Photography of the Billows.

When crossing the Atlantic I was desirous of obtaining some instantaneous photographs which should convey a true idea of the billows. When studying the contour of the waves with the intention of drawing the trigger upon a group of them suitable for my purpose, I was compelled to give up in despair all hope of securing anything which would at all convey a faithful idea of the scene. The strict scientific reality could easily be secured, for the photographing of waves is a very easy matter if one has rapid plates and a quick shutter, but I felt that realism in such a case would not be truth.

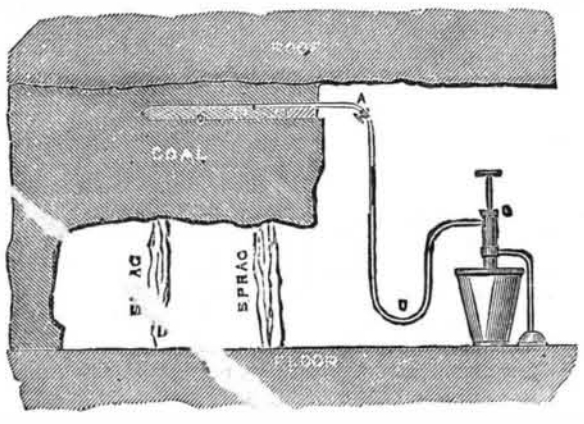
Mentioning this difficulty to Mr. Moran, the artist, with whom I conversed on that apparently paradoxical topic—the untruthfulness of real truth—he observed that artists fully realized this difficulty, and that with reference to the present case he could by a few strokes of the brush on the canvas convey a far more accurate idea of the Atlantic billows than could be obtained by any series of the most perfect realistic views that could be taken by the camera. I thought at the time what a wonderfully effective picture could be obtained if a series of instantaneous photographs of Atlantic waves, consisting of about thirty, and taken at intervals of a quarter of a second, were printed in such order as to be capable of being viewed by one of that now numerous class of thaumatropic instruments known by every kind of name from the "phenakistoscope" down to the "wheel of life," or "praxiscope." Think of such a picture being projected on the screen of the lantern and showing an Atlantic wave in actual motion!—*J. T. Taylor, in Photo Times.*

BLASTING WITH LIME.

At a recent meeting of the Iron and Steel Institute a paper by Mr. Moseley on a new system of bringing down coal was read. This was a short and useful paper, describing a system of getting coal by the aid of quicklime and water, of which something has recently been heard. The accompanying diagram shows the method in question, which is used with great success in Messrs. Smith & Moore's Shipley Collieries, Derbyshire.

The mode of operating is to employ lime in a specially caustic state made from mountain limestone. This is ground to a fine powder, and consolidated by a pressure of about forty tons into the form of cartridges, two and a half inches in diameter, having a groove along the side. These are then packed into airtight boxes to protect them from damp, and are ready to be conveyed to the mine for use. The shot holes are first drilled by means of a light boring machine, and an iron tube, about one half inch in diameter, having a small external channel or groove on the upper side, and provided also with perforations, is then inserted along the whole length of the bore hole. This tube is inclosed in a bag of calico, covering the perforations and one end, and has a tap, A, fitted on to the other end. The cartridges, B, are then inserted and lightly rammed, so as to insure their filling the bore hole.

After the cartridges have been inclosed by tamping, in the same way as with gunpowder, a small force pump, C, is connected with the tap at the end of the tube by means of a short flexible pipe, D, and a quantity of water, equal in bulk to the quantity of lime used, is forced in. The water, being



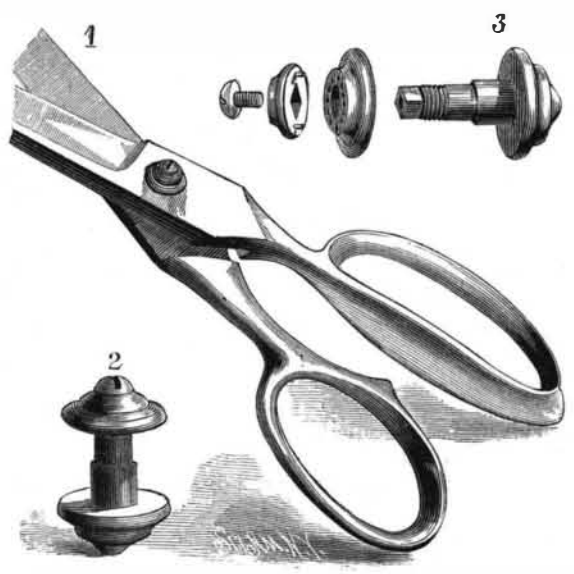
BLASTING WITH LIME.

driven to the far end of the shot hole through the tube, escapes along the groove and through the perforations and the calico, flowing toward the tamping into the lime, saturating the whole of the charge, and driving out the air before it. The tap is then closed, so as to prevent the escape of the steam generated by the action of the water on the lime, and the flexible pipe attached to the pump is disconnected. The action of the steam first takes place, cracking the coal away from the roof, and this is followed by the expansive force of the lime. The sprags are left in under the coal so as to allow the force to exert itself as far back as possible, and in many instances the coal is forced off and falls for a distance of several inches behind the end of the drilled holes. In ten to fifteen minutes, on the removal of the sprags, the coal falls clean from the roof, in large masses ready for loading, practically making no small. This system, says the *Engineer*, has the great advantage of doing away with all danger of igniting gas and causing an explosion.

NEW NUT LOCK.

The engraving shows a novel and very effective nut lock for the screw pivots of shears, scissors, and many other purposes. By this device the loosening of the retaining nut is prevented, and it does not materially differ in appearance from the common screw nut of the pivots of shears, scissors, and similar articles, while it can be applied in all cases in which absolute security against the loosening of a screw is desirable, thus making it a perfect nut lock or safety screw.

The screw pivot has a fixed head and a nut screwed on the threaded shank of the pivot, the nut having a number of



KEMMLER'S NUT LOCK FOR SCREWS.

socket holes arranged in a circle, into which the projecting pins of a cap plate enter. The cap plate has a square center opening, which fits on the square end of the screw pivot. A screw entering the end of the screw pivot holds the cap plate in place.

Fig. 1 shows the pivot screw with the improved nut lock applied to a pair of shears; Fig. 2 shows the pivot screw separated from the shears; and Fig. 3 shows the several parts separately in the order in which they go together.

Further information in regard to this useful invention may be obtained by addressing Mr. W. C. Kemmler, Columbus, Ohio.

The Poisonous Constituents of Tobacco-smoke.

A series of experiments has been recently conducted by Herr Kissling, of Bremen, with the view of ascertaining the proportions of nicotine and other poisonous substances in the smoke of cigars. His paper, in *Dingler's Polytechnisches Journal*, gives a useful *résumé* of the work of previous observers. He specifies, as strongly poisonous constituents, carbonic oxide, sulphureted hydrogen, prussic acid, picoline-bases, and nicotine. The first three occur, however, in such small proportion, and their volatility is so great, that their share in the action of tobacco-smoke on the system may be neglected. The picoline-bases, too, are present in comparatively small quantity; so that the poisonous character of the smoke may be almost exclusively attributed to the large proportion of nicotine present. Only a small part of the nicotine in a cigar is destroyed by the process of smoking, and a relatively large portion passes off with the smoke. The proportion of nicotine in the smoke depends, of course, essentially on the kind of tobacco; but the relative amount of nicotine which passes from a cigar into smoke depends chiefly on how far the cigar has been smoked, as the nicotine content of the unsmoked part of a cigar is in inverse ratio to the size of this part—*i. e.*, more nicotine the shorter the part. Evidently, in a burning cigar, the slowly-advancing zone of glow drives before it the distillable matters, so that in the yet unburnt portion a constant accumulation of these takes place. It would appear that in the case of cigars that are poor in nicotine, more of this substance relatively passes into smoke than in the case of cigars with much nicotine; also that nicotine, notwithstanding its high boiling point, has remarkable volatility.

Anhydro-sulphamin-benzoic Acid.

Anhydro-sulphamin-benzoic acid, the recent addition to the list of chemical products, is described as a white crystalline substance, very soluble in alcohol, but sparingly soluble in water, and characterized by a sweetness so great that the merest trace of the alcoholic solution in water gives it a distinctly sweet taste. Its discoverer, Dr. Constantine Falberg, estimates that it has from twenty to thirty times the sweetness of cane sugar. Should it prove wholesome and producible in quantity, with comparative cheapness, it may play an important part in the future social and industrial history of the world.

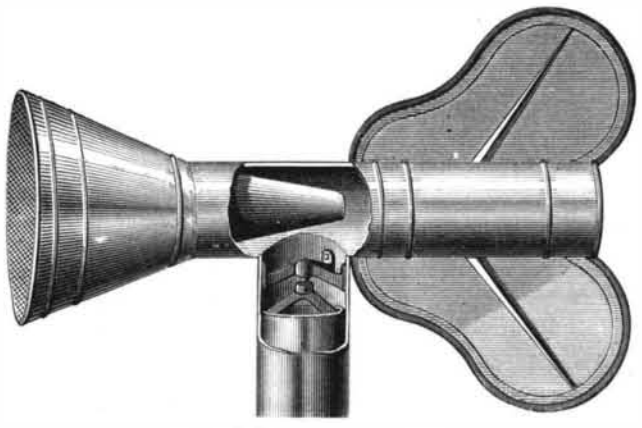
A Submarine Detecter.

The importance of being able readily to discover the locality of a submerged torpedo or a metallic obstruction in time of war, or of lost anchors, chains, or electric cables in time of peace can hardly be over-estimated, and hence the value of a submarine detecter, the working of which we have recently seen demonstrated. This instrument is the invention of Captain McEvoy, who is well known in connection with submarine engineering and torpedoes, in which he has from time to time introduced some very marked improvements. The apparatus consists of a small mahogany box, in which there is a pair of coils or bobbins, a vibrator similar to that employed in electric bells for making and breaking contact, and a telephone. To this box is attached a given length of flexible cable, with four conducting wires in it. To the other end of this cable is attached a flat wooden case, in which there are two coils. This case is weighted so that it will readily sink when placed in the water. There are also terminals on the box for attaching battery wires, and an arrangement for putting on and cutting off the current is provided. There are two complete circuits through the box, cable, and wooden case, the one primary and the other secondary. The battery, the vibrator, one coil in the box, and one coil in the wooden case are in the primary circuit, while the telephone, one coil in the box, and one coil in the wooden case are in the secondary circuit. When the battery is on, the coils in the box are adjusted so that little or no noise from the make-and-break action of the vibrator is heard in the telephone. When thus adjusted the instrument is ready for work, and if the wooden case is then brought near a metallic body a loud noise is heard in the telephone, thus indicating the proximity and locality of such a body. The principle upon which this invention is based is that of the induction balance of Professor Hughes. In Captain McEvoy's apparatus the application of the principle to the detection of the presence of metallic bodies through the sense of hearing has been worked out in a very ingenious and equally practical manner. The instrument cannot fail to prove invaluable in discovering and locating the position of the objects we have mentioned, as well as in indicating the whereabouts of sunken ships, helping to recover treasures, and in assisting generally the operations of divers.

NEW VENTILATOR.

We give herewith an engraving of a novel ventilator, patented by Mr. J. M Fennerty, and manufactured by the Fennerty Siphon Ventilator Co., of Memphis, Tenn. This ventilator, as will be seen by reference to the engraving, is made on the ejector principle, a winged horizontal tube, having on its end facing the wind a funnel projecting into it, and beyond the vertical pipe with which the horizontal pipe communicates, and over which it is pivoted. The vertical pipe is provided with a valve which prevents any possibility of a downward draught.

The wind blowing in the funnel creates a partial vacuum at the upper end of the vertical pipe, which insures a continual upward draught in the pipe. The vanes are sufficiently large to keep the funnel always facing the wind, so that the slightest breeze concentrates a stream of air at the smaller end of the funnel, and creates an upward movement of the air to the vertical pipe.



FENNERTY'S VENTILATOR.

This ventilator is well adapted for ventilating dwellings, cars, steamboats, mills, and mines. It has no parts to wear or become injured by exposure. It is inexpensive in its construction, and can be made by ordinary tools.

Examination of Glasses.

The author applies the known blowpipe reactions. Lead in glass or enamel is detected by heating for a minute or two a bead of the sample fused to the end of a small glass rod. Glass free from lead shows no change. Specimens containing much lead blacken, and the bead becomes opaque. Green cupriferous glass, if heated in the reduction flame, is colored in parts an intense purple red. The simultaneous presence of lead masks this reaction. If a fragment which is to be tested for copper or gold is heated in a glass tube, and if both are drawn out a little while soft, the color due to gold remains unchanged, while red copper-glass becomes perfectly colorless.—*Max Müller.*