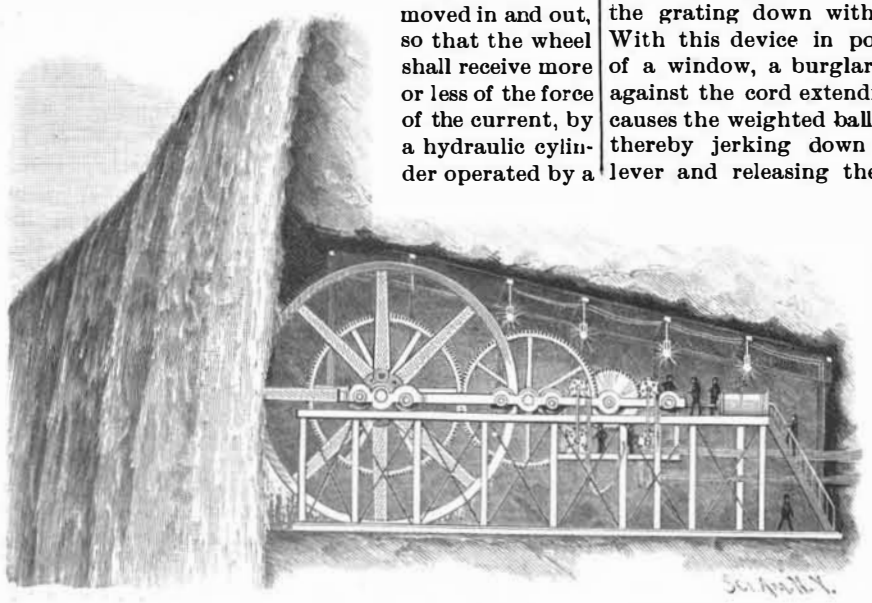
A NEW WATER POWER DEVELOPING DEVICE.

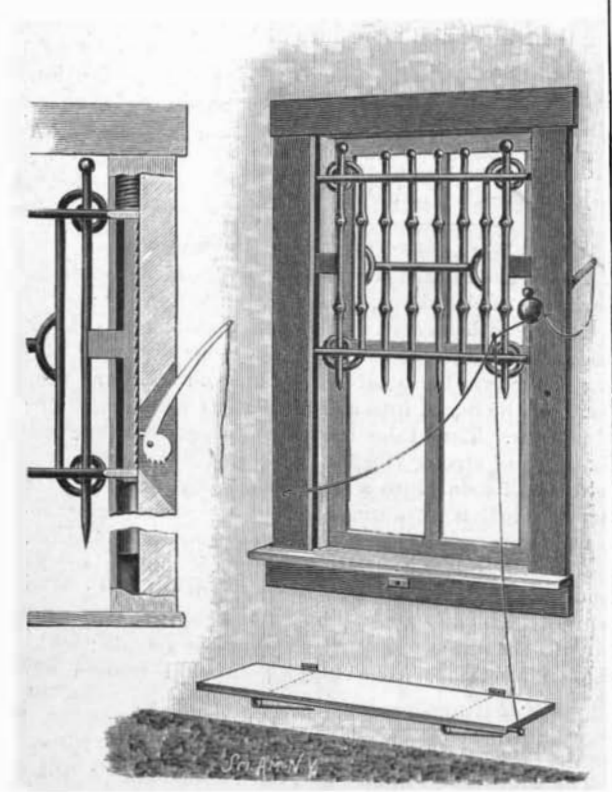
The device represented herewith for economically and efficiently developing natural water powers has been designed by Mr. M. Maginn, a mechanical engineer, of No. 2222 Wabash Avenue, Chicago, who suggests its advantageous use at Niagara Falls. The inventor proposes to excavate a cavity or drift under the falls, in front of which the flow of water will be continuous, making a recess in the rock some 30 feet wide and 65 feet high, and of sufficient depth to accommodate any desired machinery. In this recess is to be fixed, on permanent foundations, a stationary iron truss designed to carry a traveling frame sufficiently heavy to support an overshot steel water wheel of 60 feet diameter, with main driving shaft and spur gears, and intermediate shaft and connecting gears, with which are to be connected electric generators. It is designed to place upon the traveling frame four mammoth dynamos, of approximately 2,500 horse power each, and four similar dynamos upon a suspension frame directly underneath, one-half only of the whole number of dynamos being operated simultaneously, while the others are reserved for auxiliary purposes. The traveling frame is to be moved in and out, so that the wheel shall receive more or less of the force of the current, by a hydraulic cylinder operated by a steam force pump on the river bank, and arranged to automatically keep up the required pressure. The machinery is to have permanent inclosing walls, within which light will be furnished by electricity, the power being distributed to distant points by electric cables.



MAGINN'S DEVICE FOR UTILIZING WATER POWER.

AN IMPROVED WINDOW BURGLAR GUARD.

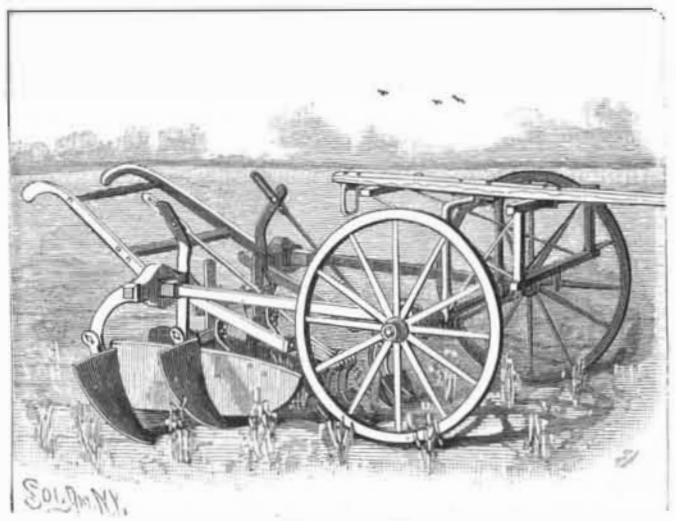
The illustration herewith represents a device by means of which a person attempting to unlawfully enter a building through a window will be caught and held a prisoner. It has been patented by Mr. John B. Harris, of Eutaw, Ala. The inner face of the sides of the window frame are provided with grooved ways extending from top to bottom, in which are adapted to slide projections from a perpendicularly moving metallic grating, these projections being attached to vertically sliding bars, while the lower ends of the grating bars are formed with sharp points. To hold the grating in raised position when set for use, a lever with cam-shaped head is pivoted in a recess in the side of the window frame, as shown in the sectional view, the lever having a pin adapted to fit in one of a series of holes in the vertically sliding bar in the grooved ways in the side of the casing. The cam-shaped head also has teeth by which the grating may be locked in lowered position. A bracket is mounted at the window side, in the shape of a ring, over which fits another hinged ring having an arm, the latter ring being adapted to hold a weighted ball, connected by a cord with the lever holding the grating in raised position, a cord from the arm likewise leading across and being made secure upon the other side of the window frame. Beneath the window frame is a board mounted on springs, and serving as a step, a cord from this board being also fastened at its other end to the arm extending from the ring supporting the weighted ball. This board is hinged so that it may be folded up against the wall and secured by a button when not in use. In the bottom of each pocket of the grooved ways at the sides of the window frame are cushions for the vertically sliding bars to strike against when the grating falls, and to the upper ends of the bars are secured coiled springs to throw the grating down with force when released. With this device in position upon the inside of a window, a burglar entering, on pushing against the cord extending across the window, causes the weighted ball to drop off the inclined arm, thereby jerking down the arm of the cam-headed lever and releasing the pin holding up the grating, which is then thrown down by the compressed springs. Should the burglar observe the cord, and cut it, a similar result would follow upon his pressing his foot on the step just inside the window, the intruder being in either case impaled by the sharp points of the descending grating.



HARRIS' WINDOW BURGLAR GUARD.

AN IMPROVED CULTIVATOR.

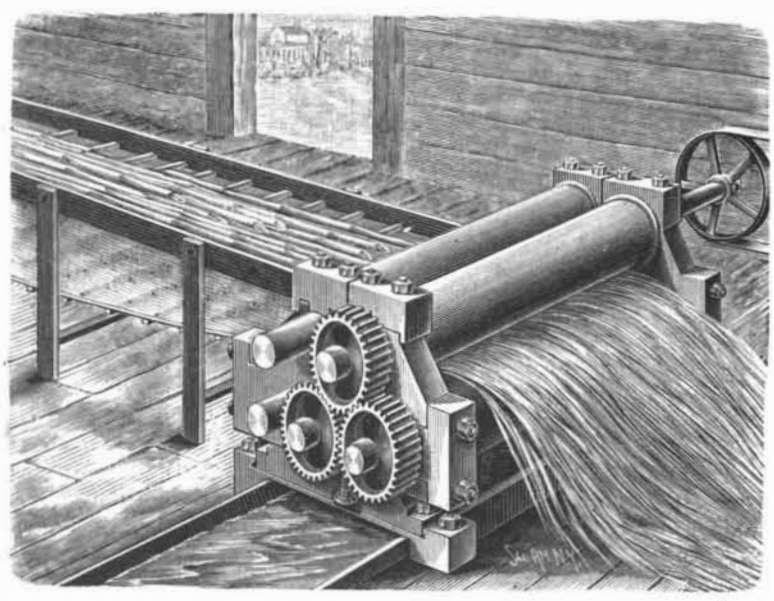
The accompanying illustration represents an improved cultivator which has been invented by Mr. Enoch Landes, of Reserve, Brown County, Kansas. It is designed specially for cultivating young corn, and is adapted to be used alone or in connection with a riding frame. It has an adjustable shield for protecting the plants, and the cultivator blades are adapted to break up the ground and clear away the weeds at each side of the rows, the blades and hoes being adjustable. The frame block from which the handles extend has on its inner end a downwardly extending arm, to which a cultivator blade is adjustably attached, while a rearwardly curved arm carries another detachably secured cultivator blade. To the inner face of this blade-carrying arm bars are secured which carry two or more forwardly curved hoes, the vertical adjustment of which is effected by a rod carried rearward and upward to a contact with the inclined face of an upper extension of the blade-carrying arm. From a perpendicular standard on the inside of the blade-carrying arm a shield is adjustably secured, adapted to travel upon the ground longitudinally of the implement between the rows to be cultivated, the attachment of the shield being such that it may be given any vertical inclination desired. In operation it is designed that two of these cultivators shall be employed, one to travel at each side of the row, the shafts or tongues being united to a transverse pole, to which the whiffletrees are attached, or directly to the axles of a pair of wheels or equivalent riding apparatus.



LANDES' CULTIVATOR.

IMPROVED MILL FOR CRUSHING SUGAR CANE.

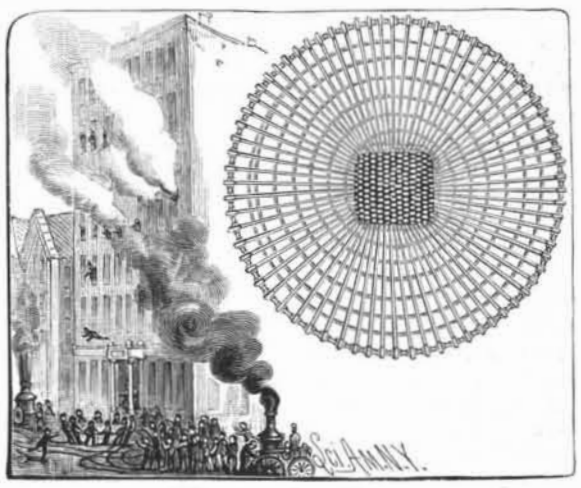
The accompanying illustration represents a mill designed to crush sugar cane so thoroughly as to extract all the juice therefrom, and furnish a dry bagasse. It has been patented by Mr. Charles Hughes of Matanzas, Cuba. The mill is made with five rollers, three being mounted alongside of each other in a horizontal plane, while the other two are placed above and inside the outer line of the lower rollers, the rollers being all geared together, so that a rotary motion imparted to one will be communicated to all. Adjustable turn plates are supported between the first and second and the second and third lower rollers, and there is one such plate centrally between the two top rollers, whereby the cane will be passed through, so as to be subjected four times to the pressure of the rollers, from its entrance at one side to its exit at the other. Each of the lower rollers has an annular flange to prevent the cane from leaving the roller sidewise, while a pan or other suitable receptacle is placed below to receive the juice pressed out of the cane. The shafts of the two outer lower rollers are mounted in sidewise adjustable boxes, but the shaft of the central roller is mounted in bearings which are adjustable sidewise and laterally, so as to regulate the relative distance between the several rollers with great accuracy. The adjustable bearing of the central roller consists of a box resting on a bottom plate supported on a wedge-shaped plate, through a groove of which pass set screws to raise or lower the box as desired, there being also vertically adjustable wedge-shaped plates on the sides of each box, with bolts and nuts to take up sidewise pressure.



HUGHES' CANE MILL.

AN IMPROVED LIFE-SAVING NET.

A net designed to be held beneath the windows of a burning building, so that the inmates in jumping or falling upon it will not be injured, is illustrated herewith, and has been patented by Mr. Malcom Hunter, of No. 32 Dutch Kill Street, Long Island City, N. Y. This net is preferably made about ten feet in diameter, of Russian bolt rope three-quarters of an inch in circumference, and with a three-sixteenths inch outside galvanized grasping chain, but has an approximately solid rope center piece, with ropes radiating therefrom to form the body proper of the net. Each of the radiating ropes is equal in length to the full diameter of the net, and they are so intertwined and spliced with short pieces as to make at the center a compact, closely united piece, affording great strength, while still designed to act as a cushion for a body falling thereon. The use of a grasping chain instead of a heavy rope permits the net to be folded into a small compass.



HUNTER'S LIFE-SAVING NET.

COLORADO is becoming an oil producing State. Wells in the valley of the Arkansas, near Pueblo, are yielding about 1,000 barrels per day.

Funeral Ceremonies in Paris.

In all countries death and the ceremonies of burial are sad and repulsive. In France, perhaps, decency is observed as well as in any country, thanks to the excellent organization of the Compagnie des Pompes Funebres, which forms, so to speak, the administration of all the churches in Paris, exercising on their behalf the monopoly of funeral ceremonies. This company, whose monopoly is regulated by law, is a vast enterprise, possessed of exceptional resources, an immense number of horses and carriages, a numerous and well disciplined personnel. Every year it takes charge of about fifty thousand funerals, about half of which are those of the poor. Thanks to this enterprise, even the poorest citizens are buried with some show of decency and in conformity with strict rules. The administration of the Pompes Funebres is situated in Paris in the Quaie d'Aubervilliers. It is a big, heavy, white stone building, built round a vast glass-roofed court yard. To the right and left of the entrance doors are the offices of the director and the bookkeeping department. In the court yards are the store rooms, the stables, the coach houses, and the harness rooms. Everything is black, somber, and silent; everything is rigorously numbered and ticketed, classified, and arranged for immediate use. The porteurs, or bearers, commonly called *croquemorts*, have a big room furnished with oak benches, where they assemble every morning, four hundred in number, to await orders—gloomy, serious, clad in various styles, some with blouses, but most of them in jackets. Over this room are other rooms with cupboards running down the middle in double rows. Each cupboard is numbered and fitted with a lock, the key of which the correspondingly numbered *croquemort* keeps. In these cupboards are kept the uniforms of the bearers, who dress before going out on service and undress when their service is over, only wearing their regulation costume while on duty. The masters of ceremonies have each a private room to dress in. Their uniform consists of a cocked hat, coat, knee breeches, silk stockings, buckled shoes, a court sword, and a wand. This personage is paid by the day, so much for each funeral. His duty is to arrange the procession in proper order, to fix the order of the precedence among the mourners, and to start the funeral.

Beneath the vast building of the Pompes Funebres are cellars dimly lighted with gas jets and full of rows and rows of coffins of all sizes and qualities. This cellar contains a stock of fifteen thousand coffins ready for use, varying in length from six feet two and one-half inches down to twenty-seven and one-half inches, which are the regulation maximum and minimum sizes of dead French humanity. For persons taller than six feet two and one-half inches a coffin has to be built on purpose, and to order. On one side of the cellar are the lead coffins, and in one corner a stock of square boxes in which coffins are packed for traveling by rail or steamer without attracting attention. Near the door of the cellar are some huge coffins, with a circumference of six to nine feet, destined for the accommodation of very obese corpses. Likewise near the door are thirty hand-carts of peculiar form, on two wheels, painted green and lined with black. These carts are used only when some terrible epidemic is decimating the population. The price of the coffins, of the inner lining, and of the covering pall, are all regulated by an immutable tariff. In 1870, during the siege, the little hand-carts, painted green and lined with black, had to serve universally as hearses, for all the horses had been killed for food.—*New York Mail and Express.*

Friction of Steam Engines.

According to recent experiments of Dr. R. H. Thurston, the friction of a Sweet straight line engine, cylinder 6 inches by 12 inches, rated at 20 horse power, without load and with ordinary slide valve, was 12 per cent of the rated power. When arranged with a balanced valve, the friction was 9 per cent of the rated power.

A Lansing high speed automatic engine, with cylinder 12 inches by 18 inches, rated at 100 horse power, the friction without load was found to be 8·88 per cent of the rated horse power.

A traction engine, locomotive type, with cylinder 7 inches by 10 inches, rated at 20 horse power, the friction without load was found to be 9 52 per cent of the rated horse power. In a condensing engine with cylinder 21 inches by 20 inches, being part of a compound engine, the low pressure cylinder indicating 71 horse power, the friction without load was 7 horse power, or 10 per cent of the indicated power.

In conclusion he remarks that it may be fairly conceded, after many years of engineering opinion to the contrary, that the friction of engines, loaded or not loaded, is nearly a constant, variable only with the condition of lubrication, and slightly only with great variations in speed. The friction of unbalanced valves was found to be about one-third of one per cent of the gross friction, and of the balanced valves about 0·025 of one per cent of gross friction.

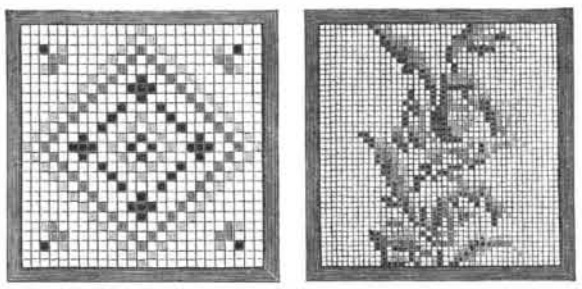
And finally that, in the various makes of engines tested, the maximum cofficient of friction may rise to 20 per cent of the indicated power, or fall to less than one per cent in the best engines.

METHOD OF PRODUCING DESIGNS ON WIRE CLOTH.

BY GEO. M. HOPKINS.

An experiment showing a phase of capillarity is illustrated by the annexed engravings. This experiment was originally intended for illustrating tapestry and other designs formed of small squares, in colors, upon the screen; but it has another practical application, which is capable of considerable expansion. For projection, a piece of brass wire cloth, of any desired mesh, say from 12 to 20 to the inch, is mounted in a metallic frame to adapt it to the slide holder of the lantern, and the wire cloth is coated lightly with lacquer and allowed to dry.

The slide thus prepared is placed in the lantern and focused. The required design may now be traced by means of a small camel's hair brush, colored inks or aqueous solutions of aniline dyes being used. The small



METHOD OF PRODUCING DESIGNS ON WIRE CLOTH.

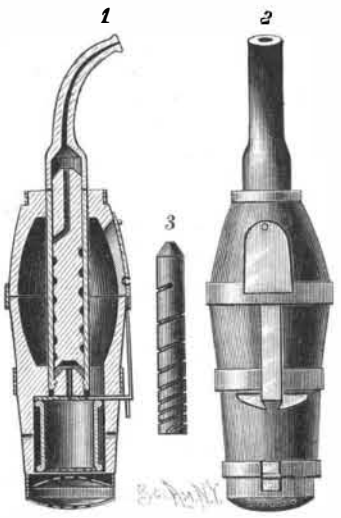
squares of the wire cloth are filled with the colored liquid, and show as colored squares upon the screen. Different colors may be placed in juxtaposition without liability to mixing, and a design traced without special care will appear regular, as the rectangular apertures of the wire cloth control the different parts of the design.

The colored liquid squares are retained in the meshes of the wire cloth by capillarity. A damp sponge will remove the color, so that the experiment may be repeated as often as desired. In this experiment the colored squares have the appearance of gems.

These designs may be made permanent by employing solutions of colored gelatine; but in this case the squares are so small that they are not very effective without magnification. Really elegant designs may be produced in this way for lamp shades, window and fire screens, signs, etc. The mesh of the wire cloth should be quite coarse, say 10 to the inch. The wire cloth is supported a short distance from a design drawn on paper, and the different colors are introduced into the meshes by means of an ordinary writing pen. The gelatine solution should not be very thick, and it must be kept warm. Ordinary transparent gelatine may be colored for this purpose by adding aniline. Colored lacquers answer admirably for filling the squares. The beauty of this kind of work and the simplicity of the method by which it is produced recommend it for many purposes.

AN IMPROVED TOBACCO SMOKING PIPE.

The accompanying illustration represents a pipe designed to prevent the nicotine and other unhealthy substances from entering the smoker's system. It has been patented by Mr. George F. Colquitt, of No. 906 Walker Street, Denison, Texas. The pipe has an oval shaped barrel surrounding the central tube, as shown in Fig. 1, for the storage of tobacco, the tobacco being introduced by an outside door, shown in Fig. 2, while immediately beneath this door is a gate, closed by a spring bar, by means of which the tobacco is admitted to the combustion chamber below, having a perforated bottom. A tube is held centrally in the barrel, the pipe stem being held in this tube, a spiral groove being cut on the stem, as shown in Fig. 3, leading to a central aperture in the upper part of the stem, opening at the top into the mouth piece. The tobacco in the barrel is separated from that in the combustion chamber by the spring gate, after sufficient has been allowed to pass down, and fire is communicated through an opening in the bottom cover. In smoking, the nicotine will be mainly deposited on the conical end of the plug in the lower part of the central tube, while the smoke travels a long distance around the spiral groove before it reaches the smoker's mouth.



COLQUITT'S TOBACCO PIPE.

The Sacredness of Seven.

A writer in the *Agricultural Implement* has been studying over the mystical number seven, and concludes that it is undoubtedly the sacred number. There are seven days of creation; after seven days' respite the flood came; the years of famine and plenty were in cycles of seven; every seventh day was a Sabbath, every seventh year is the Sabbath of rest; after each seven times seven years came the jubilee; the feasts of unleavened bread and the tabernacles were observed seven days; the golden candlestick had seven branches; seven priests with seven trumpets surrounded Jericho seven times and seven times the seventh day; Jacob obtained his wives by servitudes of seven years; Samson kept his nuptials seven days, and on the seventh day he put a riddle to his wife, and he was bound with seven green withes and seven locks of his hair were shaved off; Nebuchadnezzar was seven years a beast; Shadrach and his two companions were cast into a furnace heated seven times more than it was wont. In the New Testament nearly everything occurs by sevens, and at the end of the sacred volume we read of seven churches, seven candlesticks, seven spirits, seven trumpets, seven seals, seven stars, seven thunders, seven vials, seven plagues, seven angels, and a seven-headed monster.

Ventilating Our Homes.

An old writer says: "When men lived in houses of reeds, they had constitutions of oak; when they live in houses of oak, they have constitutions of reeds."

Evidently the truth inculcated is that the better the air and more bountiful its supply, the healthier is the inmate of a house, be it palace or cottage. Too often the very wealth of a house builder militates against his splendid mansion becoming that ideal home of comfort that it should be, and the inmate of some wretched, leaky little hovel, perched on a rocky hillside, will have every advantage over such a one as regards vigor of body and elasticity of spirits.

Science tells us that there is a needed respiration for the walls of our houses, and that, fortunately for us, whether conscious of it or not, the materials of which our modern houses are made admit of the passage of air in a greater or less degree. Brick, stone, wood, and mortar, solid as they look to us, are easily pierced by that volatile fluid which we call air.

Such is the elasticity of air that, fortunately for us, a slight force only is needed to put and keep it in motion. The difference of 20° Fahrenheit in temperature between outdoor air and indoor air will cause the passage of about eight cubic feet of air each hour through every square yard of wall surface made of brick. A plastered wall also admits of the free passage of air, and actually serves as an efficient filter by arresting the progress of dust or any of those particles—often injurious—with which the atmosphere is laden.

Heat is the great motor for ventilation, whether natural or artificial, and the great problem in winter is to introduce a sufficient quantity of pure warmed air to make one's room comfortable without attendant draughts that shall imperil the health of their occupants.

Open fireplaces, whether the fuel consumed in them be wood or coal, are among the very best ventilators that we have, and yet the question of expense is bringing them more and more into disuse. But there is no need to be discouraged on that score, because the eyes of all practical people are being opened to the importance of combining the twin forces of heat and ventilation in such a manner as shall tend, in the future, to prolong life as well as render it more comfortable and enjoyable.—*N. Y. Fashion Bazar.*

Easy Experiment in Chemistry.

The *Practical Teacher* gives the following simple experiment in chemistry, which any child can try:

Cut three leaves of red cabbage into small pieces, and, after placing them in a basin, pour a pint of boiling water over them, letting them stand an hour; then pour off the liquid into a decanter. It will be of a fine blue color. Then take four wineglasses—into one put six drops of strong vinegar; into another, six drops of solution of soda; into a third, the same quantity of a strong solution of alum; and let the fourth glass remain empty. Fill up the glasses from the decanter, and the liquid poured into the glass containing the acid will quickly change to a beautiful red; that poured with the soda will be a fine green; that poured in with the alum will turn to a pretty purple; while that poured into the empty glass will remain unchanged.

Underpinning of Houses.

The walls under houses and barn basements, if they have been built several years, always need some attention on the approach of winter. Our climate, so moist in fall and so cold in winter, makes sad havoc with walls. Mortar being largely composed of lime readily absorbs dampness, and freezing when moist disintegrates it. A little fresh mortar and a few hours' work with the trowel will save the ingress of much cold every winter.