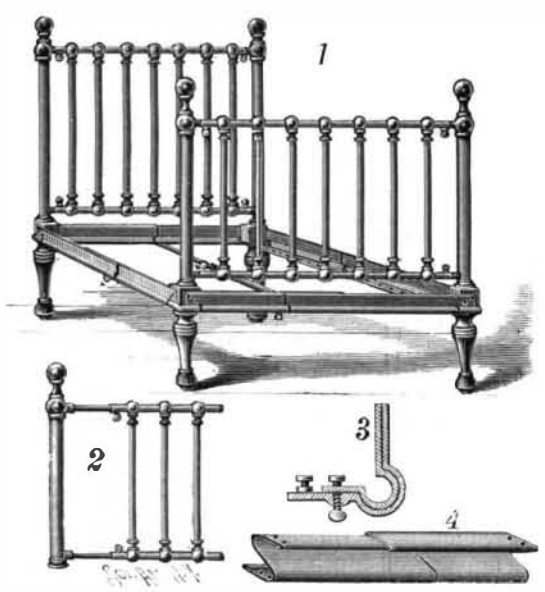
Cross Lighting.

Some traditions die hard, being accepted without examination by nine persons out of ten and by all who are in or under authority and, like officials generally, opposed to, or suspicious of, innovation. Among these is the belief in the hurtfulness of cross lighting. This method of lighting would seem only to be held injurious in schools, for in our own houses we are only too pleased if we can have windows on two or more sides of a room. Even in Germany, where statistics and experimental investigation pervade every department of administration, and where in each detail the executive is guided by an order in council somewhat inappropriately called an "Erlass," we find cross or double lighting still expressly condemned. Yet Cohn and Förster, Javal and Ferrand, Rumbold and a Royal Commission on School Construction have urged the groundless nature of the prejudice. Provided always that the eyes are not dazzled and that no shadow falls on the reading or writing, it is impossible to have too much diffused daylight or its artificial equivalent. The loss of intensity with increasing obliquity of the rays of light is acutely felt in wide rooms, especially when not high in proportion, on the side opposite the windows; whereas if there be windows or lights on each side, the intensity of illumination is equalized and its total amount doubled. It is only necessary that that coming from the right should be naturally or artificially the weaker, as by having the windows north and south or by filling those on the right with clouded glass. Windows in front are always objectionable, but light from behind, if not so strong as to cast a shadow, can but serve to increase the illumination derived from the proper quarter. As Cohn and Förster long since pointed out, reading or other work demanding clear but effortless vision is in the open air when the sky is overcast a real luxury. Under these circumstances the light is ample but shadowless; it comes from everywhere, but from no one quarter more than from another. The most perfect artificial illumination conceivable is that obtained by Hrabowski's arrangement of hemispherical milk glass reflectors with prisms and mirrors by which the light of an electric arc lamp is diffused equally throughout the building, though the source is hidden from view. The light is photometrically equal to that of a clear summer day and as free from color; it is almost shadowless and is, in fact, superior to daylight in not being liable to fluctuations, although its intensity can be regulated at will.—London Lancet.

A NEW EXTENSION BED.

An extension bed has been patented by Alfred W. Furnival and Henry Martin, of Second Avenue, Astoria, N. Y., which may be adjusted in length and width to meet various requirements. With this object in view, the side and end rails are made in two parts adapted to slide one upon the other. As indicated in the cross section in Fig. 3, these rails are constructed of plates so bent as to form vertical and horizontal flanges which are united by a bulb. The rail sections may slide longitudinally, but are prevented from being laterally displaced by the peculiar construction of the bulb. By means of a screw, the two parts of each rail may be held in any desired position. To the rails corner-blocks are secured and provided with legs. Corner-posts are carried by the blocks and have adjustable connection with the head and foot pieces. As shown in Fig. 2, the head and foot pieces are composed of hor-



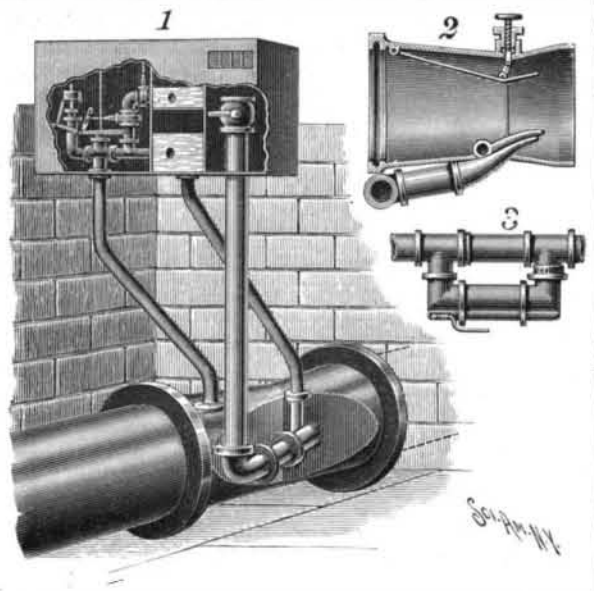
A NEW EXTENSION BED.

izontal tubes and vertical connecting rods. The horizontal tubes slide over rods fixed to the corner posts and are held in any desired position by means of screws. The springs for this bed are shown in perspective in Fig. 4. These consist of reversely curved plates adjustable longitudinally and rolled over or beaded to prevent lateral displacement. The springs are held within the bed by means of holes engaging pins on the side rails, and are supported at their central portions by means of a rod made of telescoping sections and extending between the end rails.

Among the many advantages claimed for this bed are its structural firmness and its ready adjustability to conform with the accommodations afforded by various rooms. The construction of the springs is noteworthy for the novel means employed to prevent sagging of the central portions.

AN APPARATUS FOR PURIFYING WATER.

The methods usually employed in purifying water require costly pumping and filtering stations and



McELROY'S APPARATUS FOR PURIFYING WATER.

special machinery. It is the purpose of an invention patented by the designing engineer of the Brooklyn Water Works, Mr. Samuel McElroy, 170 Broadway, New York, to supersede these expensive appliances by providing an apparatus in which the force of gravity becomes the agent of applying air or antiseptic solutions to the water running in a conduit.

In the line of the conduit the inventor places the induction valve shown in Fig. 2, the casing of which is contracted between its ends, so as to produce an increased velocity of water in the throat thus formed. This valve is further provided with inlets for the entrance of air and of antiseptic gases or solutions, and with a deflecting plate adjusted by a screw rod to promote the increased velocity of the water. A casing, as shown in Fig. 1, is placed near the induction valve and is provided with an air chamber properly connected with an inlet to the induction valve and with a check or stop valve to guard against reactions. The casing is furthermore provided with a solution chamber and with a mixing chamber also connected with the induction valve and guarded by proper check and stop valves. The solution and mixing chambers supply the antiseptic gases as they are required. A roil pipe is applied to the conduit as shown in Fig. 3, for the purpose of collecting the organic matter with which the water may be impregnated.

In operation the water flowing through the conduit will produce a draft which draws through their respective pipes the air from the air chamber in the casing and the antiseptic solutions stored in the solution chamber. The impurities of the water coming into contact with these corrective agents will be destroyed or neutralized.

Among the advantages claimed for this apparatus are its automatic action and its cheapness.

The Slime on Fishes.

A fish just taken from the water, if handled, says The New York Sun, is found to be slippery and coated with slime. All fishes, the meanest and the noblest, killi-fish and shark, shad, salmon, and trout, wear this slime. They could not exist without it.

The slime is secreted usually in a continuous series of ducts with numerous openings, arranged in a line extending along the side of the fish. Some fishes have one line on a side, some have five or six. The lines may be plainly visible, and in some cases appear to be a marking on the fish. More often they are not observable at all. Some fishes store this secretion in pores distributed over the whole surface of the body, the larger number, however, in pores in lateral lines. There are also pores for the secretion of mucus or slime in a fish's head.

The slime is exuded through the divisions between the scales to the outer part of the body, over which it spreads, forming a sort of outer skin or covering, transparent, and having elasticity and tenacity, and often considerable body. It would not be remarkable for a fair sized fish, say a fish of two pounds weight, to have a coating of slime a thirty-second of an inch in thickness. Fishes vary greatly in the amount of slime which they secrete; the eel will suggest itself as one that is very slimy.

The fish's slimy coating reduces its friction when in motion and helps to increase its speed. It aids in protecting the scales from injury, being of sufficient substance to serve in some measure as a cushion. The slimy covering makes the fish hard to hold, and so enables it the more readily to escape from its enemies. It is sometimes repugnant to other fishes, which are repelled by its odor. It is the slime from the fishes handled that makes the angler "smell fishy" as the expression goes.

A most important function of the fish's slimy coating is to protect it from the attacks of fungus, a form of plant life found in all waters, salt and fresh, including the purest. The slime covers the entire exterior surface of the fish, including the fins. Fungus does not attach to the slime; but if the fish were to be injured so that there was upon it some spot uncovered by the slime, upon that spot some minute fragment of fungus, so small as to be scarcely more than visible, would be likely to lodge. Once lodged, the fungus is reproduced very fast.

Fish sometimes recover from attacks of fungus, but much more often they do not. The fungus displaces the skin, inflammation is set up, and the place attacked becomes practically a sore. With its continued growth the fungus may cover the side of the fish and extend over the gills and finally kill it.

THE "SENTINEL" BICYCLE-LOCK.

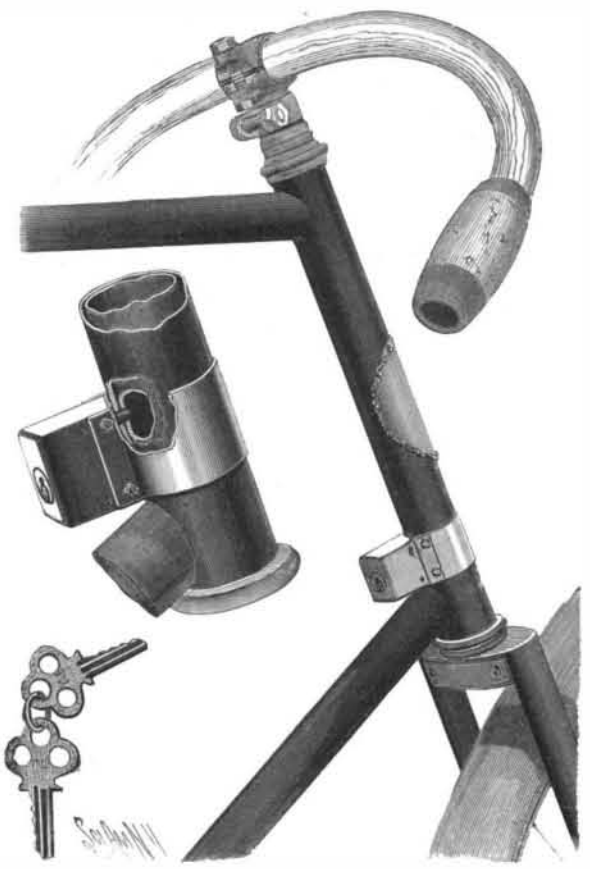
An ingenious bicycle-lock, which will no doubt find very general favor with wheelmen, is now being introduced by the Yale & Towne Manufacturing Company, of No. 9 Murray Street, New York.

The lock, as shown in the illustration, is intended to be permanently fastened to the steering-head of a bicycle, and is designed to hold the front wheel at an angle to the frame, thus rendering it impossible for the bicycle either to be led or ridden away.

The locking mechanism is that of the well known Yale pin-tumbler type, which makes the number of key changes practically limitless, thus absolutely precluding the possibility of other keys being in existence which may fit the lock.

We learn from the manufacturers that, during the past summer, a number of these locks have been in use by riders, and that it is their unanimous testimony that they are of the greatest service.

The lock is of neat design and finish, and, to quote one rider, "no better insurance can be put on a wheel."



THE "SENTINEL" BICYCLE-LOCK.

It is thought that it will be extensively placed on bicycles by manufacturers, as a special feature for the coming season; but it may be easily applied to any wheel. While shown in the present cut attached to the head with a separate band, it may also be used directly behind the name plate; the latter being employed as a band to secure it to the wheel.

We hear that one of the largest bicycle manufacturers in the country, having an extensive export trade, has undertaken to introduce the lock throughout Europe.

A VELOCITY of 8·3 or 10·6 kilometers per second is obtained for the wave front of the Indian earthquake of June 12, 1897, the two values being obtained by means of the two times recorded for the start of the earthquake at Calcutta. The velocity of the propagation of the maximum inclination of the earth's surface to the vertical comes out 2·61 or 2·76 kilometers per second. —G. Agamennone, in Science Abstracts.

Science Notes.

An alcohol thermometer 70 feet in length is now being put in place at Winchester, Mass. It will be placed in a pit of its own depth and be used for scientific measurements of the earth's temperature. It is constructed on the same principles as smaller instruments.

The great telescope for the Paris Exhibition of 1900 is said to be making good progress, and it is expected that a magnifying power of 10,000 will be used on occasions, but 6,000 will be the normal. The aperture will be 1¼ meters, or nearly 49¼ inches, the focal length being nearly 197 feet.

The French Société d'Encouragement has awarded the grand prize of 12,000 francs to M. Moissan for his numerous researches in chemistry; the prize of 2,000 francs for the experimental study of the properties of metals and alloys to M. C. E. Guillaume; and an encouragement of 500 francs to M. Capredon for his work on metallurgical chemistry.

The hypothesis is put forward by H. V. Gill, in The American Journal of Science, that the stratification of the electric discharge in Geissler tubes is due to gas-waves somewhat analogous to those which produce the dust figures in a Kundt's tube. This theory is supported by dust figures obtained by electric discharges at various pressures of gas.

The employment of individual glass jars for the retention of milk delivered by peddlers has been prohibited by milk inspectors in several cities, on the ground that they are dangerous to public health. The objection is advanced that their sterilization is impossible, as water of the requisite temperature to destroy germs would break the jars. Safety is only insured by the use of receptacles that can be subjected to steam heat. The glass jar has been tabooed at the West Point Military Academy, and should be generally abolished, and especially its pasteboard overlid.—Phil. Med. Jour., August 13.

A chronograph has, says the Deutsche Uhrmacher Zeitung, been invented which is said to excel by far all former achievements in this field, and to admit of measuring one millionth part of a second and even smaller spaces of time. The apparatus is based on the following principle: At the end of a tuning fork of a very high number of vibrations a hole is provided, through which a pencil of rays falls upon the case of a revolving cylinder whose circumferential velocity is thirty meters per second. In consequence of the quick vibration of the tuning fork and the rotation of the cylinder, the said luminous tuft describes upon the cylinder, which is doubtless covered with paper sensitive to light, a curve whose dimensions correspond to certain particles of time.

In one of the streets in the neighborhood of the famous London Bridge there has for some time been carried on an industry peculiar even to that city of curious and crowded occupations, namely, an eelskin leather factory. Here are prepared and manufactured an interesting variety of articles from the skin of the common eel. By means of numerous complicated processes the skins in question are manipulated until they resemble and would be easily taken for leather, although of a more glutinous and pliable nature. In one specialty this strange substance is cut into long, thin strips and plaited very closely together for whiplashes and to cover portions of the handles of more expensive whips. Certain kinds of lashes and harness laces are also made from such skins, combining flexibility and toughness.

The following fluids are recommended by Amann for preserving biological specimens: Lactophenol: Carbolic acid, 20; lactic acid, 20; glycerin, 40; distilled water, 20 parts. Recommended for fronds of mosses, hepaticæ, fungi, and algæ. Lactophenol copper solution: Crystallized copper chloride, 0·2 part; crystallized acetate of copper, 0·2 part; distilled water, 95·0 parts; lactophenol, 5·0 parts. For preserving chlorophyl, recommended for Demidiaceæ, Palmadaceæ, Confervæ, etc. Concentrated lactophenol copper solution: Crystallized copper chloride, 2·0 parts; crystallized copper acetate, 2·0 parts; lactophenol, 95·0 parts; water containing algæ is mixed with 10 per cent of the above solution. The whole material is preserved thereby for a long time. Lactophenol glycerin jelly: White gelatin, 85; distilled water, 44; glycerin, 30; dissolve by heating on the water-bath, filter and mix with 10 parts of lactophenol. Lactophenol copper glycerin jelly: Prepared as above, with the substitution of 10 parts of lactophenol copper for lactophenol. Phyocyanin and chlorophyl retain their color excellently in this medium. Lactophenol gum: A strong solution of gum arabic in water 1, glucose 2, and lactophenol. For preparing mosses for the herbarium. Potassium mercuric iodide glycerin: The author states that the salt dissolved in concentrated anhydrous glycerin gives a mounting medium of 1·78 to 1·80 refraction index. He recommends the mixture for Diatomaceæ. The preparations are ringed on with amber or dammar varnish mixed with 2 per cent of boiled linseed oil.—**Pharm. Centr., xxxviii., 544.**

Miscellaneous Notes and Receipts.

Remedy for Bee Stings.—It is reported from France that the juice freshly expressed from poppy stems, if promptly applied on bees' stings, will immediately alleviate the pain and not allow an inflammation to occur.

Simple fire-extinguishers can be produced by anybody at a slight cost, says Technische Berichte. Dissolve 20 pounds of common salt and 10 pounds of sal-ammoniac in 30 liters of water and fill the mixture in quart bottles of thin glass. The extinguishers thus prepared are highly suitable to smother small fires. The bottles, which should be securely corked up and sealed, to prevent the contents from evaporating, are thrown into the flames of the starting fire or its immediate vicinity with enough vehemence to cause them to break.

A Balloon Trip Over the Swiss Alps.—The bold project long cherished by the well known aeronaut Spelterini to cross the Swiss Alps in a balloon is soon to be carried into effect. The Paris firm of Bésançon has constructed for Capt. Spelterini a balloon whose size surpasses that of all former ones. Its circumference is no less than 58 meters and the surface 1,065 square meters, while the contents is 8,768 cubic meters. The network surrounding the balloon is capable of sustaining 110,000 kilos, while the car lifts 76,000 kilos. The air ship weighs 1,000 kilos. The total rising power of the balloon, which is filled with hydrogen gas, is 3,700 meters; 2,000 kilos of ballast is taken along in sand bags. The weight of the passengers and their instruments is estimated at 400 kilos. The best silk stuff was used as material, 6,386 single pieces of silk being employed, whose seams have a total length of 4,440 meters. Everything is made as air tight as possible by repeated varnishing.

The expedition, which will be joined by the well known Swiss geologist, Prof. Heim, of Zurich, and a representative of the meteorological central station at Zurich, is a scientific one. The greatest attention has been paid to procure the best instruments required for the various scientific observations, so that reliable results may be looked forward to with certainty. The giant balloon, which bears the name of "Wega," has been exhibited from September 4 to September 13, at Zurich, whence it was taken to Sitten, in the Rhone Valley, from which place the ascent is to take place. There the last preparations are made for the project, which is as interesting as it is audacious, and the favorable moment for the ascent is awaited. This will take place as soon as favorable weather reports are received from the meteorological central station at Zurich and small trial balloons have demonstrated the presence of the suitable wind direction.—Staats Zeitung.

What is the Best Time to Take Medicine?—According to the Leipziger Drogisten Zeitung, Dr. E. Vogt gives in the Revue de Thérapie the following elucidations on the most suitable time for taking medicine. Most medicine can be taken any time on an empty stomach, before or after meals. But if an irritating substance is introduced into the stomach, it is important that it be not in too small a volume. If such a body is soluble in water, a highly diluted solution is given; if it is insoluble, it is given with the meal. The form of the drugs is also of importance. Thus hard pills, taken on an empty stomach, may irritate; likewise wafer capsules, whose contents first spread over a limited space in the stomach. But if such capsules, e. g., sodium salicylate, are given with the meal, the contents mix at once with the food and cannot cause any local irritation of the mucous membrane of the stomach. If, however, a prompt action is desired, the medicament is given on an empty stomach, but always diluted, because it is very sensitive to strong solutions. Many have an impeding or retarding action on the digestion, e. g., chloroform, naphthol, saccharin, etc.; therefore it is of importance to administer them when the process of digestion is past or almost so. In this category fall the metal salts, the iodides and bromides, which should be taken with plenty of water on an empty stomach early in the morning or late at night. Mercury salts irritate the mucous membrane of the stomach; therefore they are given in a diluted solution on an empty stomach early in the morning. The author cannot believe that calomel with cooking salt might partly become transposed into sublimate; at any rate, no accidents need to be apprehended from this source. Otherwise strict observation should guard against mistakes. A glass of quinine wine given before the meal causes a slight alcoholic stimulation in the stomach of a child, and one should be careful not to take this for the strengthening effect of the quinine. Therefore, it is better to give such wines after meals. Bitters should be taken the moment one sits down at table, not half an hour before the meal. It is imprudent to administer cod liver oil before the meal. Why coat the stomach with oil whose walls are expected to exercise an assimilating action? For that reason cod liver oil is given after eating or at least an hour before. Sodium bicarbonate taken before the meal causes too large a secretion of gastric juice. After eating it blunts the excess of acid.

Nickel and Aluminum Coins.

The Secretary of the Treasury will soon order the Philadelphia mint to resume experiments in the use of alloys in the five cent and one cent pieces, says The Washington Star. This will be done under a House resolution. The test will be to determine whether it is advisable to substitute pure nickel in these coins in place of the alloys now used. The Swiss and Italian governments use pure nickel in their minor coins, and they have proved satisfactory. Pure nickel is much harder than the alloy now used, and, it is said, would not abrade so quickly. Whether it would retain the color better must be determined, but those competent to judge are of the opinion that coins of pure nickel, after being in circulation for a short period, could not be distinguished from the present five cent piece. It is also thought the nickel coins would be more difficult to counterfeit, one reason being that they are highly magnetic, and another that the cost to the counterfeiter would be much greater than now.

The present alloy of the five cent piece is 25 per cent nickel and 75 per cent copper. Under the new process there would be about 94 per cent nickel in the coin. The two cent pieces have 95 per cent copper and 5 per cent of tin and zinc.

Experiments are also to be made with aluminum. Heretofore these experiments have failed to produce results. The last experiments were made early this year. Prior to that the last experiments were in 1864.

In 1863 the director of the mint called the attention of the Treasury Department to the propriety of substituting coins manufactured of aluminum of the denomination of five and ten cents, to take the place of the fractional notes of these denominations in circulation at that time. In 1864 a number of experiments were made with an aluminum alloy containing 99 per cent of silver and one of aluminum, with a view to ascertaining the fitness of the same for coins of the denomination of five and ten cents. The alloy, however, did not work satisfactorily, as it was found that it not only discolored rapidly, but was difficult to work.

An alloy of thirteen parts copper and one of aluminum was also tried, as well as another of nineteen parts copper and one of aluminum.

These two alloys gave the coins a gold color, and the metal was found to be very hard, and it was difficult to procure perfect impressions.

At the request of the National Academy of Science and by direction of the Secretary of the Treasury, a number of other experiments were made in 1864 with aluminum, under the auspices of Dr. John Torrey, Prof. Bache, Prof. Henry, Dr. Barnard, and Prof. Gibbs, members of the academy. For this purpose a bar of alloyed aluminum was furnished, which upon assay was found to contain nine parts of copper and one of aluminum. These experiments were made with a view of ascertaining the adaptability of aluminum alloys for coinage purposes, also to test the tenacity of the same as compared with copper. The composition was found to be very rigid under the rolls, requiring many annealings, and proved very refractory in working, so much so that perfect impressions of the coins were not obtained.

No further experiments were made after this date with aluminum alloy for coinage purposes until the experimental pieces called for by the resolution were struck.

The Austrian government makes its minor coins of 97·37 per cent nickel, 1·30 cobalt, 0·32 copper, 0·80 iron, 0·14 silicium, and 0·07 carbon. Too much cobalt darkens the color, and an excess of iron and carbon makes the metal too brittle.

Improvements in Santiago.

Capt. Brady, of the United States Signal Corps, has been ordered to begin the construction of an overland telephone line 320 miles in length, from Guantanamo to Santiago and Manzanillo. The present cost of transmitting messages by telegraph from Guantanamo to Santiago is twenty cents a word up to thirty words and twelve cents for each additional word. Educational statistics have been prepared by Gen. Wood, and they show that forty-one per cent of the white population and twelve per cent of the colored people are able to read and write. The schools were to be opened the first week in October and attendance was to be made compulsory. English will be taught, and thirty teachers, at a salary of $60 a month, have been engaged and a superintendent, at $125 a month, has also been appointed. Much gratification has been expressed over the law-abiding nature of the people in the province, as there has been no murder since the occupation of the Americans, and the few crimes which have been committed are all of a petty nature. The city of Santiago is being put in an excellent sanitary condition.

AN observatory on Pike's Peak is to be built by the Manitou and Pike's Peak Cog Railway Company, and the contract has been signed for the construction of the tower. It is proposed to mount in this tower four powerful telescopes for the benefit of visitors.