

Reclaiming Sterile Land in Germany.

The value of agricultural land in the consular district of Mannheim, Germany, is unusually high, says Consul Hoffman. The holdings per capita are small, and owners are consequently compelled to plant remunerative crops, reserving only sufficient ground for the cultivation of food products and forage for cattle. An interesting illustration in the attempt to retain, or even increase, the arable surface is at present to be observed two miles east of the city.

The valley of the Rhine is about 20 miles across at this point, the lower or river terrace consisting of agricultural lands exceedingly rich in loam and old river deposits, while two miles east of the river the second terrace rises to a height of about 40 feet, most of which consists entirely of fine sand, covered at various places by a thin film of loam and now used for the training of pines. Passing through several miles of artificial forest, one emerges to find better soil and ordinary farm lands used for raising wheat, oats, potatoes, and carrots.

The removal of the edge of the above-mentioned sand terrace was begun early in the spring, the material being transported by cars over a temporary track. The sand is removed by means of specially constructed dredges, and at this time of writing about 6 acres have been exposed, reducing the surface to the level of the farm lands on the lower or river terrace. The top crust of loam has been carefully removed from the sand terrace and carried down to the newly exposed surface of sterile river gravel to form new acreage, being there distributed and having a depth of about 6 or 8 inches. Over a great portion of this new surface young cabbage plants are growing, and other crops will be started as rapidly as the loam is deposited and leveled.

This illustration is but one of many showing rigid economy among these hard-working inhabitants.

THE SURPRISE PEN.

Our engraving shows a very clever trick pen which would tend to create great surprise among the uninitiated. Let us suppose that a gentleman is seated at his desk and is busily writing when a neighbor comes in and he jokingly challenges the latter to try and forge his signature. He hands the pen to his friend, who attempts to write. Immediately there is an explosion and the paper receives a big ink blot. The writer is apt to be surprised by the report, which is like a pistol shot, and if a timid person, is apt to be frightened. The noise comes from the pen itself, as it is so constructed that it can be loaded and shot off at will. The person in the secret can handle the pen with safety, but the poor unfortunate will experience a rather unexpected shock to his nerves when he attempts to write with it.

The upper part of the penholder, into which an ordinary writing pen is thrust, works on a pivot about half way down its length. This separate part is provided with only one-half a bottom, in order that it may engage the conical head of a piston rod which ends in a plunger which sets off the cap secured in the bottom of the penholder. The normal position of the plunger is against the cap of the holder, but it can be raised by means of a projecting pin riveted to the rod and passing through a slot cut in the side of the lower part of the holder. Now the closed half of the bottom of the pivoted end enters a notch caused by the conical head of the plunger, and the plunger with its spring is cocked, as it were, by means of the projecting pin, and is held in place by the bottom of the pivoted section. When the pen is pressed to the paper the pivoted section swings on the pivot, releasing the plunger, which is forced down on the explosive cap by the spring.

The lower end of the penholder is threaded, so that it can secure the end cap firmly in place. The explosive cap is put in the end cap, and it is screwed on the bottom of the holder. Ordinary paper caps for children's pistols are used. As long as the plunger simply rests on the cap there is no danger of an explosion, but just before the joker wishes to give his friend a scare, he cocks it by pushing the plunger up with the pin, until the pivoted top engages it.

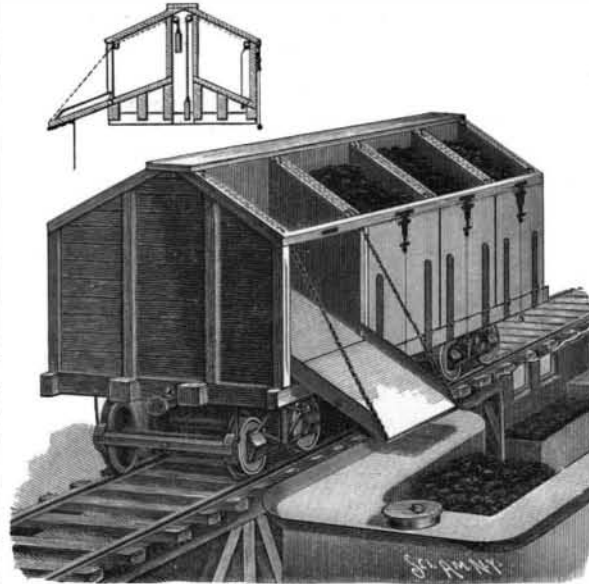
Toning Muddy Platinotypes.

Workers in platinotype find to their cost that damp paper, or paper printed without proper precautions in damp weather, gives dirty-looking, muddy prints. These, however, may be recovered, and gain a splendid blue-black tone if spread over with glycerine, and a little gold solution be poured on, to be rapidly and evenly incorporated with the glycerine with the aid of a swab of cotton-wool. The change in tone is rapid

and marvelous, and a wash to free from (the auriferous glycerine completes the process.—M. E. M. D. in Photo. News.

A NEW WAY OF COALING LOCOMOTIVE-TENDERS.

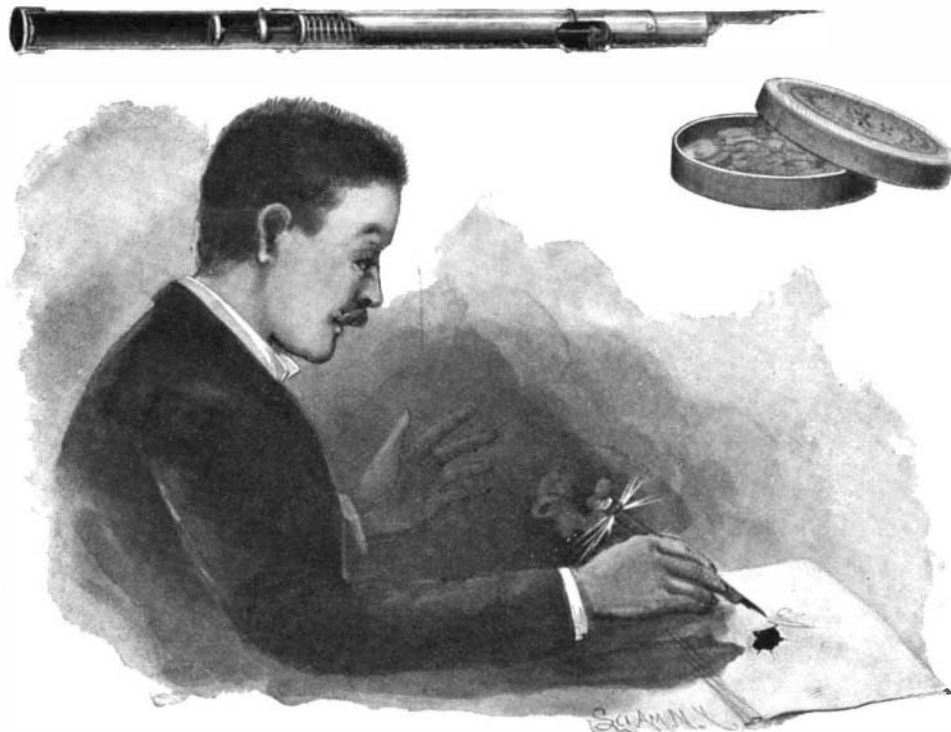
At regular intervals along their lines, the various railway companies have established coaling stations for their locomotives, to which stations coal is conveyed in cars and unloaded. When coaling an engine at these stations large iron buckets are loaded by hand, hoisted by a crane and then lowered into the tender. The expense and labor incurred in this process



AN IMPROVED COAL CAR.

are considerable, and the coal itself is often wasted by this repeated handling. It is the purpose of an invention recently patented by M. J. Griffin, General Yard-Master, and W. P. Hogan, Car-Foreman of the Grand Trunk Railway at Island Pond, Vt., to overcome these difficulties.

The invention in question consists in dividing a car into a series of pockets having sloping bottoms discharging toward the outer sides of the car. These pockets are closed by doors or chutes which can be raised or lowered, and used to discharge the coal into the locomotive-tender. The partitions forming the pockets are made double, with a space between the parts to receive the sides of the doors or chutes. When closed, the doors are locked in place, each by a catch comprising a slide held in engagement with a staple by means of a spring. A rope attached to the lower part of the slide permits the doors to be readily unlocked. The doors are raised and lowered by ropes carried over pulleys through the space in the double partitions, and up on the under side of the foot-board. Counterweights are attached to the ropes, and move vertically in a longitudinal well



THE SURPRISE PEN.

or chamber, as indicated in the cross section. In using the car an elevated track is provided, running parallel with that occupied by the locomotive. When the engineer desires to replenish his coal supply, he runs alongside of the elevated track with the tender of his engine beneath one of the pockets in the car. The catch of the door or chute being then released by pulling upon the rope, the door falls and the contents of the pocket are discharged into the tender. Locomotives can in this manner be coaled from both sides of the elevated track without causing any delay and without incurring any great expense.

Trade on the West African Coast.

The methods of trading on the west coast of Africa have changed very little in the last fifty years, says The New York Sun. There is much improvement in communication with civilized countries, but the natives themselves are the same old "heathens who in their blindness bow down to wood and stone." The climate has a great deal to do with this, and the always hot and malarious country makes great activity impossible. It is only when we read of possible international complications, caused by the traders of one European country encroaching upon the ceded rights of another, that we find that the trade is worth fighting for. This is notably the fact just now on the Upper Niger, where the French traders and the English representatives of the chartered Royal Niger Company have differences to settle. The French traders used formerly to confine their attention to their own settlements in Senegal and other minor places, and for some years they have had a railroad in operation in the region of the Gambia River, but lately their merchants have been more progressive and are vying with England and Germany for prestige in numerous coast ports. There is now telegraphic communication right down to the Gold Coast, and it promises to be continued down the west and southwest coasts until it reaches Cape Colony and forms a belt connection with the telegraph up the east coast of Africa.

From the old days when Liverpool and Bristol vessels indulged in slave trading as a side issue until quite recently, smart brigs and schooners would go out to the coast with a cargo of merchandise, and the captain would be both trader and navigator. He would visit a number of small places and barter his cargo on board his own ship for palm oil and small quantities of ivory, gold dust, and other native produce. Often the voyage would occupy a year or more, and each vessel would take, besides her crew, coopers and mechanics to assist in the loading. It is said that often a cask of salt, which might be worth \$5, has been exchanged for a cask of palm oil worth \$150; but that was long ago.

The trade has long ceased to be so lucrative, and though business is still conducted by bartering spirits, tobacco, cotton goods, and a thousand and one other things for produce, it is very rarely that a vessel will trade on her own account. There are several lines of mail steamers that go down the coast from European ports, and the merchants have trading stations or "factories" ashore where they receive merchandise from the mail boats, and dispose of it for produce which they prepare for home shipment. On the northwest coast, in the region of the Gambia River, ground nuts—in reality our peanuts—are cultivated and shipped from the principal port, Bathurst, to Europe, and are there crushed and a valuable oil extracted.

Going south, the next port of importance is Monrovia, the capital of the little republic of Liberia, called often the American colony. Further south again comes Sierra Leone, a large town, and civilized in comparison with many other places; in fact, it is compulsory to wear clothes on its streets. The Sherbro River is hereabout, with its numerous trading stations, and from this vicinity large quantities of palm oil and palm kernels are shipped.

Again going south, or rather east, at this point, one comes to Lagos and the Gold Coast, with Cape Coast Castle and Accra as important military stations. From this district a quantity of gold and ivory is received, and in many places rubber and small quantities of cotton. Further down still, the ports of Bonny and Akassa, at the mouth of the great Niger, are depts where large hulks are anchored to receive merchandise and produce, either from or to the branch steamers that run up the great river. An enormous trade in palm oil is done up the Niger.

As one goes south, Gaboon, another French settlement, is an important point, and here and further south still rubber is taken in large quantities and shipped to Europe, where it vies in quality with the fine South American products. The Congo River is becoming very productive, and down in this part of the coast the climate is much more endurable; in fact, if you go still further south to the Portuguese settlement of St. Paul de Loanda, the country is healthier and the climate good. Lately the merchants are trying to cultivate cotton and jute, and the latter takes very kindly to the soil, and promises to rival the best qualities of the East Indies. Palm oil is not so valuable as it used to be, the low price of cottonseed oil and tallow affecting it very considerably. It is used principally in the manufacture of soap and candles.

It takes thirty-seven specially constructed and equipped steamers to keep the submarine telegraph cables of the world in repair.

Artificial Vanillin and Vanilla Flavors.

Recently considerable excitement was aroused in Vienna, Austria, by the fact that a number of seemingly most mysterious cases of poisoning—and not a few fatalities—were traced to the use of ices and confections purportedly flavored with vanilla. But why the vanilla alone should be at fault is pertinent query, since this was the verdict brought about by the investigation.

That the vanilla bean is in a measure toxic, if ingested in large quantities, no one familiar with this growth will deny; but any amount that could induce an untoward effect must, necessarily, be so great that it could not, by any possibility, be embodied in gallons of ices or a hundredweight of confections. Again, though the bean produces a malady in those handling it known as the "vanilla disease"—a form of skin eruption that, while it may be communicated to others, is necessarily self-limited—this can have nothing to do with poisoning by vanilla "flavors," since its source is a minute insect, the "vanilla louse," of the same precise class as the cheese mite, and its period of life is extremely brief when transferred to the integument of human beings.

Also worthy of being recalled is the fact, admitted even by those most interested in their production, that vanilla "flavors," vanilla "extracts," vanilla "essences" and "tinctures," such as are employed solely to promote *souvenir* or piquancy, are never absolutely pure; on the contrary, for the most part, they are made with tonka bean alone, or with tonka to which from five to twenty per cent of vanilla bean is added. The high prices the latter command, and which oftentimes are actually prohibitory, are cited as an excuse for the deception; further, it is added, the mixture secures a better flavor, one preferred for domestic, culinary, and confectionery purposes. In this connection it may be remarked that while so-called "fruit flavors," employed in kitchens, confectionery establishments, bake shops, and at soda fountains, are almost invariably derived from butyric ether—a product of rancidity—this accusation does not hold good as regards vanilla preparations.

But even tonka beans are at times expensive, and recently they, as well as vanilla, have been replaced, in the manufacture of flavors, by vanillin. This latter is the active principle of both vanilla and tonka beans, but if had from this source, would manifestly serve to still further increase the cost of "extract" production. It has been had also from coal tar by process of synthesis, but this again was held insufficiently economical, or it was feared the knowledge that a flavor owed

its origin to an anilin factory would militate against it as a marketable product. Now vanillin is purportedly derived from the inner rind of the bark of certain pine and fir trees, by the aid of sulphuric acid and either sodium or potassium chromate, the process being somewhat intricate, secret, and legally protected. It is likewise (and perhaps more commonly, certainly more economically) had from oleaginous, gummy, and balsamic substances that are possessed of an aromatic, stereoptin constituent known as cardol; and it is the latter upon which the burden of reproach is supposed to rest—a supposition that does not appear to be well founded.

Cardol is certainly highly toxic; so is hydrocyanic (prussic) acid, to which our most delicious fruits owe their flavor. Cardol is found, but only in infinitesimal quantities, in most forms of vegetable growth, the only fruit yielding it in fairly tangible proportions being the "elephant louse" (*Anacardium orientale*) of the far East; and while it is highly poisonous when injected into the circulation, and most irritating when applied to the skin, producing a painful burning eruption, attended with considerable swelling and infiltration of serum (cellulitis), it is known to be inactive when taken into the stomach, being insoluble in any of the digestive secretions. Manifestly, then, cardol cannot be deemed a factor in vanilla poisoning, unless it can be shown: First, that it is present in artificial vanillin in appreciable quantities; second, that in the manufacture of vanillin certain chemical transformations result whereby a cardol combination of free and ready solubility is had.

The remarkable part of the Vienna investigation lies in the fact that no evidence is offered to show that the constituents of the ices and confections other than the vanilla flavoring were investigated. Considering the number of fatalities, an examination for developed and contained ptomaines, or for anilin coloring matters, would seem to have been demanded. At the same time, more knowledge regarding artificial vanillin is desirable.

The Scientific American in Colorado.

The following entirely unsolicited criticism of the work achieved by the SCIENTIFIC AMERICAN during the war recently appeared in the Daily Chieftain, of Pueblo, Col., and we feel sure that our readers will bear with our pardonable pride and that they may be interested in reading the notice:

"It is singular but true that the SCIENTIFIC AMERICAN, a paper which might be supposed to be devoted to musty and tiresome compilations of scientific lore, has

throughout the Spanish war contained the most accurate and interesting illustrated war sketches, especially those pictures presenting naval vessels and their structure. The war ended, the SCIENTIFIC AMERICAN this week presents elaborate illustrations of that great Western triumph of peace and progress, the Omaha Exposition. Provincial and narrow the New York dailies may be, but the SCIENTIFIC AMERICAN is always progressive, not only metropolitan, but cosmopolitan."

The Current Supplement,

No. 1185, contains a number of articles of general interest. "A Day in the Chief Fire 'Watch' of Berlin" is an illustrated article showing the various types of fire companies, practice houses, practice towers, etc. "Central Station Statistics" gives valuable and authoritative figures as to central electric lighting stations in the United States owned and operated by private corporations, individuals, and municipalities. "General Blanco, the Governor-General of Cuba," is a subject of a biographical note accompanied by a large portrait. "American Competition from an English Standpoint" is another article on the subject from our English contemporary, The Engineer. "Some Forms of Filariae" is an article by Dr. G. Archie Stockwell and is an interesting study in natural history. "Glacial Geology in America," by Herman L. Fairchild, is concluded. "The Cultivation of Saffron" is an illustrated paper on this industry. "A Hunting Expedition in the Altai Mountains" describes an interesting excursion of two Germans in a little known region. "The Development of Pure Food Legislation" is an important address by W. D. Bigelow, the retiring president of the Chemical Society of Washington, D. C.

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RECENTLY PATENTED INVENTIONS.**Mechanical Contrivances.**

AN APPARATUS FOR EXAMINING THE EXACT SPHERICAL FORM OF BALLS.—HENRICH MELTZER, Ratibor, Germany. This is an apparatus by which to detect inaccuracies in the spherical form of steel balls, and it is based on the principle that truly spherical bodies, placed on a true inclined plane, will roll in an undeviating path. In carrying out the invention, a narrow incline plane, of true formation, is provided, and the balls to be tested are liberated at its top in regular succession, and in a line longitudinal with the plane. The true balls will roll throughout the length of the plane, while the untrue balls will, in deviating, roll off the edges of the plane. It is thus that the test is effected.

PROPELLER.—CARL J. H. FLINDT, New York city. This invention relates to propeller wheels for steam vessels, and its object is to provide a propeller wheel so constructed that its friction against the water during rotation will be reduced to a minimum, so that greater speed will be secured. It consists of two propeller blades attached to the shaft, and crossing each other at right angles, the blades being extended in straight lines from the shaft outward and having their fore and aft edges forward and rearward of their connection with the shaft, the width of the blades being greater than the height and the extreme stern ends being curved toward the shaft.

STRAP OR ROPE CLAMP AND TIGHTENER.—AARON GRANT THAYER, Kensington, Kan. This new invention provides a simple and durable clamp for ropes or straps. In brief, it consists of a clamp comprising a frame having guide bars, a ring and cross bar for the admission of a rope or strap, and a slidable cross bar on the guide bars, and arranged to operate in conjunction with the ring and cross bar to securely clamp the end of the strap or rope in place.

SCREW-JACK HEAD.—DANIEL GLENN, Del Rio, Texas. This invention provides a locking device for screw-jack heads, so that the parts cannot separate, the locking mechanism being used as a brake to prevent the jack from moving backward. It consists of a screw-jack having a threaded shaft terminating at one end in a peripherally grooved head, a bearing head recessed to fit over said head and having an internally opening groove in the wall of said recess adapted to register with the groove in the shaft head, locking blocks fitting the grooves and holding the two parts together, the groove in the bearing head being of a depth to entirely receive the blocks, and set screws in the bearing head and engaging the locking blocks.

BALL-BEARING SCREW-JACK.—DANIEL GLENN, Del Rio, Texas. This invention consists in the peculiar shape of the thread of a screw-jack by which the thrust surfaces upon the shaft and nut are substantially at right angles to the direction of the thrust, also in the stop mechanism, which will prevent the backward rotation of the jack and which can readily be released at

will. Both the screw and nut have the flank of the thread receiving the thrust curved to fit the balls and the nut has an inclosed passage or ball race connecting its opposite ends. By means of this construction, the screw-jack may be operated with less friction and wear than in the ordinary type.

ROTARY ENGINE.—F. M. RICHARDS and H. M. FORBES, Portage, Wis. In this engine the piston and the abutments are rotary, the abutments being mounted on shafts which are arranged at right angles with the main shaft carrying the piston. The abutments are in the form of disks, with flanges projecting into the steam room of the cylinder, and each having a portion cut away at one side to allow the piston to pass. The abutments and the piston are inclosed in a suitable casing. The engine is provided with a steam chest containing an oscillating valve. There are ports in the piston through which steam is admitted to and exhausted from the working chamber. The shafts of the revolving abutments are connected positively by gearing with the shaft which carries the piston. This novel and ingenious rotary engine cannot be fully described without the aid of illustration.

HARNESS SUSPENDING AND RELEASING APPARATUS.—JOSEPH W. HOWGATE, Wilmington, Del. The invention comprises an improved method of construction whereby the suspension and releasing devices are quite compact, easily and quickly worked, and so arranged also that the moment the harness is released the suspension device is at once reset in position by supplementary springs and raised high enough to be out of the way of the horses and fire engine. The pulling on a strap secured to the actuating lever sets off the releasing mechanism, allows the harness to fall upon the horses, and, at the same time, operates the resetting attachment.

AWNING.—CELESTIN BERGERON, New York city, N. Y. In this invention there is a combination of a vertical shaft with a horizontal awning roller located at the top of the window, connected by beveled gear and a driving mechanism or crank at the lower end of the vertical shaft attached by a universal joint, so arranged that it can be detached after the awning has been rolled up. There is also a ratchet device attached to the vertical shaft to enable the awning to be held at any desired angle. The construction prevents the awning from being tampered with by unauthorized persons.

AWNING FIXTURE.—JAMES SULLIVAN, New York city. The object of this invention is to provide a fixture through the medium of which the awning is lowered or dropped and automatically locked in position, and when the awning is raised the runners will be freed, enabling the entire awning to be carried upward to its highest position in the usual manner. The device can be economically and durably constructed.

PIANO.—BERNARD KROEGER, White Plains, N. Y. The object of this invention is to permit a specially trussed piano string frame to be readily removed from the casing of a piano, such as that styled the "Grand," whereby the case can be moved independently of the

frame and consequently with less risk, inasmuch as it will be greatly lightened. Metal trusses are arranged on the underside of the sounding board free from contact therewith, for the purpose of strengthening the frame and to prevent buckling by the strings on the upper side.

Railway Appliances.

CAR AXLE BOX.—ELISHA J. HUNT, New York city, N. Y. This improved car axle box is arranged to reduce friction to a minimum and to prevent the car journals and bearings from becoming hot. The portion of the car axle in the box is provided with a corrugated wheel which meshes into a secondary corrugated wheel located above it, the axis of which supports the weight of the car frame. The ends of this axis are constructed in spherical form for the purpose of reducing friction and the prevention of end thrust. It appears to be a very satisfactory means of reducing friction.

AUTOMATIC STOP VALVES FOR HOSE COUPLINGS.—GEORGE W. EDGINGTON, Coalville, Utah. This invention is designed to provide an improved automatic stop valve, arranged to close each of the coupling members when the same is uncoupled, and prevents dust and other impurities from passing into the train pipe, thereby preventing damage to the air brake mechanism. The essential feature of the coupling consists in providing each member with two disks having perforations, one disk being movable and the other stationary. In the act of coupling, the movable disk is located so that the perforations slide over the solid portions of the stationary disk and thereby prevent the expulsion of air at the time the coupling is parted. When the ends of the coupling are placed together and locked, the rotation of the movable disks causes the apertures of each to correspond with the apertures in the stationary disks, and thereby completes the circuit of air. The simplicity of the mechanism and the certainty of its operation are very desirable features.

Miscellaneous.

MOVABLE CAISSON.—CHARLES C. LOVEJOY, New York city. The purpose of this invention is to provide an improved caisson more especially designed for use on frozen ground, in rivers or streams having bottoms of gold-bearing sand. The caisson is arranged to permit its floating about from one place to another. It can be raised or sunk at will and is provided with a working chamber for miners in its lowermost position. The caisson has a water-loading compartment in the upper portion of its casing and a working chamber in the lower portion. A compressed-air supply pipe opens into the working chamber and water-pipes lead from the working chamber into the loading compartment, so that the water is forced by the compressed air from the working chamber into the loading compartment. Doors in the bottom of the working chamber give access to the sand in the bed of the waterway.

COMBINED WAGON, SLEIGH, AND BOAT.—CHARLES BALTRUWEIT, New York city. The object of

this invention is to provide a vehicle, combining a wagon, a sleigh, and a boat, and arranged to permit a convenient and rapid change from one form to the other, according to the condition of the route to be traveled. The vehicle has a front and rear axle, a bolster connected by a king-bolt with the front axle, sleigh-runners secured to the bolster and rear axle, and a boat removably carried by the runners. A pair of posts are mounted on the runners, the posts of each pair being connected with each other by a cross-beam to form supports for the boat.

CAN-TOP.—MARY E. ANDERSON, Columbia, Mo. The invention relates to can-tops and is intended to protect the contents of the can from insects, etc. The top is provided at its upper end with an internal and external or double cylinder, the said cylinders being united at their lower ends and forming an annular groove, in which is mounted a slide adapted to open and close the outlet openings in the cylinders leading to the discharge spout. When the slide is closed, all foreign substances are absolutely excluded from access to the interior of the can.

COMBINED LAUNDRY-TUB COVER AND DRAINING-BOARD.—PETER C. FISCHER, Homestead, N. J. The object of this invention is to provide a substantial cover for laundry-tubs which will not be injured by steam and which will ventilate the tub thoroughly, and which may be used as a dish-drainer or draining-board without removing the cover. It consists of a metal top hinged to a back strip. The cover has a depression forming a tray and is provided with apertures in the depressed surface whereby the cover may be used as a draining-board. A hollow, ventilated, marginal flange receives the cover, so that air may circulate even when the cover is closed.

ENVELOPE FASTENING.—CLYDE L. SMITH, Leipsic, O. The object of this invention is to provide means of an inexpensive construction by which envelopes and similar packages may be readily and effectually sealed. It consists of the envelope provided with a slot, a sealing flap adapted to enter the slot, and of a fastening plate secured to the sealing flap and having a hooked end adapted to engage the upper wall of the slot. In sealing the envelope, the sealing flap is merely inserted within the slot and it is found to fasten the same. To unseal it, it is only necessary to place the forefinger beneath the flap and move the flap toward the bottom of the envelope and then withdraw.

PROCESS OF EXTRACTING METALS FROM METALLIC OXIDES.—HENRICH C. ASCHERMAN, Cassel, Germany. In electric furnaces, the extraction of pure metals from their oxides presents considerable difficulty when the metals have a great affinity for carbon. This is obviated in the present invention by adding to the oxides treated the sulphide of antimony in greater proportion than the oxide, and then subjecting the mixture to electric currents in a fusion furnace, the mixture forming the negative pole of the arc.

FURNACE.—JOHN S. L. RODRICK, Washington, D. C. This invention refers more particularly to an addition to