Candidates for admission or promotion will be required to furnish the Board of Examiners with evidence of their abilities in the execution of mechanical drawings, and their proficiency in penmanship.

The Examining Boards will report the relative qualifications of the persons examined, and number them, giving to the best qualified the lowest number.

When, in the opinion of the Department, the wants of the service require the admission of Engineers of any grade above that of Third Assistant, the same qualifications and restrictions as to times of service will be exacted, as by the regulations are required for promotion to the grade in question: *Provided*, that all appointments to the grade of Second Assistant shall be made between the ages of twenty-one and twenty-eight; and to that of First Assistant, between twenty-five and thirty-two; and to that of Chief Engineer, between twenty-eight and thirty-five.

The Assistants must employ all favorable opportunities for acquiring a practical knowledge of the fabrication of the different parts of steam engines and their dependencies, that they may be able to repair and replace such parts as the space and means for making and repairing can be furnished in steam vessels. When other qualifications are equal, candidates whose skill and abilities in these particulars are superior will have precedence over others, for admission or promotion, who may be considered equal in other particulars.

NOTE.—As resignations are of almost daily occurrence in the Naval and Marine Corps, the number of officers, as given above, may vary somewhat from the number on the pay roll.—REP.

It will be seen by these particulars what the actual condition our navy is at this momentous period of our country's history.

Our Correspondence.

Aquarium.

MESSRS. EDITORS:—On page 151, present volume, SCIENTIFIC AMERICAN, the promise was made to state the habits and peculiarities of the fish, and of the other inhabitants of the aquarium. Infinite and wonderful are the views which may be obtained in one of these tanks. And in noticing the fish let us first begin with the stickleback, which is among fishes what the humming-bird is among the feathered tribe; the largest one of these I have ever had or seen was not two inches in length. It is quite narrow, and very quick and nimble, being shaped much like the salt water mackerel. He would die a thousand times rather than give up a battle with another fish, and so ferocious is he that it is the exception rather than the rule, if he does not attack a fish placed in the same tank with him. No matter how large or how small his neighbors may be, they are quite sure to find but little mercy, and still less timidity, in their Liliputian adversary. I had one of these fish that kept the entire end of the tank, and woe be to any fish that dared to intrude on what he considered as his personal property. At one time a bullhead, five or six inches long, tried to push him out of the way, but as the stickleback did not agree to it, he punished him thus:—Raising his spines he moved back a short distance, and, returning seemingly with the speed of a bullet, he ran under the fish, cutting him open with those cruel spines, just as well as it could have been done with a knife; and then sailed around the tank in the most consequential and self-approving style imaginable. They trouble the gold-fish less than any others; but sometimes they will even attack large gold-fish, many times their own size, and frequently they find themselves between the jaws of these fish, but scarce ever are they swallowed; for when just in that position, they erect their spines and refuse to go any further. If the gold-fish attempt to crush him, it must, of course, be somewhat injured by the sharp little spines. I have often released this little fish from what to us seems a not at all desirable situation, when off he would swim as if nothing had happened, and not long after would try it again. They are very fond of feeding on the tails of tadpoles, or on frog's feet, and these members are not at all safe when there is such a thing as a stickleback in the tank. I have heard it said that they build nests in the water, in which the female spawns, but have never seen anything of that kind; but there are seasons of the year in which their colors are much brighter than at others, and when he remains in the sunlight moving his delicate little fins, I know of nothing more beautiful. Their bodies seem almost transparent, and especially beautiful are the males, which may generally be distinguished by their pugnacious propensities. Tadpoles come next on the list; they will soon be seen to grow very fleshy, then two feet will make their appearance near the tail, followed in the course of a month by two more back of their head, and gradually the tadpole becomes changed into a perfect frog, the tail being absorbed in the formation of the legs; and who can tell with what feelings of novelty, mingled with surprise and delight the once poor tadpole, but now Hon. Frog, gives his first croak as he dives into the water?

A word in regard to feeding fish. They are apt to be fed too much, and great care should be taken not to place an unnecessary quantity of food in the tank, as it decays and renders the water impure. The best food is a small angle worm, or fresh raw meat cut up in small pieces, and given to them once or twice a week. There are a great many rules which might be given, but the management of an aquarium is best found out by experience; and when the balance between animal and vegetable life has been found, the water may be kept in the tank for an indefinite period of time. I had a small tank in which water and a suitable stock of fish were kept for thirteen months, and not a single fish or plant died during that time; but it at last was broken, and thus the water was changed sooner than intended. Now, in conclusion, if you wish a pure, healthful and innocent study and amusement, either make or buy an aquarium; it will be money well invested. T. D. A.

Rochester, March 2, 1861.

Valued Testimonial.

MESSRS. EDITORS:—Please allow me, through the columns of the SCIENTIFIC AMERICAN, to express my sentiments respecting the high estimation which I entertain of the value of your paper to mechanics, inventors, manufacturers and others. The information which it contains, I have found to be thoroughly useful, and of great importance to myself as a practical mechanic; and as an organ for introducing new inventions to the public, it stands unrivaled. Your kindness to correspondents has been of great assistance to me in furnishing information which has been the means of my obtaining a valuable patent through your agency, and of introducing me to the Collins Company, by which I have been enabled to bring my cast steel molded plows to perfection and public use.

F. F. SMITH.

Collinsville, Conn., March 6, 1861.

The Baltimore Mechanics' Fair for 1861.

By a circular received from E. Whitman, chairman of the Committee on Exhibition, we learn that the Thirteenth Annual Exhibition of the Maryland Institute for the Promotion of the Mechanic Arts, will open early in October next. Steam power, with all the shafting, fixtures, &c., free of expense, will be in readiness for propelling the machinery, also laborers to assist in arranging the same. All freights from New York, Boston and Philadelphia, by steamboat, on machinery exhibited at this Fair, will be settled by the Institute both ways, and if the owner is not present, or has no agent there, by forwarding the bills of lading to the chairman of the Exhibition Committee, they will receive his personal attention in fitting up and arranging the same for exhibition.

Mr. Whitman says:—"From the success of our former exhibitions, the facilities and conveniences offered at the exhibition in October next, together with the central locality of our city between North and South, we flatter ourselves that we shall be able to offer greater inducements to manufacturers, mechanics, artists, inventors and others to exhibit at this Fair than has ever been offered at any similar exhibition in this country."

OLD COPPER CENTS TO BE WITHDRAWN FROM CIRCULATION.—The director of the Mint, at Philadelphia, has arranged with Adams' Express Company for the transportation, free of cost to the shipper, of the old copper cents to the mint to be exchanged for those of the new issue. They must be arranged in packages of not less than $20 each. Our ferry companies will be inexcusable if they pay out any more of the old cumbrous coin.

CEMENT FOR SHIPS AND WOODEN PIERS.—A substance for coating ships' bottoms and wooden piers exposed to the attacks of the ship-worm has been patented by S. Zoubtchaninoff, of Paris. It consists of bitumen 4 parts by weight, common resin 4 parts, crude turpentine 6, colza oil 2, sulphuric acid 8. The whole of these ingredients are placed in a cauldron heated and stirred until they are completely incorporated together. Apply it hot with a brush.

Column of Varieties.

An inch pipe, one foot high, holds 9.42 cubic inches

The soluble indigo of commerce makes a good blue ink when slightly diluted with hot water. It is incorrosive for steel pens, and it flows freely.

Excavations were lately recommenced in Pompeii, and among the first discoveries made was a druggist's shop, containing pill-boxes in abundance.

A deep purple ink, called mauve, is now becoming somewhat fashionable. It is made from the common aniline purple liquid employed for dyeing silk.

The *Alta Californian* states that the gold and silver ores in Tulare county are yielding at the enormous rate of from $1,500 to $6,000 to the tun of quartz.

The Melbourne *Herald* states that in less than a quarter of a century, Australia has increased from a population of 170 to 530,000 persons; and in ten years has exported 23,000,000 ounces of gold.

According to Humboldt, the destruction of forests on the tops and sides of mountains results in the scarcity of wood for fuel and building, and the drying up of mountain springs and rivulets.

Within the past ten years an American aquatic plant has become so abundant in the rivers and canals of England as to offer serious obstacles to navigation. It is supposed to have been introduced with some logs of American timber.

The sugar crop of Louisiana for last year amounted to 228,753 hogsheads, at the ratio of 1,150 lbs. to each; the molasses crop amounted to 18,414,550 gallons. Steam engines are used on 1,009 Louisiana sugar plantations; 283 are operated by horse power.

Very minute quantities of lead, mixed with copper, render the latter so brittle that it cannot be drawn into wire. Sulphur affects copper in nearly the same manner. Annealed copper wire is a better conductor of electricity than hard drawn wire.

The cars of the Pennsylvania Railroad Company are lighted with gas, which is supplied at the works of the company at Altoona. The gas is forced under a very high pressure into a receiver in each car, which contains a supply for three burners to last 18 hours.

In Montreal the skating pond is roofed over, so as to prevent its being covered with snow. It is lighted at night, and the band of the Canadian Rifles generally attends. The ladies frequent it, wearing short dresses, looped up so as to be out of the way, and Turkish trowsers.

An American engineer, who has lately made an extensive tour through the manufacturing districts of Great Britain, counted 46 new steamships in the course of construction on the river Clyde. These vessels range in size from 6,000 tuns to 200, but most of them are over 2,000 tuns.

Upwards of one million papers of seeds have been put up at the Agricultural Department of the Patent Office within the past two months and sent to members of Congress for distribution. Each collection or batch comprises 54 varieties of vegetable and about the same number of flower seeds.

The American Association for the Advancement of Science was to meet at Nashville, Tenn., on the 17th of April, but we understand that the meeting is to be postponed for one year, owing to the disturbed state of the country—an unwise step; science should go forward unfettered by political considerations.

On the northern lakes wild moanings are frequently heard under the ice, especially just prior to thaws. This is caused by imprisoned air seeking an outlet. It is frequently heard at a great distance like the wailings of a bound giant, then it bursts out like explosions of artillery, frequently causing huge rents several miles long.

At a late meeting of the Manchester (England) Philosophical Society, Dr. C. Calvert stated that he had recently analyzed several samples of snuff, in all of which he found traces of red lead. This is a most dangerous adulteration, as the lead in such snuff will ultimately accumulate in the heads of snuff-takers and produce dreadful diseases.

Dr. Landerer, of Athens, states that garlic stands pre-eminent, as a plant, which snakes dislike. In Greece, gardeners who suffer frequently from their bites while collecting cucumbers and melons (under the large leaves of which the reptiles conceal themselves) find it an excellent plan, before commencing operations, to strew crushed garlic among the plants to frighten off the reptiles.

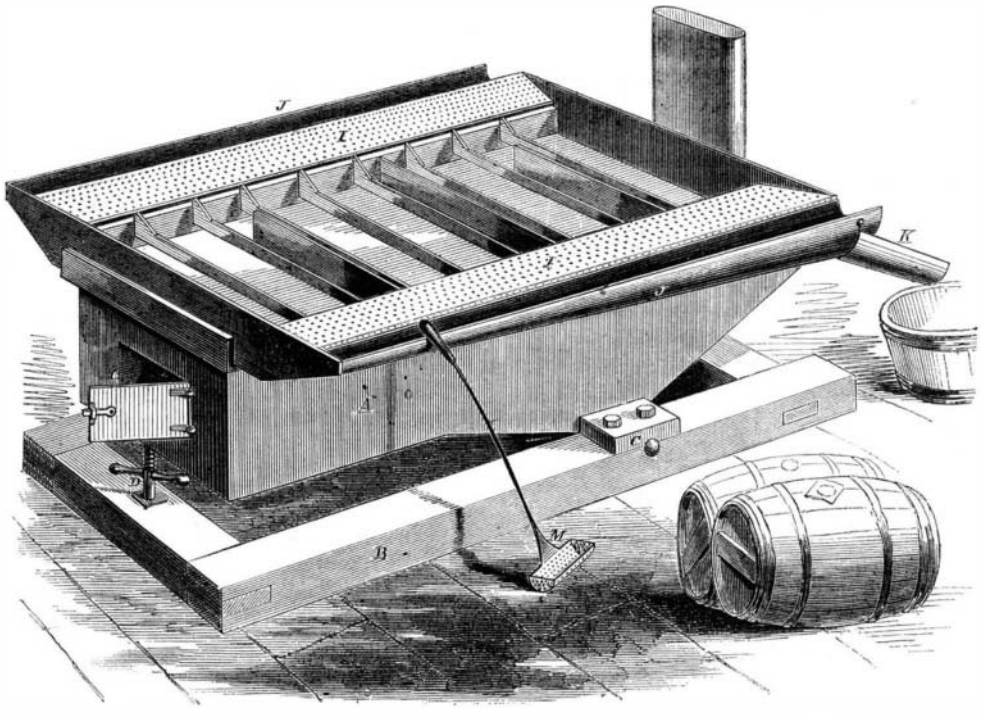
Improvement in Apparatus for Evaporating Saccharine Juices.

In boiling the juices of the sorghum, maple, sugar cane, &c., for the purpose of evaporating the water which they contain, the scum which rises is generally thrown to the sides of the pan; and this fact is taken advantage of in the invention here illustrated, to arrange an apparatus by means of which the scum is removed with great facility, and the juice mixed with it is very thoroughly strained back into the plan.

The furnace, A (see cut), is hung upon the frame, B, by the pivots, C, and is adjusted in its position by the screw, D. The sides of the pan, E, are made sloping outward above the sirup, and the strainers, I, are placed over them, so that, when the scum is drawn up upon the strainers, the juice which is mixed with it will pass through them and be conducted back by the sloping sides into the pan. Just outside of the strainers are the inclined troughs, J J, into which the scum is drawn and which conduct it into the spout, K, by which it is led away to a proper receptacle.

The skimmer, M, may be made of perforated tin in semi-circular form, with end pieces as shown. The bars, F F, extend across the pan just under the sirup, serving as supports and guides to the skimmer when in use. These bars have inclined ends, as shown, to lead the skimmer up on to the strainers, I I. The bars, G G, are the usual ones extending nearly across the pan to obstruct and guide the flow of the sirup.

The patent for this convenient apparatus was granted Feb. 12, 1861, and further information in relation to it may be procured by addressing the inventor, M. H. Mansfield, at Ashland, Ohio.



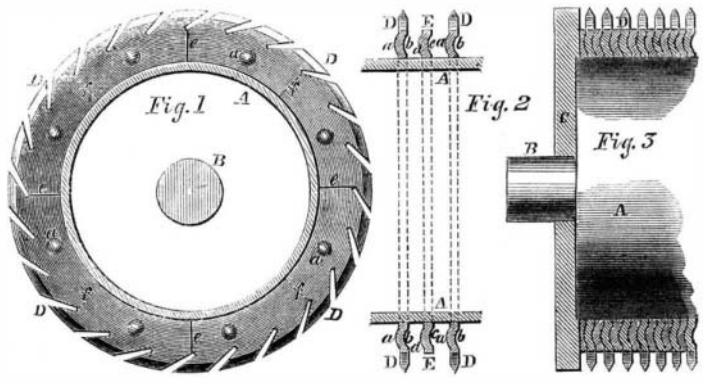
MANSFIELD'S APPARATUS FOR EVAPORATING SACCHARINE JUICES.

The Oreide of Gold.

This substance, of which so many articles called jewelry are now made, is simply an alloy of copper and zinc—a brass of a peculiar color resembling "jeweler's gold" of about 16 carats fine—copper and gold mixture. It is the invention of MM. Mourier and Vallent—two Frenchmen. It was patented in France in December, 1854, and in the United States in March, 1857. Some of our daily papers have lately referred to this substance as if it were some new discovery; whereas, if they had consulted the pages of the Scientific American—where all the most recent information respecting new discoveries first appear—they would have found it described in full on page 308, Vol. XII., old series, (June, 1857). It is composed of 100 parts (by weight) of pure copper, 17 of zinc, 6 of common magnesia, 3.60 salammoniac, 1.80 quick lime and 9 of crude tartar. The copper is first melted in a crucible, then the magnesia added, then the salammoniac, lime and tartar separately, and in powder. These are kept from contact with the air, and all well stirred for about 20 minutes, until they are incorporated together. The zinc is now added in strips, which are thrust below the scurf formed on the top of the crucible. The mass is now stirred, the lid put on the crucible and its contents kept fused for about 25 minutes; after which the crucible is opened, the slag skimmed carefully from the surface, then the molten alloy is poured out into ingot molds if it is required to be rolled, or into iron molds if designed for castings. When designed for works of art, however, it is best to cast it into ingot form first, then melt it in a furnace and cast it. This alloy is very beautiful, and well deserves the name "oreide of gold," as it greatly resembles the precious metal. It is very ductile, and may be rolled into very thin leaf; but it is nearly as easily tarnished as common brass. We believe it may be used for making excellent tubing for marine boilers, and think it may be more usefully employed for this purpose than in furnishing two-penny trinkets for street-sweepers. It is manufactured upon an extensive scale by Messrs. Holmes, Elton, Turrell & Co., of Waterbury, Conn., assignees of the American patent.

Improvement in Bur Cylinders.

In the manufacture of woolen cloth, it is usual, before the wool goes to the cards to pass it through a machine to rid it of the burs which the sheep are apt to collect in the pastures by rubbing against the plants that bear them. The burring machine consists of a cylinder covered with sharply pointed steel teeth which comb the wool in between them, while a rapidly revolving beater, close over the top of the cylinder, knocks the burs off into a box placed in proper position to receive them. The wool is then combed out from beneath the teeth of the bur cylinder by a doffing card or brush.



BIDWEL'S IMPROVEMENT IN BURR CYLINDERS.

The teeth of the bur cylinder are formed on the periphery of flat rings of cast steel, and these rings are slipped upon a central shaft with narrower rings between them to separate them the desired distance apart; which varies from the 1-11th to the 1-20th of an inch. As the steel rings are punched from plates, there is of course a great waste of metal, amounting in practice to one-half. To diminish this waste as much as possible, it has been the practice to make the bur cylinders of several sizes, from 5 to 9 inches in diameter, punching the smaller rings out of the larger ones. This practice is objectionable, however, as manufacturers desire but two sized cylinders, one about 6 inches in diameter and the other about 9 inches, though they have been obliged to use the several sizes in order to effect this economy of metal in their construction. Another objection to the employment of the entire ring is the impossibility of hardening it without warping or cracking it, so that it has been necessary to use the steel in a very soft state.

All these difficulties are completely obviated by the simple little invention here illustrated. This consists merely in making the rings in sections, and in the mode of fastening them to the central shaft. In the cut, Fig. 1, is a flat view of one of the rings formed in eight sections. These sections are held in place by sinking, with a punch, depressions, *b b*, Fig. 2, in one side of the plate, raising corresponding elevations, *a a*, Figs. 1 and 2, on the opposite side, and these fit to similar depressions and elevations formed on the packing rings, as plainly shown in Figs. 2 and 3. The whole are held in place by a cap, C, which is secured by a key through the shaft, A.

It will be seen that these small sections may be punched from a steel plate with only chippings of waste, thus effecting great economy of metal. The plates, too, may be readily hardened and tempered; and the cylinders may all be of any size desired.

The patent for this invention was procured, through the Scientific American Patent Agency, Nov. 15, 1859, and further information in relation to it may be obtained by addressing the inventor, James Bidwell, at No. 159 East Twenty-ninth-street, New York.

Influence of Trees upon Climate.

Jochim Frederic Sahouw, Professor of Botany at Copenhagen, speaks as follows of the influence of forests upon the atmosphere:—"We find the most evident signs of it in the torrid zone. The forests increase the rain and moisture, and produce springs and running streams. Tracts destitute of woods become very strongly heated, the air above them ascends perpendicularly, and thus prevents the clouds from sinking, and the constant winds (trade winds or monsoons), where they can blow uninterruptedly over large surfaces, do not allow the transition of vapors into the form of drops. In the forests, on the contrary, the clothed soil does not become so heated, and, besides, the evaporation from the trees favors cooling; therefore, when the currents of air loaded with vapors reach the forests, they meet with that which condenses them and change into rain. Since, moreover, evaporation of the earth goes on more slowly beneath the trees, and since these also evaporate very copiously in a hot climate, the atmosphere in those forests has a high degree of humidity, this great humidity at the same time producing many springs and streams."

New Style of Letter Paper.—Our suggestion to make letter paper in single leaves has been very promptly acted on. We have received from Messrs. Kempton & Mullin, of Mount Holly Springs, Pa., a sample of paper which they call "Business Letter," which is made with only two pages to the sheet of just about the right size for most business letters. The sample sent us is of most excellent quality and finish.

Attempts are about to be made in the city of St. Louis to propel the street cars with steam in place of horses. There are no restrictions in that city, as in New York and other places, against steam cars being used in the streets.