

Diving for Gold.

Perfect success has never attended the labors of the gold miner in trying to get gold from the beds of rivers when the water is flowing over the bed. Rivers have been turned aside and wing-dams built, so as to get at the auriferous deposits, and river beds have been worked at low stages of water, but none of these devices for pumping up gold from beneath the river have been successful or practical. Large amounts of money have been expended on dredges and pumps for working river bottoms, and various plans have been adopted. In no case, however, has any money been made out of the operation. Still there are people who contrive to bring up gold from beneath flowing rivers, and make money by it. For instance, in the state of Cauca, Colombia, where there are many deposits of auriferous gravel, most of the small gulches and ravines have been worked out a hundred years ago, though more or less mining is still going on. Many large streams have auriferous beds, and the natives, unable to turn the course of the river, mine in a peculiar way. The women take a batea in their hands, and dive down in ten or fifteen feet of water, scrape the loose sand and gravel into it, and bring it to the surface. Then they climb on to the bank and pan it out. They get from a few cents to four bits a batea. Sometimes the men engage in this work, but it is mainly done by the women. After a dive, the latter sit down on the bank and smoke a while before going down again. They teach the children of twelve to dive for gold also. Sometimes rich pockets or deposits are struck. Nobody but natives engage in this sort of work. At the Saragossa, the Clara Creek, and the Tewee River a good deal of this mining by women diving is done. —Iron.

CLOTH DRYING AND TENTERING MACHINE.

The cloth drying and tentering machine shown in our engraving dries goods upon a similar principle to out door drying under the most favorable circumstances, that is, by evaporating the water in the cloth by a soft and even heat, and carrying off the vapor as it is formed. Cloth dried by it has the appearance and feel of cloth dried out of doors, while it is dried much more rapidly, at less expense, and without regard to state of weather. This machine also gradually and very evenly tenters the cloth to width desired, without injury to the fabric, and at the same time will stretch the goods lengthwise if required.

The wet goods are taken into the machine at the top in front, the operator standing upon the elevated platform. Steel tentering pins carried on endless chains at either side, engage the edges of the goods, and the goods are carried in, the chains are made to gradually diverge for a distance of 41 to 16 feet (according to size of machine), until the desired width of goods is obtained, this being under the immediate control of the operator. The goods are then carried twelve times back and forth the entire length of machine, through and among twelve rows of steam pipes, through which steam has a free circulation, producing a uniform heat throughout, and are then passed out dry at the bottom of front of machine, then up to and between a pair of suspended rolls to the folder, which lays them in folds on a table ready to be carried away. A current of air passes through the machine carrying off the vapor. The motive power is furnished by a compact pair of horizontal engines.

This machine is built by Kinyon Brothers, Raritan, N. J.

George Gifford.

Mr. George Gifford, a well known patent lawyer, died at his home in Jersey City, N. J., July 2, at the age of 72. Mr. Gifford was for many years counsel for the principal

sewing machine manufacturers, serving Howe, Wheeler and Wilson, Grover and Baker, and Singer in that capacity. He made a success of that department of legal practice at a time—twenty-seven years ago—when there were very few of the profession who made mechanics and the subject of the patent laws a special study. Mr. Gifford not only acted as counsel for the united manufacturers under the well known combination, but he was referee and judge between them in their separate capacities, enjoying their full confidence in every position.

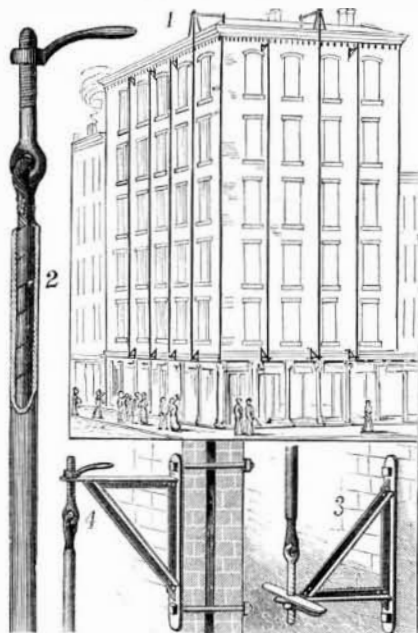
FIRE ESCAPE CABLE.

We give an engraving of a very simple, easily applied and efficient fire escape invented by Mr. A. O. Morford, of Portchester, N. Y.

The fire-escape cable is composed of a rope, preferably of wire, and an outer covering or cushion of soft rubber.

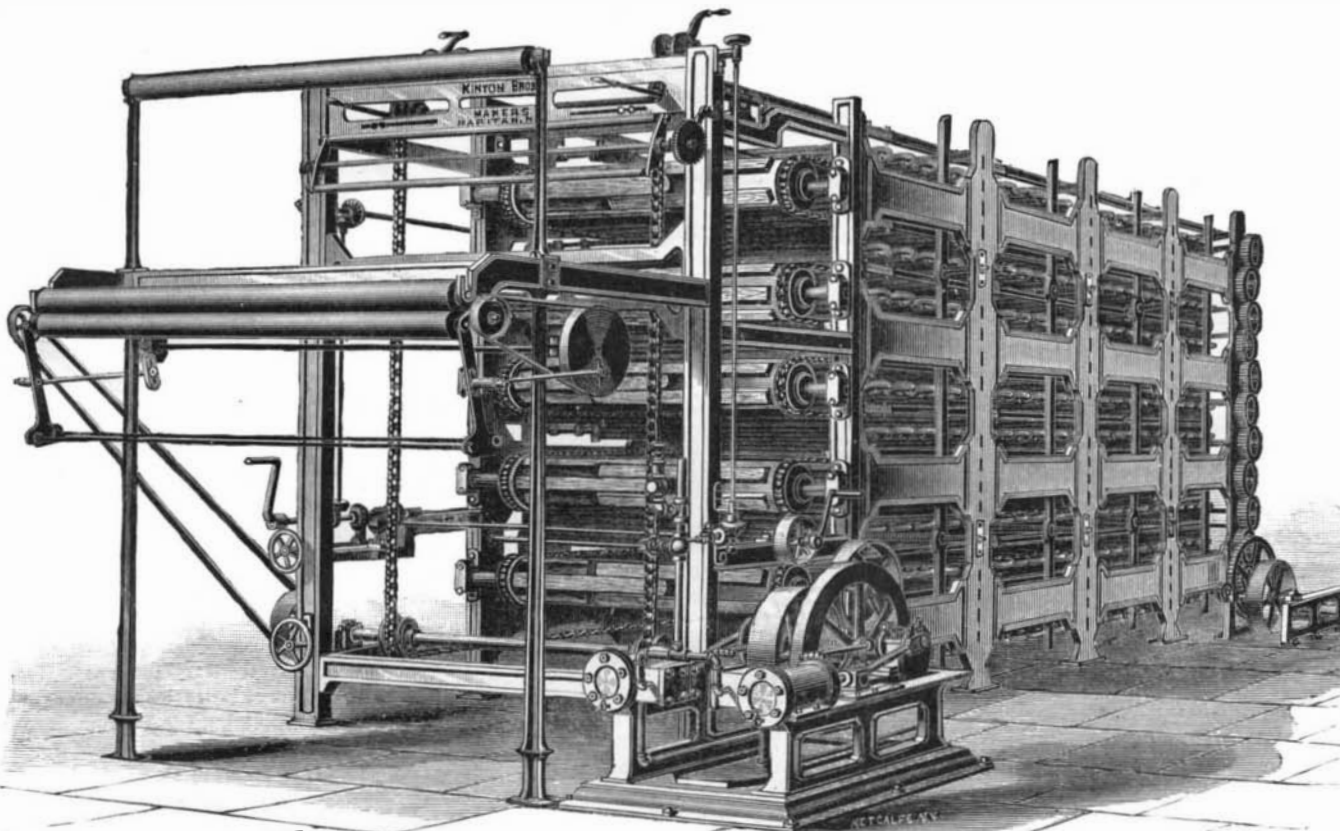
The cable is connected at each end with an eyebolt, as shown in Fig. 2. The eyebolts pass through brackets, Figs. 3 and 4, at the ends of the cable, and the nuts are screwed up tightly, making the cable taut.

In the form of cable shown the outer casing or cushion is a continuous tube of soft rubber drawn snugly upon the cable, but the covering or cushion may be composed of a strip of soft rubber wrapped spirally around the rope, with

**MORFORD'S FIRE ESCAPE CABLE.**

overlapping edges, which form spiral stop ridges or ribs. Where the edges of the strip of rubber overlap in wrapping the rope, a rubber or other suitable cement is applied to the covering for cementing the layers together, thus forming practically a continuous covering or cushion. In both cases the wrapping or covering of soft rubber will be of such thickness as not only to furnish a protection for the hands in grasping the cable, but a cushion into which the hands will embed themselves with but a slight grip, thus furnishing a firm and safe hold upon the cable with the outlay of but little strength, without cutting, burning, or otherwise injuring the hands, as would be the case with a naked rope.

In the spirally-wrapped form of cable the folds of the strip of rubber also furnish easy hand-grasps, and the ribs or ridges prevent all danger of the hand slipping upon the cable. Besides the advantage of a firm hand-grasp upon

**KINYON'S CLOTH DRYING AND TENTERING MACHINE.**

the cable, the soft rubber cushion enables the person descending to cling with his limbs to the cable, so as to cause a considerable friction between his clothing and the rubber covering, and thus diminish to a great extent the amount of strength required in the hands to effect a safe and easy descent. This fire escape is very cheap and may be readily applied without defacing the building. Its tensile strength is six tons, and the inventor informs us that sixty persons per minute can descend this escape. Further information may be obtained by addressing the inventor as above.

Rapidity of Cerebral Acts.

M. Albert Rene has, according to the *Revue Scientifique*, made a long series of experiments in the physiological laboratory of the Faculty of Medicine at Nancy on the rapidity of transmission of impulses through nerves, and the rapidity with which cerebral acts are performed. He finds that the intensity of the stimulus has a direct influence on the rapidity of nervous transmission. The stronger the stimulus the more rapid the transmission. The rate of transmission cannot therefore be stated in exact terms, since it is relative, as has been not unfrequently noted for other kinds of cellular activity. He has also confirmed the fact, now very generally admitted, that it is impossible to measure the rapidity of transmission in sensory nerves by stimulating different points of their length, for the rapidity of the response is not proportionate to the length of the nerve traversed. Thus the response to a stimulus applied to the fingers is often made with a shorter interval of time than a stimulus applied to the elbow or to the shoulder, though the length of nerve called into play is much greater in one case than in the other. In a word, it is impossible to compare the results obtained from different regions. The most exact method of measuring nervous transmission appears to be that of response to an auditory stimulus. The rapidity with which nervous impulses are here conducted he estimates at 28 meters per second, which is a little lower than the number obtained by other physiologists. For the rapidity of transmission of motor impulses M. Rene gives twenty meters per second, which is below that of experimenters, and notably below that of M. Chauveau. The duration of a cerebral act he estimates at thirty-five one-thousandths second. In young infants the duration is more considerable, amounting to 0.09 second. The duration of a reflex act—that is to say, the time occupied by the entire reflex arc, sensation, transmission to the cord, including motor impulse, and muscular movement—is 0.15 second.

A New Niagara River Bridge.

The Canada Southern Railroad Company have contracted for a bridge across the Niagara River at a point about 300 feet above the present suspension bridge, to be finished by the first of next December. The bridge will have a clear span of 500 feet between the towers on each bank and will be built of steel. It will be a cantilever truss bridge, wide enough for two tracks, and calculated to sustain the heaviest load that could be placed upon it by continuous trains of loaded freight cars. The cantilever style of bridge has never been used on very large structures, although several bridges of great length are now being constructed on this principle. Each shore section is supported by a tower at nearly its middle, or center of weight, the inner end being anchored and the outer end approaching a corresponding section from the other side. In this instance the projecting sections will be advanced 187½ feet each, making 375 feet together, and the remaining gap of 125 feet will be filled by an ordinary truss bridge resting on the ends of the cantilever spans. The steel towers supporting the cantilevers will be 130 feet high above the stone foundations, which will rise 50 feet above the water. The bridge will be stayed against the force of the wind, as well as supported from the towers, by wire cables.

Dullness in Woolen Manufacture.

From 250 requested replies to questions, received from the proprietors of woolen mills in New England, the Boston *Advertiser* ascertains that 759 sets of cards are stopped, equal to the consumption of 300 pounds of wool each, daily; in the aggregate, 230,700 pounds per day. Probably these re-

turns, which indicate a stoppage of more than one-third of the sets of cards in New England, are incomplete, and do not indicate the extent of the reduction, as no answers have been received from a number of letters of inquiry.

A NEW vegetable parasite, *Haplococcus reticulatus*, has been recently discovered in pork by Dr. Zopf. It occurs in from 30 to 40 per cent of the animals examined. Would it not be well if we paid more attention to the sanitary legislation of Moses, a fragment of the ancient medical law of Egypt?

Clairvoyance.

Almost every physician, during the course of his professional life, hears stories regarding clairvoyance. Some individual has had a vision or dreamed a dream which is subsequently found to have represented, most marvelously, actual objects or persons that were at the time far away.

An organization in London has been investigating the alleged phenomena of this class, endeavoring to apply scientific methods to their study. The *Nineteenth Century* and the *Fortnightly Review* have at different times published some of the results of this work. Quite recently the latter journal has published an article by Mr. Edmund Gurney and Mr. Frederick W. M. Myers, claiming very positively that the mind may at certain times be capable of receiving impressions through other channels than those of the various senses; in other words, that the so-called *clairvoyance* is an actual physiological fact. As an example of the class of phenomena alleged to be real, we append the following:

"One Sunday night last winter, at 1 A. M., I wished strongly to communicate the idea of my presence to two friends, who resided about three miles from the house where I was staying. When I next saw them, a few days afterward, I expressly refrained from mentioning my experiment; but in the course of conversation one of them said, 'You would not believe what a strange night we spent last Sunday,' and then recounted that both the friends had believed themselves to see my figure standing in their room. The experience was vivid enough to wake them completely, and they both looked at their watches, and found it to be exactly one o'clock.' (One of these friends has supplied independent testimony to this circumstance.)"

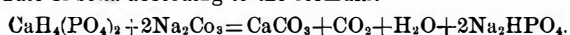
We have ventured to furnish our readers this account of the work of these gentlemen because of the strong indorsement that has been given to it, and because of its important physiological and pathological significance. If it could be proved that the mind can perceive through other agencies than the senses, it would establish a fact which would antagonize the present physiological theories (based upon evolution) of the development of these senses; for it is now believed that they were developed in order to enable the animal to adapt himself to his environment. They were made *by* the environment primarily, rather than *for* it, and in the history of animal evolution there are absolutely no data which enable us to account for the development of a super-sensual perceptive power.—*Medical Record*.

Decline of Cotton Milling in Scotland.

The remarkable decadence of the cotton manufacturing industry in Scotland teaches an impressive lesson of the results of arbitrary interference with the natural course of trade. Fifty years ago there were 134 cotton mills in Scotland, all doing a lucrative business. In Glasgow and its immediate vicinity 18,000 hands were regularly employed in the cotton mills. Thirty years ago there were 68 cotton spinning mills, with 1,163,575 spindles and 14,057 operatives. Now the number of mills has been reduced to 22, of spindles to 729,000, and of operatives to 3,645. The chief cause for this great falling off may be summed up in the single word, trades-unionism. Between thirty and forty years ago the operatives' trades-union determined to keep the details of the manufacture as much as possible from the employing class, and voted that no son of a master should be initiated into the mechanical mysteries, except by the consent of the majority of the society, ascertained by a secret vote. When permission was obtained, instruction was not allowed to be proceeded with during ordinary hours. These and other obstacles being deliberately maintained, the natural consequences followed. The sons of employers, unable to obtain the training necessary to qualify them to take their father's places, went into other vocations and professions, and, as the heads of the old firms passed away, they left no direct representatives to carry on their work. The mills were managed after a fashion and for a time by second and third parties; but the actual proprietors, handicapped by their ignorance, could not keep abreast of modern invention and competition, and one by one most of them closed their mills. There have been other contributory causes which account in part for the decline, but the first and heaviest blow at the industry, the London *Economist* declares, was the short sighted, selfish, and suicidal action of the operatives' union thirty years ago.

Volumetric Estimation of Phosphoric Acid in Fertilizers.

A. Mollenda says that in superphosphates containing no free acid, the amount of soluble phosphoric acid (acid phosphate of lime) can be estimated from the quantity of carbonate of soda required to form the ordinary bibasic phosphate of soda according to the formula:



If there is any sulphate of lime present in the solution, it will be converted into carbonate and yield a sulphate of soda; hence the lime must first be removed before it is titrated with soda, which may be accomplished with the oxalate of soda. He would digest 100 c. c. of superphosphate solution containing 1 in 50 for 4 hours, with frequent shaking; it is next heated to boiling in a beaker glass, an excess of oxalate of soda added, the oxalate of lime filtered out and washed. To the filtrate and wash water is added some pure litmus tincture, and then titrated boiling hot with one-half normal solution of carbonate of soda; the liquid must remain blue when cold. In titrating a fertilizer made from bone meal

the end color is grayish-green. A semi-normal solution of caustic soda is still better, as the titration can be done in the cold, and it gives accurate results with ammoniacal superphosphates, while with carbonate of soda there is a perceptible difference due to escape of ammonia on heating.

In using caustic soda it is an advantage to employ phenolphthalein or phenacetolin as indicator; and it is unnecessary to filter out the precipitated oxalate of lime, since the milky liquid itself may be titrated directly.

When a superphosphate contains free acid, whether sulphuric or phosphoric, lime water or carbonate of soda is added to the solution drop by drop until a trace of permanent turbidity is visible; then the lime is precipitated and the liquid titrated as in the other cases.—*Chem. Zeit.*

The author does not state whether this method is more accurate than uranium titration; certainly the end reaction will be more easily observed.

A German Insecticide.

The *Repertoire de Pharmacie* quotes, upon the authority of Dr. Nessler, a receipt for an insecticide which is said to have a great reputation among German horticulturists. It consists of soft soap, 4 parts; extract of tobacco, 6 parts; amylic alcohol, 5 parts; methylic alcohol, 20 parts; water to make 1,000 parts. The extract of tobacco is made by boiling together equal parts of roll tobacco and water for half an hour, adding water for what is evaporated. The soft soap is first dissolved in the water with the aid of a gentle heat, and the other ingredients are then added. The mixture requires to be well stirred before it is used, and is applied by means of a brush or a garden syringe fitted with a small rose.

FERN BASKET.

This new form of fern basket is made of the stems of ivy. The stems are bored and threaded, as it were, on stout wire, and are very strong and durable. They have a picturesque



A NEW FERN BASKET.

appearance when hung up, and have the great advantage of not obstructing the light so much as the ordinary flat basket.

Tobacco Juice Vapor for Plants.

The vapor of tobacco juice has been tested in France as an insecticide in green houses with great success. Instead of burning or smoking the tobacco, which is a very offensive process to some persons, the tobacco is made into an extract by soaking or boiling, and the juice is then placed over a chafing dish, a fire, or the flame of an ordinary lamp, and deposited in the greenhouse or conservatory. Delicate plants which are very sensitive to smoke are not injured by this vapor, and it leaves no offensive atmosphere, while it effectually disposes of thrips, lice, scale insects, and slugs. One quart of tobacco juice vaporized in a house containing 350 cubic feet is an ample amount.

The Planet Vulcan.

Although the American and the French astronomers at the Caroline Islands, last May, had fair opportunities for good observations of all the phenomena of the total eclipse of the sun, there were no indications of the existence of the planet Vulcan. The supposed planet was first discovered in 1859, and in 1878 Professor Watson, of Ann Arbor, Michigan, and Professor Swift, of Rochester, New York, both claimed to have seen the planet. But since that time it has not been seen on the occasion of the three total sun eclipses that have occurred. It may be possible that on the two occasions when it was believed to have been seen, it was in such a portion of its orbit as to be favorable to observation, and that similar conditions have not since existed.

THE first cotton mill in California is soon to be built at Oakland. The southern part of the State is regarded as favorable to cotton culture.

Nobel's Dynamite and Explosives Factory.

The dynamite manufactory of Mr. Nobel is located at Ardeer on the Ayrshire coast, and in regard to it the London *Graphic* speaks as follows: The works cover nearly a square mile in area, the buildings being scattered about like the shanties in an embryo American city, large structures and small ones, some of brick, and some of wood, but no two are together. There are about 250 workers in all, women as well as men being employed.

Immediately on passing the policeman at the gate, the workers enter into cottages for the purpose of changing their costumes, and now appear in different colored uniforms, some of the men being clad in bright scarlet, some in blue, but the majority wear clothes of a more somber color. Once the gates close upon them in the morning, the operatives are shut in for the day. Not until night do they resume their ordinary clothes, and pass outward to their homes.

The women are chiefly employed in making the dynamite into cartridges. The place is pervaded by the resolution to minimize the risk of explosion, and, in consequence, not only is every little but in which the operation is conducted separated from its neighbors, but no more than four women are allowed in each. The distinctive clothing is another precaution, although its use is more obvious in the case of the men than the women. There are grave reasons why the men in red should be separated from the men in blue, and the men in white flannel from either of the other two. The mere cutting up and packing is simple, and comparatively safe, but there are intricate processes connected with the preparation of the explosive portion of the compound, which if not carefully watched are dangerous; and, as the garb he wears is an index to the work he is doing, it is easy to find out a man who strays from his own department into another.

Four policemen from the county police force, paid by the company, are constantly on the watch to prevent dereliction of duty. They speak to no one, and are not to be spoken to. At uncertain intervals, also, there comes into the place a Government official, who sees whether the regulations laid down by Act of Parliament are faithfully adhered to. Each department of the place has an overseer, and over all is a manager, whose wide practical knowledge is such that he can be appealed to on every subject connected with the manufacture.

That it is a profitable undertaking in which the company are engaged is apparent from the high premium on the original shares, and that the product had become a resource of civilization is shown by the demand for it from all parts of the globe, where man, warring with Nature, is uprooting the stumps of trees, leveling the rock that comes between him and a straight path, breaking into the seam of the coal that is to cook his dinner, or making deep and navigable the stream that gives him communication with his neighbor.

A Novel Inclined Railroad.

About one hundred yards below High Bridge, on the east bank of the Harlem River, New York city, is a nearly finished inclined railroad which, although short, presents many features of interest. The road is built up the side of the hill at an inclination of $1\frac{1}{4}\%$, and has a length along the slope of 240 feet. The rails are of maple 3 inches wide by $2\frac{1}{2}$ inches thick, and are spiked to string pieces, running up the track, of yellow pine 8 inches square. These are supported on framework where the ground hollows, and on the surface in other places. The gauge of the road is about 4 feet $5\frac{1}{2}$ inches.

The frame of the car is triangular; the hypotenuse being parallel to the track, thus bringing the floor horizontal. They are 6 feet wide and 7 feet long, with doors in the center of each side; they run on 4 wheels 20 inches in diameter.

The power is furnished by a 50-horse power engine, built by the Lidgerwood Manufacturing Company of this city. The engine has two cylinders 10 by 12 inches. On the crank shaft are two pinions 12 inches in diameter and 8 inches face, engaging with two spur wheels, 7 feet in diameter, keyed on the same shaft. This shaft is of hammered iron, $6\frac{1}{2}$ inches in diameter, and carries, besides the spur wheels, two drums 6 feet in diameter and 3 feet across. The axis of these drums is perpendicular to the line of the track. Around each one will be wound two coils of $\frac{3}{8}$ inch iron rope, the winding being in contrary directions, so that one car will be raised while the other is being lowered. The second rope is put on to guard against accident.

The engines have a link motion and automatic brakes, with strap brakes on the drums, which can be run independently. Either of the gears is of sufficient strength to hold the load should the other break. The lever that works the links also operates an ordinary throttle valve between the two cylinders, the arm that moves the valve being connected to the link rocker shaft. By this means steam is admitted to the cylinders slowly, and the engines enabled to start and move steadily at all points of the stroke.

Preparation of Compressed Yeast.

According to this patent raw instead of steamed potatoes are used; they are to be pulped and heated with water at 50° , then mixed with green malt and rye husks, heated and allowed to saccharify, cooled, and allowed to ferment at 25° .—*J. Wehmer in Bied. Centr.*, 1883.