works, by Messrs. Simpson & Co., of Grosvenor Road, London. The engine was designed to pump 75,000 gallons of water per hour 150 ft. high, excluding friction, and was guaranteed to consume not more than 2·6 lb. of coal per actual or pump horse power per hour, the actual delivery of the pump being taken and nothing allowed for friction in the main. Nixon's navigation Welsh coal was used, and the results obtained during a trial of 11 hours 45 minutes were 6 per cent in excess of the guarantee. The average indicated horse power, was 78·2, and the coal consumption per horse power, 1·92 lb.; the pump horse power was 61, that is, 78 per cent of the indicated horse power under the unfavorable condition of no allowance being made for the friction in the rising main. The coal consumption per actual horse power measured from the water lifted without allowance for friction in mains, was 2,461 lb.

Messrs. Simpson & Co. are most enterprising in carrying out tests of engine performance, and equally liberal in giving to the profession the results of their experiments, as was evidenced by the capital paper on the subject, presented by Mr. J. G. Mair, one of the partners of the firm, to the Institution of Civil Engineers the year before last. One of the engines supplied by Messrs. Simpson & Co. to the West Middlesex Water Works gave, in a trial during this year, a consumption of 1·53 lb. and 1·821 lb. of coal per indicated and actual horse power respectively, and others at Chelsea, Berlin, Essen, and Lambeth have approached, although they have not quite attained, these figures, while one of their mill engines, supplied to Messrs. Gibbs & Co., of Victoria Docks, more than ten years ago, was found on a year's running to have used only 2 lb. of coal per horse power per hour. These results, it is to be borne in mind, have been attained when working with steam at low pressures, generally under 50 lb. per square inch, while at Dover the pressure was but 40 lb. It is much to be hoped that before long our water works engineers will follow the example set by the mill owners of the Lancashire and Yorkshire districts, where pressures of 80 lb., 90 lb., and 100 lb. are now common. With such pressures at their disposal we have no doubt that Messrs. Simpson could materially improve even upon the admirable results they have already obtained.—*Engineering.*

Asbestos Enamel.

Powdered asbestos is used by M. Erichsen, of Copenhagen, for making an enamel or coating to be applied to pipes, walls, and so on. The powder is mixed with soluble salts, such as silicate of potash, and mineral or other colors which combine with silicic acid, so as to form a product which resists the action of oxygen, heat, cold, or damp. The coating furnishes a refractory glaze, which protects the material it is applied to, whether wood, gas, or water pipes, and stone or brick buildings. When applied to masonry or wood the surface of these is first washed with soap and water. In preparing the enamel the refuse asbestos only need be employed. It is also proposed to apply the coating to boilers in order to protect the plates against a too intense fire.

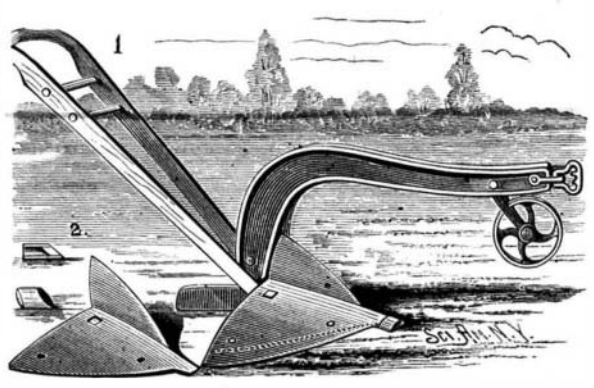
Electric Lighting and Car Propulsion by the Faure Accumulators.

The Paris correspondent of the London *Telegraph* says that when the Continental Hotel there was recently lighted up for the first time under the Faure system, the stored electrical energy was brought to one of the doors of the hotel in a cart. Communication with the candelabra in the largest room of the first floor was established in a few moments, in the presence of some 300 visitors. Many of those present afterward journeyed to the Arc de Triomphe and back in a tram car propelled by electricity supplied in the self-same accumulators, by way of testing the availability of the power thus stored.

PLOW.

The ordinary cast iron plow point of either new or worn out plows is covered with an attachment that can be applied by a blacksmith of ordinary skill, and which increases its strength and durability. This is partly accomplished by a steel covering plate cut and bent to form the share and colter, which may be of any desired shape. This is shown detached in the cut, and in place on the plow. The share is made to project over the right-hand wing of the point in order to give a good, lasting, steel cutting edge, that may be sharpened when needed. The whole may be made from a plate mainly of triangular shape, except the forward end, which lies under the detachable cap point, the left-hand portion of the plate being bent up to form the colter.

The plate thus formed is secured to the plow point by the same bolt that holds the cast point to the plow, the plate having a counter sunk hole for the reception of the bolt head. Having been thus secured, the cap point (Fig. 2) is fitted over the lip end of the plate and forward end of the point. This cap is made of steel plate cut into suitable shape and bent around and welded to form a sheath to the forward end of the point, and having a piece of steel (shown in the section Fig. 2), welded in it at its front end, sufficiently large to permit of the cap being sharpened occasionally. The solid point of the cap is hardened. It is fitted over the plow point by heating it and driving it on.



WEST'S IMPROVED PLOW.

This invention has been patented by Mr. Adam C. West, of Blanchard, Mich., and further information may be obtained from Mr. Charles V. West, of same place.