

Softening and Purifying Water.

G. E. Davis, of Manchester, has a method of using tribasic phosphate of soda, which softens the water, and leaves a useful phosphate of lime as a manure. Most natural waters contain lime or other substances which render them unfit for use for trade purposes and inconvenient for domestic use. River water, or brook water, or rain water is, of course, an exception, and it is the object of this invention to eliminate most of the lime and other interfering substances, so that well water, or water containing lime and other substances, may be used for domestic or trade purposes with almost the same ease as the water from rivers or brooks, or rain water. In carrying out the invention the patentee adds to the water to be treated tribasic phosphate of soda, preferably in a state of solution in water, and mixes it with the water undergoing treatment until the one is well incorporated with the other. The mixture made is then allowed to settle, whereupon the lime salts fall to the bottom of the vessel, mixed with other substances, and the clear water may be drawn off for use, or be pumped away into a store tank. The residue remaining in the tank or other vessel may be used as a manure, as it contains a large quantity of phosphate of lime. The quantity of tribasic phosphate of soda required will vary with the hardness of each water to be treated, but a good guide for the proportion required to each gallon of the water will be five times the amount in grains of the hardness of the water by Clark's scale of crystallized tribasic phosphate of soda—that is to say, a water of 10° of hardness would require about fifty grains of tribasic phosphate of soda per gallon; but where the hardness is of the quality called "permanent hardness," about one-half of this quantity only is necessary, or even less than that.

A Sea-going Dredger.

The members of the Engineering Society of University College, Bristol, recently spent a day on a new dredger which has been built by Messrs. Simons & Co., of Renfrew, and respecting which the secretary of the society sends us the following particulars. The dredger, which is of steel, was constructed to the plans of Mr. Girdlestone, the engineer of the Bristol Docks. It is 225 ft. long and 45 ft. broad, and draws 14 ft. 6 in. when fully laden. The dredging is performed in the usual way by buckets having a capacity of 1 ton; these revolve round tumblers, which are worked by the same engines which propel the vessel when she is under way. The buckets combined deliver from 17 tons to 19 tons per minute. The hopper capacity is from 1,000 tons to 1,200 tons, mainly depending on the nature of the dredgings. When the vessel is fully laden, the bucket ladder is raised by a crane at the stern. The vessel then steams out to sea at a speed of about ten knots an hour. The propulsion is effected by two triple expansion engines of 1,600 I.H.P. Each of the engines works a screw fore and aft. Thus there are four screws altogether, each having a diameter of 8 ft. 2 in. The process of discharging the material is very speedy. The vessel may be going along at nine knots, when on a given signal the engines slow down, and the whole 1,000 tons of spoil are discharged in the space of a minute. The doors can be drawn up and the dredger steaming back again at full speed in eight minutes from the first signal. The four screws enable her to travel ahead or astern with equal facility, and to turn in her own length when required. Thus while all large craft are obliged to make use of tugs to navigate the very sinuous course of the Avon, the dredger is independent of all extraneous aid.

How to Make Ground Glass.

Breaking the ground glass is an accident not very easily remedied in a small country village where one cannot be procured. I propose to tell the readers of the SCIENTIFIC AMERICAN how I made one.

I first bought five cents' worth of emery and two plates of glass the size required. Spoiled negatives will answer if they are cleaned, which can be done with a strong solution of lye. I placed one of the glasses on a flat board and sprinkled a small quantity of the emery on it, which I wet with water. Placing the other glass on that, I ground them together, renewing the emery and water whenever necessary. In about one hour I had two of the finest quality of ground glass, fully as good as those I would have to pay seventy-five cents for (8 by 10 size).

The emery may be carried by the amateur much easier than an extraground glass. **AMATEUR.**

An experiment, which is looked upon as a success, was recently made on the Shropshire Union Canal, at Worleston, by the officials of the London & North-Western Railway. A set of rails, of 18 in. gauge, was laid down on the bank of the canal for a distance of a mile, and a small locomotive from the Crewe Railway Works drew along easily, at the rate of seven miles an hour, two boats by means of ropes. The size and weight of the boats is not given. How many cars and how much freight the locomotive could draw on the track is not stated.

A Paper Organ.

A very original musical instrument has recently been constructed at Milan—an organ whose pipes, instead of being of metal, are of paper pulp. Its history is quite curious. Father Giovanni Crispi Rigghizo, having learned that the parish dell'Incoranata, at Milan, was destitute of music for the offices, conceived the idea of devising a cheap material that would permit of constructing organs under such conditions that the most unpretending communities could purchase one of these instruments. This monk, who had passed his life in poverty, was confronted by lack of money, and, notwithstanding his efforts to carry out his undertaking, was beginning to despair of success, when he had the fortune to meet an artisan, Luigi Colombo, who understood the construction of the instrument, and was good enough to aid him in carrying out his design. They both went resolutely to work, and, finally, in June, 1886, finished the instrument in question. Unfortunately, by reason of lack of funds, they could not exceed 22 registers, 44 pedals, and 1,400 pipes. The final result, however, is extremely interesting, since it is generally agreed that the instrument possesses great power, and a sweetness of tone not found in organs hitherto constructed.—*La Science en Famille.*

"SPIRAL" GARDEN HOSE.

The "Spiral" garden hose, a cut of which is shown herewith, is designed to resist the deteriorating influences of moisture. It may be soaked every time it is used, but, having no outside covering to imprison the moisture, dries quickly. The cotton is uninjured, and will last for years. This fact is well known by fire departments, where rubber-lined cotton hose has been known to last for over twenty years. This hose is manufactured by the Boston Woven Hose Company, of 230 Devonshire Street, Boston, Mass. This company also manufactures the "Cowen" steam hose. This hose is being largely used by the fire departments, and

**"SPIRAL" GARDEN HOSE.**

gives excellent satisfaction. It will stand a pressure of 1,500 pounds, depending for its strength to resist a bursting pressure upon the cotton jackets, which are woven with heavy filling threads running spirally the whole length of the hose. It has a much longer life than the ordinary steam hose, for when it gets used to the point where the rubber hose is before being used, it will then have lasted as long as the ordinary rubber steam hose.

The French Torpedo Boat Coureur.

A new first class torpedo boat has just been completed by Messrs. Thornycroft & Co., London, for the French government, and was launched June 13. This vessel, which is named the Coureur, is a twin screw boat, and sister ship to the Ariete, which was built by this firm for the Spanish government last year, and which attained on the official measured mile trial on the Thames, with a load of 17³⁵/₄ tons on board, the remarkable speed of 26¹/₄ knots or more than 30 miles per hour. The dimensions of the Coureur are: Length, 147 feet 6 inches; beam, 14 feet 6 inches; draught (loaded), 5 feet. The hull is constructed of galvanized steel throughout, and is divided into numerous watertight compartments, which are fitted with steam ejectors for keeping them clear of water in the event of shell being damaged by collision or shot holes. Any two of the compartments can be filled without sinking the boat.

The engines are of the usual direct-acting compound surface-condensing type made by Messrs. Thornycroft, the indicated horse power at full speed being about 1,550 collectively, divided pretty equally between the two pairs of engines. The arrangement of the machinery gives roomy engine space, a very satisfactory feature in a torpedo boat. The boilers fitted in the Coureur (two in number) are on Thornycroft's tubulous system, by means of which steam can be supplied at pressures up to 200 lb. per square inch with an immunity from leakage and priming which is not considered possible to secure in boilers of the ordinary type. This new boiler is lighter in weight, and takes up less length in the boat, than those of the locomotive type, and it has so far proved so thoroughly efficient that Messrs. Thornycroft are now fitting it in all their torpedo boats.

Another important improvement is the excellent maneuvering powers obtained by the use of Thornycroft's patent double rudders, which are placed one on each side of the propellers. The torpedo armament consists of two tubes built in the bow of the boat, for discharging Whitehead torpedoes by means of gun-

powder impulse. The gun armament is an important feature in the Coureur, which carries four 1.85 inch Hotchkiss guns, two fixed on the conning towers, and two being carried on the deck for firing broadside. The vessel is fitted with masts and sails, a Normandy fresh water condenser, and all the latest improvements, including an electric light installation for lighting the interior of the boat.

We should like to know the reason why our navy department does not supply itself with some boats of this sort.

The Folly of Haste to be Rich.

Chancellor Howard Crosby, one of the best preachers and best thinkers in New York City, has an article in the *Forum* for May, in which he says:

"The greatest need of our land to-day is an education away from the fearful danger of a haste to be rich, a cultivation of the quiet and improving arts, an encouragement of genial and benevolent lives, a preservation of home virtues, a teaching of the truth that moderation best serves the cause of happiness, and a demonstration that in helpfulness to others, man best helps himself.

"While wise laws can do much to suppress some of the worst features of the gold hunt, it is to the press, the school, and the church that we must look for the inculcation of the purer and loftier ideas that will meet and overcome the materialism which the peculiar conditions of our country have fostered, and which the thoughtless minds of our youths so readily accept." Contented minds are more conducive to happiness than riches, glory, or fame. In our life work let us remember that it will profit us but little if we gain a world of wealth and lose contentment and happiness.

Effect of Ammonia on Animal Life.

An explosion of an ammonia tank occurred May 6, at the Buckeye Brewery, with a very strange result. Almost immediately after the explosion every bird in the neighborhood fell dead. Chippies, English sparrows, and canaries all suffered alike, and after the shock dead birds could be seen lying about the sidewalks in that locality in great numbers. The explosion caused an alarm of fire to be sent in, and the horse attached to the hose reel No. 5, which responded, came near being killed by the ammonia. The animal dashed toward the supposed fire with all the speed he possessed, but when the strong odor of the ammonia struck his nostrils he was completely overcome and could not move. The horse was at once withdrawn from the place and restoratives applied. John Loder, George Kotts, laborers, and Fireman Ross were in the room at the time, but escaped uninjured. Besides the injury done to the tank, the company will lose \$500, the value of the ammonia.—*Cincinnati Enquirer.*

An Elevator Air Cushion.

A test of the Ellithorpe air cushion for elevators was made recently in a New York dry goods house. One of the largest Otis elevators, weighing 2,300 pounds, equipped with plate glass mirrors and fragile electric light globes, and loaded with baskets of eggs and with glassware filled with water, was cut loose from the top floor and allowed to fall to the bottom of the shaft. It shot down eighty feet in about three seconds. The "cushion," which stands seventeen and one-half feet high from the bottom of the shaft, and is constructed of wood and glass so as to be air tight, received the elevator with so little shock that not even an egg was broken nor a drop of water spilled. The test was considered a complete success. The force of the compressed air of the "cushion" gently pushed the elevator up again about four inches, when it descended again to its place without jar. The force of the descent was estimated at the top of the "cushion" as indicating 60,000 pounds.

Florida to Produce Opium.

The *Medical Bulletin* says that "Florida promises to become a large producer of opium. The poppy grows there very readily, and larger than anywhere else in the United States. Sixteen plants will produce an ounce of opium, and an acre should give a profit of a thousand dollars. As the plants will thrive among trees, the land on which are young and non-bearing orange orchards can be utilized while the trees are reaching maturity." The fact should be recognized, however, that the poppy, like all plants containing numerous alkaloids or highly complex compounds, tends to exhaust the soil, and hence the present proposed experiment of planting poppies among immature orange trees will probably fail. Either the oranges or the poppies will be deficient in quality or in quantity.

THE *Electrical Review* says that the uselessness of the lightning rod is becoming so generally understood that the agents find their vocation a trying one. Fewer and fewer rods are manufactured each year, and the day will come when a lightning rod on a house will be regarded in the same light as a horseshoe over a man's door.