DISCOVERIES AND INVENTIONS ABROAD.

Silvering Cloth.—A patent has been taken out by J. Cimeg, of London, for depositing metal upon silk or woolen fabrics by a peculiar process. He states that the concentrated juice of fruits, such as that of currants and apples, contains a small amount of a chemical principle which acts as a mordant on cloth and possesses the property of depositing metals, such as silver and gold, from their solutions. He takes a silk or woolen fabric, for example, and after cleaning it thoroughly to remove all the grease and gum from it, he immerses it in a solution of nitrate of silver, ammonia and Rochelle salt for a short period then steeps it in the juice of the fruit named. A reaction then takes place and pure silver is deposited in the pores of the fabric from the nitrate of silver solution previously taken up by the cloth. After this the fabric is washed in soft water, when the silver is found adhering to the fabric and cannot be removed by washing.

Extracting Wax from Wool.—Besides grease and fatty acid, which wool contains, there is also a peculiar waxy substance called "suint" which has hitherto never been extracted for use for manufacturing purposes. A patent has been taken out in England, by J. G. Tongue, for recovering this substance from wool when it is undergoing the operations of cleaning, by steeping it in strong alcohol, which dissolves the wax. By distillation afterwards the alcohol is separated from the wax, and recovered in a refrigerator to do duty over again, and the wax is left behind in the still.

Soap Powder.—The forms in which soap is made and prepared are of endless variety. A very peculiar condition of soap in powder for use has just been patented by J. Mackay, of Glasgow. For a large quantity the proportions are as follows :—1 tun of caustic soda in crystals, 112 pounds of the best yellow soap, 112 pounds of pearl ashes, 112 pounds of soda ash, 7 pounds of sulphate of soda, 7 pounds of the chloride of lime, 7 pounds of sulphuric acid, 20 gallons of water and 7 pounds of palm oil. These ingredients are all mixed together in a boiler and submitted to a boiling action for five hours, then poured out into shallow troughs, where it is stirred until it is completely cooled. It then forms a granular crystallized powder, in which state it is packed for sale.

A New Safety Paper.—A new invention of a safety-paper to prevent forgery or alteration of shares, bank-notes, cheques, bills or any paper demanding security, is mentioned in *Macniven and Cameron's Paper-trade Review* (English). It consists of a single sheet formed of several layers of pulp, superposed, of different nature and colors, according to requirements. The check it gives to alterations of documents is very excellent. The middle layer of the paper requires only to be colored of a delible or destructible color; the chemical acid employed in obliterating the writing will also destroy this color, and this cannot again be restored while the paper surface remains white.

A New Lamp for Mines.—At a late meeting of the Royal Society of Edinburgh, Mr. A. McIvor, of the University of that city, exhibiting a new mine lamp, the primary object of the invention being the safe illumination of coal and iron-stone mines infested with explosive gases, in which the destruction of human life and limb that now takes place is a disgrace to modern science and mechanical skill—about twenty persons, on an average, perishing weekly; or, to put this fact in another view, a life is laid down for every 75,000 tuns raised. The illuminating agent employed by the inventor is electricity, evolved from permanent magnets. The steam power on the mine bank acting through ordinary gearing connection on a magneto-electric machine there stationed, develops the fluid; and insulated conducting wires, let down the mine shaft and along the galleries to the workings, give off the lighting effect at their terminal points. The extremities of the wire-conductors are connected with a self-acting electric lamp, enclosed within a gas-tight case. This last-named part is essential to the plan, inasmuch as the electric light through such an enclosure may be given out in any atmosphere, however explosive. The case in the model shown was a strong rectangular cast-iron frame, glazed on the sides with plates of mica, which is unaffected by the intense heat given out by the electric light, and does not crack from flexure or from water dropping on it, as glass would certainly do. The expansion of the air within the case is provided for by a very simple contrivance. An india-rubber pouch or gas-bag is suspended below the lamp to receive the expended air; and this air, on the temperature within falling on the extinction of the light, rushes back into the lamp-case, and maintains the atmospheric equilibrium with the utmost delicacy, an arrangement which prevents the mica sides of the case from being injured by the inequality of the internal and external pressures. The lamp, with its apparatus, is mounted upon a carriage to run upon the rails of the mine, and by these means and concave mirrors an intense light may be brought to bear upon any required part.

Casting Tubes of Copper and Brass.—J. S. Crossland, of Ashton-under-Lyne, England, has taken out a patent for an improvement which consists in casting tubes in hot dry sand or loam cores in a vertical or inclined position, and pouring the metal into the mold from the top; chaplets or thicknesses, stops or wedges of copper or other metal, being placed between the core and the mold. The molds are made of common molding sand or loam, and baked in a stove or oven, or the molds may be made of iron or other metal, and made hot previous to casting. The cores are made of common molding sand or loam, having a perforated iron core barrel or stem upon which the sand or loam is coated and baked in the stove or oven, and put into the molds hot. When cast, the tubes are fit for use, but in some cases they may be turned in a lathe.

Inoxidable White Metal for Taps.—J. Vigoroux, of Nimes, France, has taken out a patent for making taps in the following manner :—Smelting and casting are effected in the ordinary manner, only that the tap is cast in three operations; that is the barrel or outer part of the tap, composed of 785 parts of tin, 195 parts of regulus of antimony and 20 parts of nickel; the key which is composed or cast in two parts, the first part or conical core, with its upper part, being composed of 807 parts of tin, 175 parts of regulus of antimony and 18 parts of nickel; and lastly, the second part of the key or jacket, enveloping the conical core and composed of tin, 715 parts; regulus of antimony, 215 parts; and nickel, 70 parts. These three castings being executed, the pieces are turned in the lathe, and the tap produced is, from the beauty of the metal, quite ornamental.

Artificial Light.—A patent has been taken out by M. Joseph Alphonse Mille, of Paris, for a compound to produce a light by means of a current of air forced through it. The composition consists of benzine, 80 parts; camphor in powder, 10 parts; and ether 10 parts. A current of air is driven by a small fan through this hydro-carbon liquid, and it takes up a small portion of it in a gaseous state. It is then conveyed through spongy platinum and ignited, forming a jet of gas-light. The described mixture is somewhat different from others which have been used, but the mode of charging air in this manner with hydro-carbon vapor for illumination is quite old. This method of producing vaporized gas-light has been applied to lamps by M. Mille, a small fan being placed in the pillar of a lamp and operated by clock-work.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Water Wheel.—The ordinary bucket water wheels, termed over-shot and breast wheels, depend upon the gravity of the water for power—impact imparting little or no power to the wheel—and in order to obtain the greatest amount of power from gravity the buckets in over-shot wheels have been so arranged as to receive the water at the top of the wheel a little at one side of the shaft, and to hold it as long as possible or to retain it in the buckets at the side of the wheel, where it is received, at as low a point as possible. In breast wheels the buckets receive the water about on a horizontal line with their shaft, but the buckets are arranged with a view of holding the water as long as possible, or until they reach a point nearly under their shaft. Buckets, however, when constructed in the best possible manner, with a view to this end, commence to discharge their water as soon as they pass the level of their shaft and gradually lose their contents until they reach a point nearly under[illegible] their shaft. Hence, it will be seen, all the water [illegible]capes from the buckets previous to their arrival at [illegible] point underneath the shaft, is principally wasted or lost. The object of this invention is to obviate this difficulty, and to this end the buckets are perforated with holes, any suitable number, so that the several buckets of the wheel will all communicate with each other, and the water instead of escaping from the buckets or being spilled out from the same as they pass below the level of the shaft, will pass from one bucket to the other, and form a continuous sheet of water at one side of the wheel; no water being discharged from the buckets until they reach a point nearly underneath the water-wheel shaft. Jonas Holmes, of Clayville, N. Y., is the inventor of this water wheel.

India-rubber Spring.—A great difficulty has been heretofore experienced in the general application of india-rubber to the manufacture of springs which operate by tension, owing to the want of some suitable mode of constructing the ends of the springs which would provide for their convenient attachment and for wear, and render the ends of the springs as strong and durable as the other parts, The object of this invention is to remedy this defect; to this end it consists in a spring composed of a piece of india-rubber tubing with an eye, or its equivalent, of metal attached to each end by means of a shouldered shank inserted into the tubing, and a seizing or band applied around the external of the tubing between the shoulder of the shank and the eye. S. J. Seely, of Brooklyn, N. Y., is the inventor of this improvement.

Growth of Illinois.

In the year 1836—only 27 years ago—Northeastern Illinois was dependent on Ohio for her butter and flour, and even vegetables. Chicago was fed mainly from the trading schooners which ran between Lake Erie and Lake Michigan; but now that spot is the greatest granary in the world. Besides this, it is the largest beef market, the largest lumber market, and probably the largest pork market in the United States. The soil of the State is of wonderful fertility, and all the vast cereal products which so astonish the world are yielded by scarcely a tenth part of the arable land. Although the stoppage of the navigation of the Mississippi, and the drain of soldiers, temporarily affects the growth of the State, a constant increase in population is nevertheless going on. Illinois is not dependent on her fertile soil alone; for, besides her rich deposits of lead, she possesses an inexhaustible supply of coal. In railroads Illinois has over 3,000 miles, intersecting the State in all directions—north and south, east and west. Were it not for those roads the war, which closed up the Mississippi river to commerce, would have fearfully crippled our resources. By those roads immense quantities of agricultural products have been sent to market; thus the roads and canal centering in Chicago delivered, in 1861, nearly 60,000,000 bushels of grain, 675,000 hogs, and nearly 60,000 head of beef cattle. In 1862, they delivered nearly 70,000,000 bushels of grain, 900,000 to 1,000,000 hogs, and over 170,000 head of beef cattle.

The Gunboat "Lafayette."

A Western journal says :—We are permitted to make the following extract from a letter received from J. F. Vincent, dated "U. S. Steamer *Pittsburgh*, Yazoo River, March 9th" :—

"The U. S. steamer *Lafayette* is here, having, after many months of work in remodeling, been finished. She is really a formidable boat, iron-clad all over, with 2½-inch iron and 2 inches of india-rubber underneath, supported by 12 inches of solid oak, and propelled by side wheels which are protected by rubber and iron. She is 304 feet in length, 50 feet beam, and draws 8½ feet of water. Her armament consists of two 200-pound Parrott guns, two 100-pound Parrott guns, and four 9-inch Dahlgrens. Her prow I do not know the dimensions of, but its cost was something like $13,000; it is made of bell-metal and malleable enough to withstand a shot if struck, yet is hard enough for the purpose for which it was intended."