after its final attack on the proving grounds. The absence of cracks is a noticeable feature in the result.

It is now learned on the best of authority that the specifications for the new battleships will call for Krupp process plates, with the usual proviso that the plates be fabricated in the United States. The superior resisting qualities of this armor will render it unnecessary in the future to place such massive plates upon the sides, barbettes and turrets of our battleships, and the modifying effect of the improved quality of armor is clearly shown in a comparison of the new battleship "Maine" with the "Oregon" and ships of her class. The superior quality of Krupp armor enables us to reduce the thickness of the belt from 18 inches in the "Oregon" to 12 inches in the "Maine," and a proportionate reduction is made in turret and barbette armor.

It is gratifying to realize that the latest product of our own armor-plate establishments is of such excellent quality as to maintain our high position in this industry.

The Cultivation of Walking Canes.

The fashion for congo canes has attained such gigantic proportions in the United States of late that some details regarding their manufacture and origin may not be without interest to the hundreds of thousands of men in America who use these popular walking sticks. Congo canes were first designed by a Frenchman, and the manufacture of the same was for a time confined wholly to France. They are made of the common overgrowth of wood that springs up from the stumps of ordinary chestnut trees soon after the trees have been felled. For a few years France did a thriving business in this new line of manufacture, the simplicity and handsome appearance of the canes winning rapid favor both at home and abroad. After a while, however, the trade reached such rapidly increasing dimensions that it attracted the attention of several large Austrian business men, who forthwith began to consider the feasibility of starting a competition in the same line, for in certain parts of Austria and Hungary, such as the provinces of Croatia and Krain, the growth of chestnut is enormous. They rented large tracts of land from the owners, agreeing to pay in return for the wood they should take away something like half a cent for every stick. Workingmen were easily obtained that would cut the sticks, working ten hours a day for the nominal wage of 80 kreuzers (32 cents) per day, so that the first steps in the cost of production were reduced to a minimum. The trade once started, good results were at once noticeable, and thus the industry which is to-day one of the most important in this monarchy was started.

The preliminary steps to be taken in the growth and manufacture of canes are very simple. In the early spring care must be taken to insure a good crop of sticks. Workmen are sent into the groves with nippers, and every stick that is to be cut later on must first be nipped. March is the best month for the nipping process, for in this month the shoots begin to sprout, and by the time autumn arrives they are ready to be gathered. Forestry laws here step in with restraining regulations by providing that a certain number of sticks in every grove must be left standing until they grow to a sufficient height to be used as telegraph poles. This does not take so long as one might think, however, for Austrian telegraph poles, it may be stated, resemble closely good-sized American bean poles, the wires being strung along the sides instead of on crossbars attached to the top of the poles.

The maximum length which the sticks reach in one season's growth—and if they are nipped in the spring the law specifically states that they must be gathered in the fall of the same year—is two meters; in thickness they vary all the way up to forty millimeters. Sticks which do not attain full growth by autumn must also be taken and be paid for at the regular price, but these are saved from waste by being bent and prepared to serve as umbrella handles. Thus every piece of material is utilized. When the entire crop has been gathered, the sticks are stripped of twigs and thrown into a bath of boiling water, which loosens the bark and makes the work of peeling quite easy. It is interesting to look on while the workmen deftly snatch the blistering hot sticks from the steaming pool and with bare hands draw the bark off in large pieces, as unconcernedly as any other person would handle the cane in a finished state.

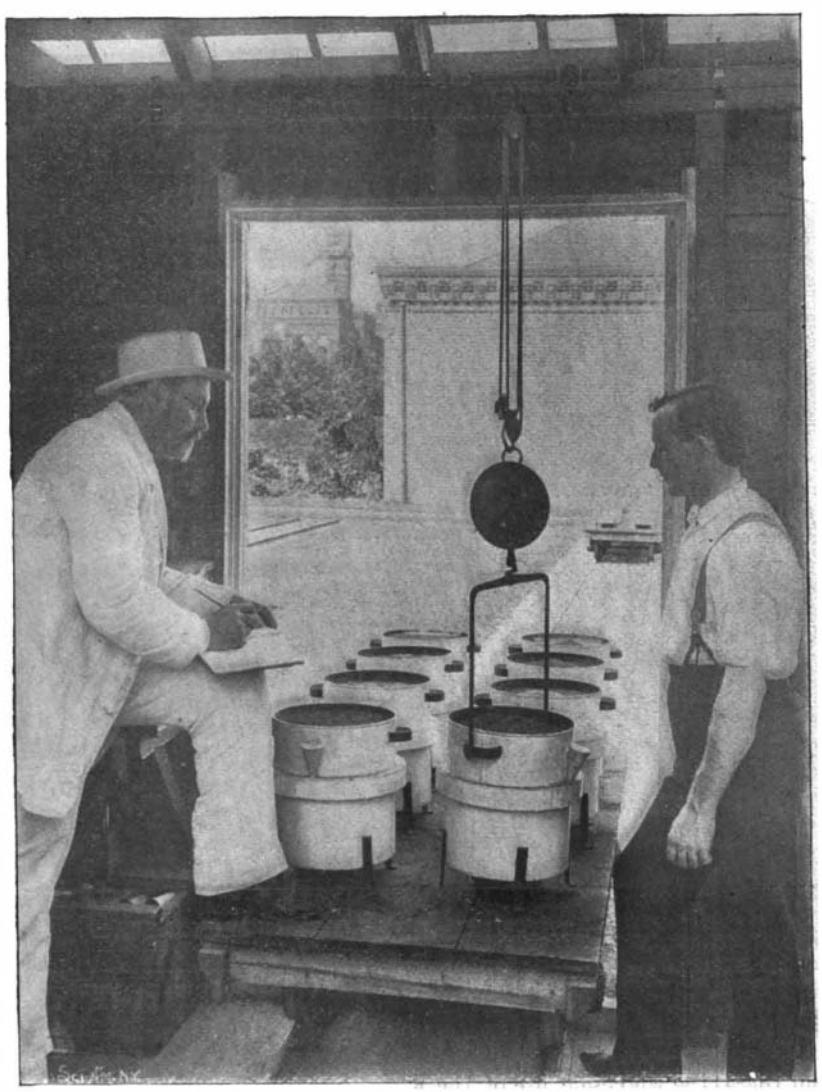
The industry of peeling and preparing the rough sticks for the future processes of bending, smoothing, and polishing is what is known here as a "Hausindustrie," a widespread and practical institution in Austria-Hungary. The "Hausindustrie" obtains in all branches of manufacture where the tools used are of the simplest and rudest kinds and the entire work may be done in the workingmen's homes. The advantage accruing to the laborer in thus accomplishing his work at home is great, for all the members of the family may take hold more or less and the small wage earned by the average "Tagelöhner" (day laborer) is increased twofold. In some parts of Germany, for example in the toy districts of Thüringen, the "Hausindustrie" has grown to so great an extent that many families have built up a large business, and their workshops are now more on the order of small factories. But the cane industry has by far not yet reached this point of development.

In order to take advantage of the clause in the present American tariff which places raw unmanufactured wood on the free list, all canes intended for shipment to the United States are sent over in the rough and finished by American buyers. It is estimated that from two to three millions of congo sticks are exported annually to the United States alone. England consumes a like amount, but the canes that go thither are exported in a finished state. The wholesale price of unfinished sticks in Austria is quite low, averaging from 14 to 17 kreuzers (5 to 7 cents) for the middle qualities and slightly more for the higher grades. These same canes, which are so inexpensive in Austria, when polished and fitted with silver tips and bands, retail in the United States for several dollars. As may be seen, the business is a paying one for the American retailer. Formerly, when the trade was in its infancy, land owners charged but a kreuzer per stick, and were glad to get rid of them at that price, but with the increased demand prices were raised, and now manufacturers cannot buy them for less than 3 kreuzers (1½ cents).

After the cane industry became firmly established and large tracts of land had been rented, fear became prevalent that the demand would not continue for a sufficient length of time to warrant large expenditures in developing the foreign market. This was the case with cherry wood several years ago, and cherry may now be purchased at prices that are considered next to nothing. But at present it appears that the market for chestnut will last for some years yet, unless a sudden change in fashion drives congo sticks out of use in the United States.

C. E. CARPENTER.

Vienna, Austria.



WEIGHING VEGETATION POTS.

THE rapid rise of the land about Hudson Bay is said to be the most remarktble gradual upheaval of an extensive region ever known. Driftwood-covered beaches are now 20 feet to 60 feet or 70 feet above the water, new islands have appeared, and many channels and all the old harbors have become too shallow for ships. At the present rate, the shallow bay will disappear in a few centuries, adding a vast area of dry land or salt marsh to British territory in America.

Thermophones.

The periodic changes of length or bulk produced by an oscillating current may be utilized for the electrical propagation of sound. The effect may be indefinitely increased by superimposing a steady current upon the variable current. A bolometer is inserted in the secondary circuit of a small induction coil. As long as the secondary current alone traverses the bolometer, no sound is heard. But as soon as an independent constant current is made to traverse the bolometer, every impulse of the induced current produces a noise in the bolometer, which in this case acts like a telephone. The loudness increases with the strength of the steady current. On replacing the induction coil by a microphone, nothing is heard. But even then, the sound may be brought out by Simon's sensitive arc. This is due to the strong steady current traversing the arc. If three or four secondary cells are put in circuit with a bolometer and a microphone, anything spoken into the latter is distinctly reproduced by the microphone. The bolometer may be replaced by strips of thin brass.—Braun in Annal. Phys. Chem.

THE STUDY OF TYPICAL SOILS.

BY MARCUS BENJAMIN, PH.D.

The Department of Agriculture in Washington has been wise in retaining during several successive administrations its able Chief of the Division of Chemistry. The result has been that during the years of his tenure of office, Dr. Harvey W. Wiley has been able to plan and complete several valuable series of experiments. None of these, perhaps, have occupied his closer interest and attention more than those which have had for their object the study of the growth of various plants under similar conditions but with varying soils. In fact, the investigation may be designated as a study of typical soils, and is perhaps the first attempt ever made in this country to study any number of soils under like conditions.

In a way the work is an extension of that most excellent series of studies that have been carried on at the celebrated Experiment Station in Rothamsted, England, under the direction of Sir John Henry Gilbert and Sir John Bennett Lawes, who for more than half a century have had charge of the scientific work in that place.

Typical soils from between thirty and forty places scattered throughout the United States were procured through the agencies of the Department of Agriculture, and a direct comparison was instituted with samples of soils of known constituents obtained from Rothamsted.

A plot of ground in the rear of the main building of the Agricultural Department was set aside for these experiments, which were begun in 1892, and a small green-house erected in which the plants are kept during the night and in rainy weather, but at other times they are rolled out into the air. This is easily accomplished, as the pots are all on trucks which may be moved at will along the tracks, as shown in illustrations.

For a portion of the season oats and beans were grown in duplicate samples of typical soils. After the crops from these plants had been harvested, the soil in the pots was again prepared for planting, and a crop of buckwheat grown. By this means two crops are secured during each season, so that the value of the experiment is largely increased, in consequence of duplicating the data obtained.

Very careful attention is naturally given to the water supplied to the pots, and formerly at proper intervals a known amount of distilled water was added to the soil by means of glass measuring vessels, but as the work has progressed, these have been discarded and a number of tin vessels, each holding two pounds of distilled water, have been substituted. As the amount of water added to every pot must be known (so that the conditions may be identical), this improved method makes it possible to add one portion of water to each of the pots in the course of two hours. This is accomplished by inserting the tin funnels containing water in the funnel holder on the side of the pot, as shown in the illustration.

Next perhaps in importance to the addition of water to the soil is the determination of the amount of moisture contained in the pot at any given period. For a long time this factor was determined chiefly by an inspection of the surface, with an occasional weighing of the pot. This method, while capable of yielding excellent results when under the immediate supervision of an expert, was frequently interrupted, owing to the absence of Dr. Wiley, who was liable to be called elsewhere by other duties. Accordingly it was deemed advantageous to have a more rigid control of the quantity of moisture present. Consequently, weekly weighings of the pots are now made, so that the quantity of moisture which has been evaporated

during the seven days may be directly determined. Knowing the quantity necessary to produce complete saturation of the soil, a simple calculation will show the quantity to be added in order that the amount of moisture in the soil shall be between 60 and 70 per cent of the total quantity necessary for its complete saturation.

For a time the weighing of each individual pot not only consumed a large amount of time, but also proved a very arduous undertaking for the attendant in charge of the pots. Accordingly, the method of weighing was improved by an ingenious mechanical device which renders it possible for one person, without assistance and without undue physical exertion in the way of lifting the pots, to weigh the entire lot of 176 in about four hours. This is shown in one of the accompanying illustrations, which is also of special interest as showing Dr. Wiley himself in the act of writing down the weights.

The final illustration shows the screen or hood that has been devised for the purpose of protecting the plants from the action of the wind and from the attacks of birds.

The laboratory work includes determinations of the total amount of dry matter produced in each pot, together with the amounts of nitrogen, phosphoric acid, and potash removed from the soil by each crop. The data from seven seasons is now at hand, and the preparation of a preliminary report is under way. It will contain statements in regard to the composition of the soils, their physical character, their water-holding capacity, their contents of humus, and the percentage of nitrogen, phosphoric acid, and potash contained therein, both as regards total content and in respect of the quantities removed by different solvents. This report will be illustrated, not only by analytical tables, but also graphically in such a way as to show in the most evident manner the relation which exists between the physical and chemical composition of the soil, its contents of moisture, and the quantity of dry organic matter produced.

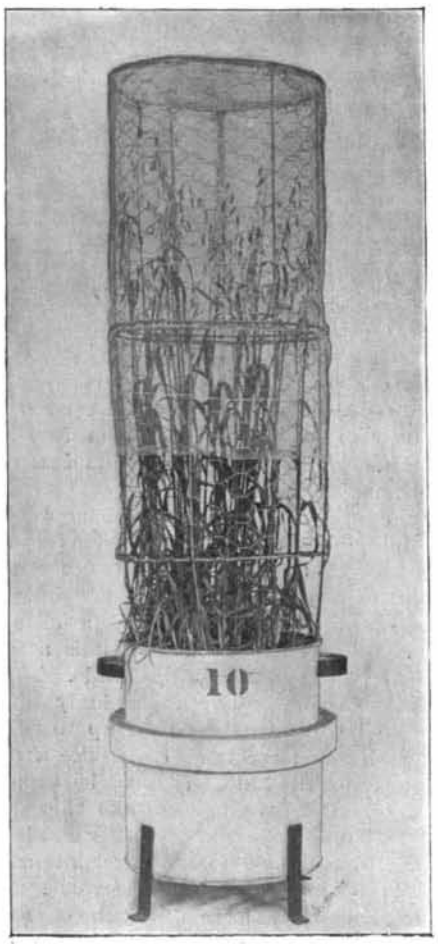
This is but one of several investigations now being conducted under the direction of the Chief of the Chemical Division of the Department of Agriculture. The great value to the farmer is obvious, for as a result of this investigation a chemical analysis of a given soil will at once determine what plant foods may be deficient in it for the production of a given crop and at the same time it will show the farmer how to supply these deficiencies when practicable by the judicious application of fertilizers or by a suitable rotation of crops. Thus in the end it will demonstrate what crops grown on a given soil will yield the greatest amount of profit to the farmer.

The slow and even tedious work necessary for the satisfactory completion of investigations carried on in the scientific bureaus of our government is not always appreciated by the general public, but when the results that are sure to ensue are so far-reaching in effects as those of the investigation which has just been so briefly outlined, then, indeed, does the wisdom of the work become clearly manifest.

THE committee on endowment of the Franklin Institute, Philadelphia, is making an appeal for subscriptions to the endowment fund. It is of the utmost importance for the future prosperity and progress of the Institute that a substantial addition to its annual revenues be acquired, not only to provide income sufficient to carry on its present work, but also to enable it to extend this in other directions.

Russian Foreign Trade.

The reports of the foreign trade of Russia last year show it to have been very satisfactory. The total exports amounted in value to $399,955,835, an increase of about 5 per cent on the previous year; and the imports to $377,641,045, a decrease of about the same amount for the same time. The increased value of the exports is attributed to the enhanced price of grain caused by the failure of the crops in India and elsewhere; in other things, such as flax and hemp, there was a very appreciable decline, and the petroleum trade fell off somewhat, owing to the competition of American oil. The home demand for oil, however, increased so that the producing industry did not suffer in any way. The exports of timber and wood products were very profitable, and the value of the eggs sent abroad amounted to nearly $15,000,000. There was also a considerable increase in the exports of cotton goods and iron ware of all kinds, principally to Asiatic countries, mostly to central Asia and Persia.



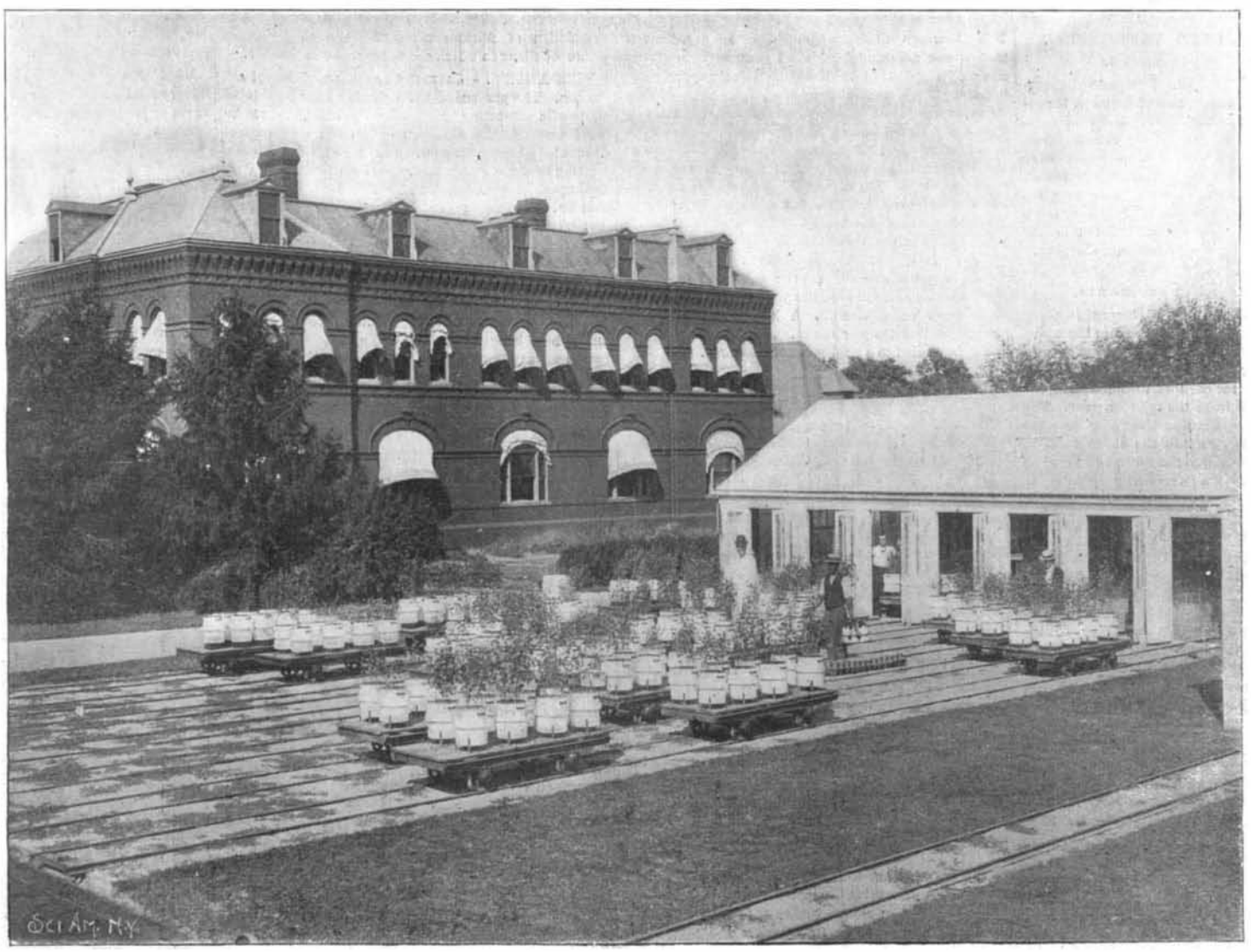
VEGETATION POT CONTAINING GROWING OATS.

As regards imports there was an increase in the manufactures of iron, and in raw materials, such as cotton, jute, and silk, the manufacturing of which is steadily increasing. The imports of tea decreased considerably, being probably displaced by beer, the brewing of which is becoming an important Russian industry. Of the total Russian foreign trade about 18·6 per cent is done with England, the remainder being largely with Germany, but a good proportion with the Mediterranean countries and France. With England the export trade last year declined and the imports only held their own.

A notable fact that has caused much comment in England was the purchase by the Finnish Railway Company of twenty powerful locomotives from American builders during the past year. The business of supplying these machines had previously been held by English builders. The British consular reports from Russia on the subject of British trade with that country attribute its want of development to the absence of activity on the part of British manufacturers and exporters, and to the slowness of the former in adapting their machinery to the production of goods suited to the taste and wants of the Russian markets. Apparently this leaves a good field open to American exporters to western territories of Russia, as well as to those developing in the East, with prospects of profitable results if they enter it in time and with goods to meet the requirements of the market.

The Trinidad Pitch Lake.

The famous pitch lake, or great bitumen deposit, of Trinidad is situated at Point Librea, on an elevation at about a mile from the sea. It covers an area, says Popular Science, of nearly one hundred acres, and its appearance is that of a dull, still, dark waste. It is irregularly circular, and its surface perceptibly convex, being more elevated in the center, and thence insensibly declining on all sides. In the center the pitch is quite soft, in fact, semi-liquid, but it becomes more and more hardened as its circumference widens out. Except the soft central parts, the surface is intersected in all directions by numerous fissures or chasms, varying in breadth from two feet to sixteen feet, and from half a foot to seven feet in depth, widening also at the surface, and terminating acutely at the bottom, thus producing, as it were, inverted angular hollows, while the sides are regularly rounded. These crevices are always filled with fresh water. Here and there where the bitumen is mixed with earthy matter grow lichens, mosses, grasses, etc. The center of the lake, the pitch pot, or chaudiere as it is called, is at all times so soft that it would be impossible to venture on it without incurring the danger of being engulfed. The lake is government property, and parts of it are leased out to private individuals, who have to pay royalties according to the amount of pitch removed, which amount is checked by the government. The lake is practically inexhaustible. No matter what quantity is taken out, it is replaced by fresh pitch, which always wells up to fill the whole. The surface of the outer edges of this most wonderful of lakes is quite hard enough to walk upon; but a curious result ensues if you stand still for any length of time on one spot. For some yards around you the pitch bodily sinks until it forms a sort of basin.



THE DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.—THE VEGETATION HOUSE AND CARS OF THE DIVISION OF CHEMISTRY FOR THE STUDY OF SOILS.

LONDON has one street 70 feet long, being the shortest street in the city.

Automatic Feed for Water-tube Boilers.

BY EGBERT P. WATSON.

The small water content of water-tube boilers as compared with fire-tube boilers demands a regular and constant feed at all times and under all circumstances when the boiler is in action; otherwise the boiler is in danger of being burned. Even if it is not burned, the tubes are liable to pull out of the tube-sheet from being softened by overheating, and serious accidents have occurred from this cause, one but a very short time ago. Men who have had no training with water-tube boilers should not be put in charge of them. But a few weeks ago the writer had a young man in his service who was of more than average intelligence, and had had, as well, several weeks' training under him in the management of a water-tube boiler of high efficiency. This young man was left in charge of a boiler carrying 225 pounds of steam under forced draught, with positive injunctions not to leave the front of it or take his eyes off the water-gage for a moment. The writer was absent just ten minutes, and, on his return, heard the pop-valve going when he got within 200 feet of the boiler. Quickening his steps, he reached the boiler just in time to prevent its destruction by burning. The water had disappeared from the glass, but issued in fitful spits from the lowest gage cock, showing that it was still above the danger line. No one was about the boiler, but in a minute or two the young man before mentioned returned, and, upon being soundly rated for his recklessness, declared that he had only been absent a few minutes from necessity. The fire had burned up white hot in the few minutes he was away, and the water had gone out most rapidly, or more rapidly than the engine could use it. Had there been an automatic feed on the boiler, everything would have run quite smoothly.

The feed on the boiler alluded to was kept up by an injector, but it is usually maintained in this class of boilers by pumps, in default of anything better. It is, in any case, however, a constant source of danger, or rather anxiety, especially with marine boilers under severe duty. Upon torpedo boats and high speed yachts the boilers are worked far above their normal rating, and as there is but a small body of water in the boiler, even when at rest, the water level, when the boiler is driven by an air blast of five or six pounds pressure, is liable to sudden fluctuations, and has to be carefully watched. The feed must not cease for one moment while the boiler is in full work, and engineers are fully alive to the necessity of an automatic feed. To devise one that will fill all requirements is not so simple as might seem upon the face of it, and any one who undertakes the task with the idea that it is, and that some sort of a self-regulating valve, or other common device, will do the work, will be undeceived when his plans are put to the crucial test of actual running. An automatic feed for a marine water-tube boiler must have brains of its own, so to speak, and know when to put water in and when not to. Just how to accomplish this has puzzled the best engineers of the world, so far. There are some devices of the sort named in use to-day, but there are not many, and they have objections which render them anything but reliable under all circumstances. Too frequently, owing to their principle of action, they speedily work their own ruin. Some of them require as much supervision as a common pump, and therefore do not fulfill their mission. When all the water is going out and none coming in, or not enough to keep up with the evaporation, only two courses are possible: One is to get more water instantly from somewhere; the other, to stop the vessel and haul the fires. What this last operation involves is known only to those who have been compelled to do it. To suddenly deposit nearly half a ton of white-hot coal on the floor of a fire-room only a few feet square—the mere hauling of it, even—is a serious matter, only to be undertaken when it is a case of ruining a boiler or a matter of life and death to all in the vicinity.

An automatic feed device for marine work must be of the simplest construction and based upon well known laws. Small valve stems delicately balanced are highly objectionable, for the reason that, although they work well when new and smooth, the deposits and accretions from the water (especially if it is at all saline) soon render the apparatus unreliable. To cover all the conditions successfully is exceedingly difficult, and it is not to be wondered at that up to this present writing engineers have failed to devise a reasonably reliable device of the kind. It must be borne in mind that marine water-tube boilers take the water in at one end and discharge it at the other end in the form of steam. It is rapidly circulated over intensely heated surfaces in comparatively thin streams, and, there being no crown-sheet, as in a fire-tube boiler, there is no reserve water at all. The evaporation is so rapid that the entire contents of a water-tube boiler may be turned into steam in a very few minutes, if the feed is stopped. In a sixty-horse power water-tube boiler, for example, there is a total content of about 600 pounds of water. The heating surface would be about 500 square feet. Now, if the boiler evaporates only five pounds of water per square foot of heating surface per hour, it would only require a quarter of an hour to boil out every drop in it, and but a very few minutes to lower the water level to the danger point.

From these plain facts it is easy to see that an automatic feed is essential to the success of boilers of the type discussed, and equally apparent that the proposition is not a simple one. Danger signals, such as blowing whistles and displaying devices of one kind or another to show engineers that the water is low, would not be tolerated. There is a man constantly on watch for this very function, and he is apt to find it out long before a whistle would. What is required is a simple mechanism that will keep up the water supply as fast as it evaporates, and will stop acting when the boiler stops; for less than two minutes would flood the boiler if the feed kept working. The man who can devise such a machine will have work supplying the demand for a long time to come.

CHARLES A. SCHOTT, Chief of the Computation Division of the Coast and Geodetic Survey, has been awarded the Wilde Prize by the French Academy. The Wilde Prize is a coveted honor open to the world, to be conferred on the one judged the most worthy from among those who make discoveries or write works on astronomy, chemistry, geology, physics, or mechanics. The award to Mr. Schott is based on a work on terrestrial magnetism. The committee which made the award consisted of some of the best-known scientists in France, including MM. Savvan, Bertrand, Levy, and Berthelot.

The Current Supplement.

The current SUPPLEMENT, No. 1196, contains many interesting articles, notably one on "The Kaiser's Pilgrimage to the Holy Land," accompanied by views of vessels which accompanied the Emperor's yacht, views in Jerusalem, etc. "Torpedo Boat Destroyers" is an important paper read before the Society of Naval Architects by G. W. Dickie, and "Designs for New Vessels for the United States Navy" is by Philip Hichborn, chief constructor United States Navy. Both these papers are of great value. "Foods" is a lecture delivered before the Drexel Institute by Dr. A. P. Brubaker and has been revised for the SCIENTIFIC AMERICAN SUPPLEMENT.

Contents.

(Illustrated articles are marked with an asterisk.)

RECENTLY PATENTED INVENTIONS.

Electrical Appliances.

ELECTRIC ACCUMULATOR.—FEDERICO PESCETTO, Turin, Italy. The present invention seeks to provide improved means for manufacturing electric accumulator-plates. The plates are cast in the usual manner, and with the minium and with the litharge which serve to form the active material of the plates, ulmin "ulmate" is mixed. The inventor claims that a plate thus prepared is lighter in weight than most accumulator-plates, that the reacting surface is increased, and that the active material is readily held in contact with the plate.

Engineering Improvements.

ROTARY VALVE.—BRAINERD W. SMITH, Delphos, Ohio. The valve-mechanism of this inventor has a segmental valve-seat on which is mounted to turn a valve formed with a cavity for connecting the cylindrical ports with the valve-chest and the exhaust, to admit and exhaust the steam to and from the cylinder-ports. The valve is formed with an auxiliary port opening into the cavity, and is arranged to open into the steam-chest at the time the cavity opens into the chest, and to be cut off or closed during the time the cavity opens to the exhaust.

Mechanical Devices.

MACHINE FOR SCREWING UP OR UNSCREWING PIPES.—CHARLES H. MCCREADY, Neodesha, Kan. This machine, for turning pipes, screw-rods, and similar articles, comprises jaws adapted to grip the pipe; a ring on which the jaws are fulcrumed; a driven revoluble ring connected with the jaws, to close the latter on the pipe, and to carry around the jaws, together with the ring on which the jaws are fulcrumed, the connection between the driven ring and the jaws consisting of a pin mounted to turn on the ring; a clevis fulcrumed on the pin; and a link connecting the clevis with a clip on the jaw.

ADDING-MACHINE.—WILLIAM R. GILBERT, Binnsville, Miss. The machine devised by this inventor is inclosed in a casing in one end of which two independent reels are mounted to turn. On the periphery of a third reel, mounted in the opposite end of the casing, an annulus turns. Two numbered tapes are attached to the two first-named reels and wound respectively around the third reel and around the annulus. The third reel and the annulus have portions projecting without the casing to permit the third reel and the annulus to be turned. A stop-arm is rigidly held by the casing to indicate the limit of movement to which the third reel and annulus are to be turned. The numbered tapes having been thus set in motion, the total sum appears on the tapes at observation openings in the casing. After noting the sum observed, the operator returns the parts to their normal position by releasing the springs attached to the reels.

ORE REDUCING AND SEPARATING MECHANISM.—PHILIP J. LONERGAN, Colorado Springs, Col. This invention seeks to provide an improvement in pan-process amalgamators, in the nature of a "pan-arrastre" adapted to take the ore directly from the rock-breaker. The machine provided for this purpose is designed to work at its maximum energy, to keep the pulp thoroughly under control and in contact with the shoes until it is reduced to the proper fineness, and to separate and discharge automatically this pulp into a slime-receiver or gutter. The invention comprehends the construction of a machine of this kind, having its center or dead area eliminated, whereby the diameter of the pan is increased, and an enlarged annular way having a superficial area is produced. Thus are created a working channel for the pulp and shoes of a large capacity, adapted to give mechanical motion to the pulp over the whole area by a direct action thereon. A long detention of the pulp is in this manner obtained, enabling it to settle and to be carried to a final point of discharge.

Miscellaneous Inventions.

PIGEON-TRAP.—GEORGE S. MOTT, Babylon, N. Y. The trap forming the subject of this invention is a sporting trap having a setting-lever connected with a bird-cage to close the cage. Mechanism is connected with the lever, whereby the trap is opened when the lever is released. A triggers locks and releases the lever. A gearing driven from the lever actuates a disturbing device operating in conjunction with the cage, to frighten the bird on opening the cage.

BRUSH.—LYDA D. NEWMAN, New York city. To provide a hair-brush, so arranged as to be readily cleaned, this inventor forms recesses in the front face of the brush-back, the bristle-holder being set in the recess and partly filling it so as to leave an air-chamber in the rear of the holder. The holder, moreover, has slots extending through it from front to rear between the rows of bristles, the slots thus communicating with the air-chamber. Impurities from the scalp or hair can readily pass through the slots to the recess in the back, and can be easily removed.

DARK LANTERN.—ROSS M. G. PHILLIPS, Los Angeles, Cal. In this dark lantern are provided two pivoted slides for the lens and a locking device to connect the slides, whereby one slide may be opened independently of the other, or both may be opened together. One slide may be actuated to throw the light down, the other slide permitting the rays to be directed straight ahead.

FILTER.—JOHN H. SIEBER, Henderson, Ky. The filter forming the subject of the present invention comprises a casing in which a porous filtering stone and a cleaning stone, spring-pressed into engagement with the filtering stone, are inclosed. The water is first passed through the filtering stone and then into a service-pipe. The outer surface of the filtering stone may be cleaned when necessary by rotating it against the cleaning stone. The inlet for unfiltered water, lying directly over the filtering stone, causes water to be showered over the entire surface of the stone, thus preventing the large accumulation of filtrates necessarily deposited on the stones of filters in which the water enters at the side.

FIRE-ALARM.—JOSEPH CASAVELLO, Cumberland, Canada. The purpose of this invention is to provide an alarm of a detonating or explosive character, that can be heard a considerable distance and that will be comparatively cheap to manufacture. The fire-alarm comprises a casing having a screen wall, a series of canisters containing explosive material, and a fuse leading into each canister. The fuses are extended around the building. As the combustible material of the fuses becomes ignited, the canisters will, as a result, be exploded, not, however, with sufficient force to injure the building.

BINDER AND SHEET.—JOSEPH S. HAM, Portland, Me. One of the features of this invention lies in the provision of means whereby McGill fasteners may be firmly held between the two sides of the cover at the back, and may be readily replaced should they be damaged. A binding strip is provided for the leaves, a portion of which is arranged to hold the fasteners in place, another portion being adapted to be held in binding engagement with the leaves of the book by means of the fasteners. The individual leaves have recesses so shaped that, when the fasteners are in position in the recesses of the leaves, these leaves will be held as firmly between the covers as if they were regularly bound therein. It is possible to remove any of the leaves from the covers or to introduce additional leaves.

CONCENTRATE-RECEIVER.—JOHN C. and RICHARD C. WATERS, Romley, Col. In concentrating machinery as hitherto employed, the concentrates are passed with the water from the machine into an ordinary box set on the floor, and are removed from the box by means of a hoe or shovel—a most laborious process. The box of the present receiver is mounted to turn and is formed with a flexible bottom separating the box into two compartments. The upper compartment is the receiving compartment. The box is mounted to move downwardly under the weight of the accumulating concentrates in the uppermost compartment. A device is provided by means of which the box is made to turn when moved downwardly.

THIMBLE THREAD-KNIFE.—ANNAH M. HUNTER, Paris, Ill., and LOUIS ILLMER, Jr., Washington, D. C. This invention is an improvement in thread-cutters designed to be used on an ordinary thimble. The thread-cutter has a cutting portion or knife, and a clasp to embrace the thimble, which clasp is composed of a helical coil, the length of which exceeds a circle, whereby the clasp is made to overlap in the direction of the axis of the helix. The clasp is formed of spring wire and may be easily forced over a thimble of any size.

BEDSTEAD.—JOSEPH W. EVANS, Haskell, Tex. The bedstead of this inventor has a rigid frame, suspended by four cords running over pairs of vertical and horizontal pulleys journaled in brackets attached to the ceiling and over fixed pulleys, and are also connected wth a slide carrying movable pulleys. A pull-cord runs on the movable pulleys and certain fixed pulleys, whereby it actuates the slide and hence applies traction to the several suspending cords to raise the bed to the ceiling.

VENTILATOR.—GUSTAV F. CRAMER, Portland, Ore. The ventilator of this inventor is adapted to operate on the vacuum principle—that is to say, it may be so acted upon by the force of the wind as to tend to create a partial vacuum in the shaft or other inclosed space below, whereby an ascending draft is created. The ventilator comprises a frame or open-sided hood, slats pivoted horizontally and eccentrically thereon, devices having a curved rim and secured to the slats, and wires or equivalents attached to and connecting the devices. The wind's blowing upon the slats on side of the hood will close or tend to close them, because the greater surface area of the slats lies below the pivots. Such movement will cause the opposite slats to open correspondingly, so that an upward draft in the chimney is induced by the partial vacuum produced on the open side of the hood. The inventor has added a small contrivance by which the hood can be entirely closed at will.

MUSIC-LEAF TURNER.—WILLIAM G. DE RAMUS, Prattville, Ala. This improved leaf-turner is adapted to be used in turning the leaves of music, or as a copy-holder for use by typewriters. The apparatus has a frame supporting the leaves. A longitudinally reciprocal carriage is mounted on the frame and has a shaft rotatable at right angles to the direction of reciprocation of the carriage. Fingers are carried by the shaft and are arranged to hold and release the leaves. A spring is coiled around the shaft, by which spring the fingers are pressed against the leaves. A device is attached to the carriage in order to regulate the tension of the spring.

Designs.

BASE FOR CALENDARS.—MAX RUBIN, New York city. The calendar designed by this inventor is made in the form of a flag, and is so constructed that the field of the flag containing, for example, the stars of the American ensign, will represent the dates, each date being inscribed in a star. The fields representing the various months may be torn off; or, they may be rotated by means of a roller to bring a new month into view, thus giving the appearance of a moving field.

WALL-PAPER.—HARRY WEARNE, Rixheim, Germany. The wall-paper forming the subject of this design has pictured upon it a continuous chain or string of roses, full and partially blown, and in the bud, together with foliage.

WALL-PAPER.—ARTHUR MARTIN, Paris, France. This design consists of a bouquet of roses encircled by festoons of ribbon intertwined with jasmine. The ribbon is connected with the stems of the bouquet. At intervals, the ribbon is formed with bows holding rose-buds.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for 10 cents each. Please send the name of the patentee, title of the invention, and date of this paper.