

**A Compressed Air Locomotive.**

What is undoubtedly the first practical attempt to use compressed air as an underground motor in a coal mine in this country is meeting with success at the Old Eagle pits of W. H. Brown Sons, 27 miles up the Monongahela above Pittsburg. The new motor was built at the Baldwin Locomotive Works, and is a most singular looking affair. The available height above the pit rails being only 5 feet 10 inches, the air locomotive had to conform thereto. The air receivers are 27 feet long and 38 inches in diameter, and made of sheet steel. These are filled with air compressed to 400 pounds per square inch, forming the actuating power of the machine. These air receivers rest on four wheels, driven by a pair of locomotive cylinders, gearing, etc., just as in a railway engine, the air taking the place of steam. The originator of this idea, Capt. Harry Brown, expressed himself as more than satisfied with this locomotive. It does the work of a score of mules, requires the attention of only one man—who also operates the air compressing machinery—and can haul 55 loaded cars (60 tons) up a gradient of 100 feet to the mile.—*Coal Trade Journal.*

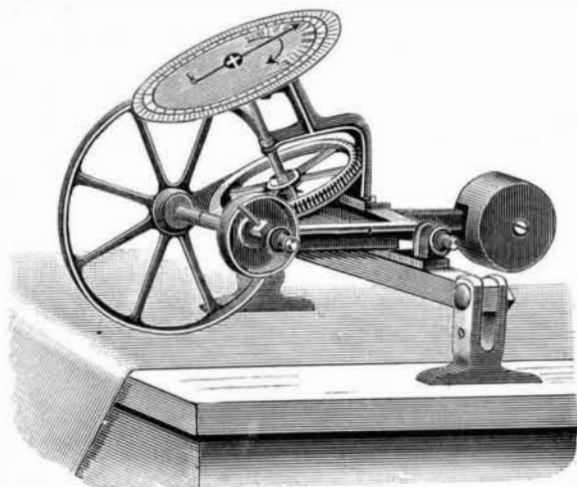
**New Method of Printing a Positive from a Positive.**

MM. Cros and Vergeraud have worked out a process for obtaining images so as to have a positive impression from a positive plate, and a negative print from a negative original. The process is based on the following circumstances: The easy reduction of soluble bichromates mixed with certain organic substances, and the relative insolubility of bichromate of silver. Suitable paper is covered with a solution of two grammes of bichromate of ammonia, and fifteen grammes grape sugar, dissolved in 100 of water; when dry, it is exposed to light under a positive. As soon as the yellow paper becomes gray, it is removed, and immersed in a one per cent silver bath, to which ten per cent of acetic acid has been added. The image will immediately appear of a ruddy hue, due to the bichromate of silver. The print, on being washed, retains the red impression of the insoluble bichromate, which becomes dark brown on exposure to sunlight. On submitting the print when dry to the fumes of sulphureted hydrogen, or dipping in a solution of sulphite of copper and potash, it becomes black. The latter process is preferable.—*Photo. News.*

**MACHINE FOR MEASURING TEXTILE FABRICS.**

To measure textile fabrics correctly by a machine is far more difficult than many people would suppose. The difference may be unimportant in the case of calico or other equally unelastic goods, but where woolen goods are concerned, which can be pulled out considerably by a slight stretching, the difference between the measurement of one person and another is sometimes serious. For this reason it is also customary to measure all goods with an elastic selvage down the middle, even when they are not doubled, as naturally the selvages stretch more than the body of the cloth.

In mills where large quantities of goods have to be measured, this is nowadays generally done by machinery. Very often the measuring arrangement is in conjunction with a plaiting or rigging machine, and the number of plaits or layers is registered, the division of a whole plait being thus roughly taken from an index, or the goods pass over a roller covered with cloth or baize, which is in connection with a dial, and is turned by contact with the passing cloth. But even here the measurement is not always correct, because in order to secure adhesion to the roller there must be a certain drag, and this means, of course, a stretching of the cloth.

**MACHINE FOR MEASURING TEXTILE FABRICS.**

Smaller quantities of goods, especially of the more valuable ones, can be measured more correctly in other ways, and our illustration shows an appliance for the purpose.

Here the cloth does not pass over a roller, or has to drag a heavy cylinder, but is simply drawn by hand or by power over a table. This can be done without exerting any drag upon the cloth. A light iron pulley runs over it, and is turned by the passage of the cloth. This pulley, whose axle runs in two small standards placed upon the table, is connected in the usual manner with a dial, upon which the number of revolutions or yards, or any other standard measure, is registered, while the subdivisions of the same are indicated by a finger and small pulley, the latter of which is keyed direct upon the shaft of the larger pulley. In order

to obviate the least drag of the cloth upon the pulley, the latter is counterbalanced by a weight, which can be shifted according to the adhesiveness required. The little machine appears simple, and will no doubt measure correctly if well made.—*Textile Manufacturer.*

**IMPROVED FIRE ESCAPE.**

The engraving shows a fire escape in which a carriage is arranged to run upon a track near the top of the house. It is provided with a pendent ladder, and may be moved along the track by an endless rope and chain and chain pulleys in one direction or the other, for the purpose of bringing the ladder opposite a window, door, or other place of escape.

A horizontal rail is attached to the building beneath the

**COPELAND'S FIRE ESCAPE.**

cornice, and supports a carriage, which consists of a U-shaped frame mounted on grooved or flanged wheels, that travel on the rail.

An endless rope passes over grooved pulleys journaled in the frame, and an intermediate pulley which is journaled in the lowest part of frame.

A chain pulley is mounted loose on the projecting axis of the lower rope pulley, and may be locked thereto by means of the spring clutch, which is fixed on the axis, and operated by a lever and hand rope extending to the ground.

An endless chain connects the lower chain pulley with the upper pulleys, which are fixed on the same axis as the flanged transporting wheels.

By pulling the hand rope the lower chain pulley and rope pulley will be locked together; then, by pulling the endless rope in one direction or the other, the carriage will be propelled on the rail in a corresponding direction. It is within the power of any person, stationed on the ladder hanging from the carriage, or on the ground, to propel the carriage and its attachments along the rail to any desired point, and thereby render the ladder available for convenient and immediate use. The ladder furnishes the chief means of escape, but a clamp, which is attached to the endless rope, can also be used as means of escape.

To render the movement of the endless rope uniform during the descent of a person on the endless rope, and at the same time automatic, an automatic governor is provided, which retards the descent and renders it uniform.

The entire fire escape apparatus, with the exception of the rail, which is a fixture, may be inclosed in a suitable box or casing on the rear side of the building, where it will be out of observation and protected from the weather, as well as from access of thieves or burglars designing to enter the building.

By constructing the box or casing with a door properly arranged, the carriage, ladder, and other attachments may be moved out at once when required for use, and guided to the desired point.

To allow the escape to travel around a corner to a different side of the building, the supporting rail is curved, and the flanged supporting wheels are made with a tread wide enough to accommodate the curve.

Further particulars may be obtained by addressing Mr. F. A. Copeland, La Crosse, Wis.

THE Commissioner of Patents has recently decided that in interference cases before the Patent Office, to determine who is the prior inventor, the wife of either contestant may appear as a competent witness.

**Oil of Wintergreen in the Treatment of Acute Rheumatism.**

Dr. F. P. Kinnicutt draws the following conclusions from the results obtained in twelve cases of acute rheumatism, treated by oil of wintergreen:

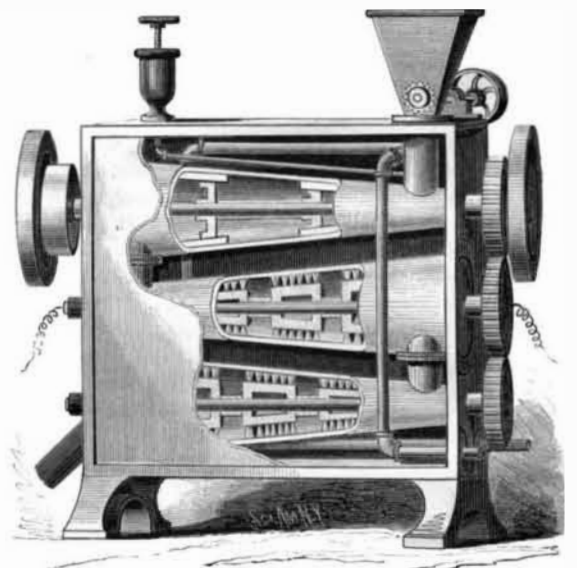
1. In the oil of wintergreen we possess a most efficient salicylate in the treatment of rheumatism. 2. In its efficiency in controlling the pyrexia, the joint pains, and the disease, it at least ranks with any of the salicyl compounds. 3. The best method of its administration is in frequently repeated doses, continued in diminished doses throughout the convalescence. 4. Its use possesses the advantages of being unattended with the occasional toxic effects, the frequent gastric disturbance produced by the acid or its sodium salt, even when prepared from the oil of wintergreen; that its agreeable taste, and finally its comparative cheapness, are further recommendations in favor of its employment.

**ELECTRO PULVERIZER AND AMALGAMATOR.**

The Manes electro pulverizer and amalgamating machine, shown in the cut, is designed for saving the rusty and fine gold, also the quicksilver, that has been lost in hydraulic washing for gold on the coast of California ever since the commencement of hydraulic washing in the summer of 1852. It is said that the loss has been at the rate of from 20 to 35 per cent of the precious metals and mercury, which, if saved, would amount to hundreds of millions of dollars.

Notwithstanding all the modern improvements in mining machinery, immense quantities of the precious metals are constantly washed away and irrecoverably lost. The value of this lost portion, according to various estimates, is very nearly if not quite as great as that of the metal secured. A great deal of engineering skill and inventive genius have been engaged in trying to devise means of preventing this great loss. This has generally resulted in placing various devices in the sluices to catch and retain the stray particles of gold or sulphuret. Some of these inventions have been more or less successful, but none of them have saved anything like a reasonable proportion of the valuable part of the metals.

The electro amalgamator, it is claimed, will save from 50 to 75 per cent of all the gold and quicksilver that passes through the machine, as the rusty gold will be perfectly scoured and electroplated with quicksilver, and thoroughly amalgamated by the rapid action of the electrical steel brushes and steel mullers that revolve inside of the series of steel cylinders in the machine, placed one above the other, and made cone shape, and connected with spouts; the large end of one cylinder is placed under the bottom of the small end of the next one and so on, forming inclined planes for the sand or crushed ore to run down by its own gravity, which is assisted by streams of water and quicksilver, constantly fed into the machine from a hopper on the upper part of the machine; and the powerful current of electricity is constantly passing through the sands or ore, as it passes from one cylinder to another, and as it is thoroughly mixed at the same time with the quicksilver by the steel brushes, no gold escapes without having been thoroughly amalgamated. The material passes through a movable iron spout into settling tanks, where the cleaning up is done. The machine does not stop except when repairs are needed; the waste water of the sluice boxes is used for driving the machines, and but one

**MANES' ELECTRO PULVERIZER AND AMALGAMATOR.**

man is required to attend to each machine. The fine sands will be conveyed into the machines through screens of the proper size. This apparatus can be used in stamp mills for amalgamating purposes, and will surpass the old process of treating gold and silver ores. The inventor, Mr. James Manes, is now engaged at the new chemical works in Morrison, Jefferson County, Colo., for the Colorado Paint and Chemical Company, as chemist and metallurgist. Mr. Manes, as an inventor of mining machinery, is well known in this and other countries. The first one of the electro amalgamating machines has just been completed at the extensive shops of the Colorado Iron Works, Denver, Colo., and the models and complete drawings are exhibited at the office, 5 Windsor Block, Denver, Colo.

**Peter Cooper.**

The departure of Peter Cooper was the peaceful close of a memorable life. If ever the contemplation of death can be not merely without terror, but even without pain, it is in such a case as this, where, surrounded by the loving circle of children to the third and fourth generations, and by hosts of warm personal friends, loaded with well earned honors, and cheered with the enthusiastic affection of the civilized world, a man who has done great things for his kind goes in the ripeness of age to his rest and reward.

Peter Cooper had long outlived his proper contemporaries; and this generation, which knew him best as a benefactor, had never known him as a bold inventor and enterprising pioneer in great business adventures—still less as an industrious mechanic, practicing a patient perseverance and a frugal economy which seem nowadays to have gone somewhat out of fashion. It is hard to realize that his life covers nearly the whole history of the United States. Born in the middle of Washington's first presidential term, when the population of the country was about 4,000,000 souls, he lived to see it the most powerful of Christian nations, containing more than 53,000,000 inhabitants, triumphant over internal rebellion, fearless of foreign foes, and filled from one ocean to the other with appliances of science and monuments of human skill not dreamed of in his boyhood. Except the stationary steam engine, which had just begun to be generally used when he was born, Peter Cooper witnessed the inception and growth of all the great material improvements which make our modern life what it is. Many of them, notably the railway and the telegraph, he essentially assisted in the days of their feeble beginnings; and his characteristic attitude toward them all was one of encouragement and hope. He was an optimist of the most wholesome type, not believing that things were well enough as they are, but full of a sublime faith that things can be bettered, and ready to welcome with sanguine support all attempts to better them.

In this, as in many other particulars, the history of Peter Cooper is distinctively American. No other country, in the early years of this century, could have given free scope to the versatile ingenuity and unconquerable perseverance with which he turned from one trade to another, until he planted his foot upon the road to fortune. Under other institutions, he would have remained a hatter, like his father, or become a brewer or a coach maker, after once beginning in either of those trades.

But in this free atmosphere he was able to follow each path that offered itself, to master each business that he undertook, and to leave it for another that promised larger scope. He failed in nothing; each step was an advance; and when at last he took up the manufacture of glue and isinglass, the principal occupation of his life, he pursued it with an unwearied and unconquerable ardor as truly American as his versatility.

Another peculiar feature of his career was his conception of the uses and duties attached to wealth. He felt bound by the very fact of his prosperity not only to relieve the unfortunate, but also to organize agencies which should permanently benefit the city, the growth of which had been the basis of his own success, and the working classes, by whose co-operation all great fortunes are built up. The absence of governmental endowments for charity and for learning has always rendered the claims of these objects upon individual generosity stronger in this country than elsewhere. Public spirit has done among us more than official action could have accomplished; and this spirit, fostered by our political system, has gathered strength through the inspiration of great examples, among which that of Peter Cooper is one of the most conspicuous, and has been perhaps the most fruitful.

Notable as have been the results directly flowing from his beneficence, they are insignificant compared with the indirect consequences of the noble contagion which his enthusiasm communicated to other men. It is impossible to measure the effect of his example, showing as it does both sides; the joy and potency of a wise benevolence, and the immediate reward which it commands in the affection and praise of all mankind.

We had intended, in commencing this article, to emphasize particularly Mr. Cooper's earlier achievements, and their relation to the progress of the arts. But goodness is more than greatness; and we feel that the universal feeling is right when it mourns to-day the departure, and rejoices in the history, not of the ingenious inventor, the successful manufacturer, or the enterprising capitalist, but of the lover of men, whose wisest schemes, like his most trivial acts and words, uttered his inmost disposition. The Cooper Union, planted by his hand, and tended with daily assiduity by him to the last, bears in every part the indelible marks, not merely of the man's wisdom or philanthropy, but of the man's self. As his benign face has been for years a most frequent and familiar object within its walls, so his gentle soul pervades and inhabits it forever.—*R. W. Raymond, Eng. and Min. Jour.*

ALPI, the highest mountain in the Philippines, is 10,824 feet high. Only recently has it been ascended by explorers.

**A HAIRY CHILD.**

The picture is that of a girl, six years of age, covered from head to foot with soft, silky hair. Upon first sight little Kra-o, as the child is named, would appear to be the "missing link" between the ape and man, but a closer examination of this peculiar being will prove that this diagnosis is faulty in all respects. We have simply an excellent type of hypertrichophrisis (superabundance of hair), cases of which have been known in this and previous centuries. Kra-o, who is being exhibited in London at present, is quite an intelligent child, and has acquired enough knowledge of the English language within a few months to be able to make herself understood; and this is an ample proof that, although her outward appearance is that of an animal, she has a bright mind and considerable intelligence. A correspondent of the *Institution Ethnologique*, Mr. H. Kaulitz-Jarlow, writes as follows to the editor of the *Illustrirte Zeitung*:

"Kra-o is about six years old; she is of the same size as other children of her age, but of a finer build; thick, jet black hair covers her head and reaches down to the backbone, and forms a perfect mane on the shoulders; the eyebrows are wide, glossy, and silky, and the eyes are of a deep black with open pupils, and the iris is missing entirely, as in the gorilla; the resemblance to the face of the latter is very great and astonishing; the nose is flat, and has wide nostrils inclined diagonally toward the cheek bones; the cheeks hang down and are baggy, and in them Kra-o stores her food and carries it about with her in the same manner as her cousins of the ape tribe.

Her head, like the human type more than any other part of her body, and the intelligent eyes, the agreeably rounded mouth with the full lips, which can smile very pleasantly

**HAIRY CHILD FROM BORNEO.**

when Kra-o plays and talks, do not at all correspond with the ape-like body of the child. Kra-o is of a brownish-yellow color, and the hair extends from the crown of her head to the soles of her feet. She is generally very jolly, loves to play, and is more thankful than most children if persons take the trouble to amuse her. If she is molested and teased, her wild nature shows itself; she throws herself on the ground, screams, strikes the person, and finds great pleasure in tearing out some of her superabundance of hair."

We must call the attention of our readers to the fact that the above is only an extract from a letter from Mr. Kaulitz-Jarlow, who seems to be very enthusiastic in the matter of classifying Kra-o as one of the apes. Kra-o was found in the presence of her parents in the Loas district, in Borneo. Her father died while traveling to Bangkok, and her mother is at present at the court of the King of Loas. Mr. Karl Bock brought the child to England, and it is now exhibited by Mr. Jarini.

**Bakuol, a Safe Illuminating Oil from Baku Petroleum.**

The introduction of the oils of the Caucasus into commerce naturally attracts much attention in Europe, but more especially in Russia. That their composition is not precisely like that of American petroleum was ascertained a few years ago, and is still further illustrated by the following report of Professor Mendelejeff, president of the Chemical Society of St. Petersburg, upon the preparation of a safe illuminating oil, not flashing below 50° C. (122° Fah.), from Baku naphtha.

Mendelejeff says that by mixing ordinary Baku kerosene,

which has a gravity of 0.82 or 0.83 and burns between 20° to 30° C. (68° to 86° Fah.), with another product of Baku petroleum called "intermediate oil," which has a gravity of 0.86 to 0.88 and does not take fire below 100° C. (212° Fah.), a safe oil can be prepared, using them in the proportions in which they occur naturally, namely, 2 or 3 parts of the former to 1 or 2 parts of the latter. This mixture has a specific gravity of 0.84 or 0.85, and fills all the requirements of an illuminating material free from danger, as it takes fire only between 50° and 70° C. (122° and 158° Fah.). Since such a mixture burns well in the ordinary kerosene lamp, it can be recommended as an excellent illuminant.

The crude petroleum from the Caucasus yields from 20 to 30 per cent of the lighter oil above described (called over there kerosene) and 10 to 20 per cent of the "intermediate" or heavier oil. By the utilization of the described mixture a much larger portion of the petroleum product becomes available for illumination, which would result in reducing its cost.

Mendelejeff proposes the name of "Bakuol" for his new mixture.

[Mixing the oils of high and low flashing points from American petroleum has a very different effect, namely, that of reducing the flashing point of the mixture to a dangerously low point.—Ed.]

**The Aim of Exercise.**

It should be understood by the public, as it is known to the profession, that the aim of exercise is not solely to work the organism which is thrown into activity, though that is one, and a very important, part of the object in view, because as the living body works it feeds, and as it feeds it is replenished; but there is another purpose in exercise, and that is to call into action and stimulate the faculty of recuperation. Those who believe in the existence of a special system, or series, of trophic nerves will not object to this designation of the recuperative function as a separate "faculty," and those who believe nutrition to be effected in and by the ordinary innervation will recognize the sense in which we employ the term in italics. It is through defect or deficiency in the vigor of this faculty that unaccustomed feats of strength, whether of mind or muscle, are found to be exhausting.

The task is performed, but the underlying faculty of restorative energy, or power of recuperative nutrition, located in the particular part exceptionally exercised, is not in a condition to respond to the unusual call made upon it. When a man goes into training, or, which is practically the same thing, when he habituates himself to the performance of a special class of work, he so develops this recuperative power or function that the repair or replenishing necessary to restore the integrity and replace the strength of the tissue "used up" in the exercise is instantly performed.

The difference between being accustomed to exercise and able to work "without feeling it," and being barely able to accomplish a special task, and having it "taken out" of one by the exploit, whether mental or physical, is the difference between possessing the power of rapid repair by nutrition, and not having that power in working order—so that some time must elapse before recovery takes place, and during the interval there will be "fatigue" and more or less exhaustion.

The practical value of a recognition of this commonplace fact in physiology will be found in the guidance it affords as to the best and most direct way of developing the power or faculty of recuperation by exercise. Many persons make the mistake of doing too much. Exercise with a view to recuperation should never so much exceed the capacity of the recuperative faculty as to prostrate the nervous energy. The work done ought not to produce any great sense of fatigue. If "exhaustion" be experienced, the exercise has been excessive in amount.

The best plan to pursue is to begin with a very moderate amount of work, continued during a brief period, and to make the length of the interval between the cessation of exercise and the recovery of a feeling of "freshness" the guide as to the increase of exercise. We do not mean that false sense of revival which is sometimes derived from the recourse to stimulants, but genuine recovery after a brief period of rest and the use of plain nutritious food. If this very simple rule were carried into practice by those who desire "to grow strong," there would be less disappointment, and a generally better result, than often attends the endeavor to profit by exercise unintelligently employed.—*Lancet.*

**Chlorine as Plant Food.**

A German exchange says that chlorine is a very important nutrient for plants. To all appearances the chloride of potassium exceeds the nitrate in nutritive value as long as the quantity does not exceed a definite limit. When there is too much of the chloride, the quantity of chlorophyll decreases, the plants ripen sooner, but the oxalic acid increases in quantity. In fact, it acts just like hydrochloric acid would.