

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included.....\$3 00 One copy, six months, postage included..... 1 50

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.00 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal or express money order. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all newsdealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, express money order, or registered letter.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies, 50 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, MAY 28, 1887.

Contents.

(Illustrated articles are marked with an asterisk.)

Animal poke\* 339
Attractions produced by jets of steam or air\* 342
Autographs of the electric spark\* 345
Beeswax, specific gravity of..... 340
Bellite..... 341
Black bees of Tasmania and their medicinal honey..... 337
Boilers, rotary, management of..... 347
Books and publications, new..... 347
Bridge, draw, Newark Bay\*..... 335, 340
Bronze, an acid-proof..... 339
Brotherhood of Locomotive Firemen..... 337
Business and personal..... 344
Car couplers, tight vs. slack..... 344
Car coupling, improved\*..... 336
Correspondence..... 341
Cow, two-headed\*..... 343
Electric spark, autographs of..... 345
Electricity, static, experiments..... 341
Fertilizer dropper, etc\*..... 344
Flotation..... 341
Grant relics, the..... 337
Inventions, engineering..... 346
Inventions, index of..... 347
Inventions, miscellaneous..... 346
Invention wanted..... 337
Items of interest, many..... 341
Ladislav Adolphe Gaiße..... 340
Liquids, momentum of..... 339
Lock, combination, improved..... 336
Motor, water\*..... 339
Mustiness, to prevent..... 341
Notes and queries..... 347
Garlock improved\*..... 336
Printer's chase, improved\*..... 336
Road roller, steam, improved\*..... 342
Rounding jack for hat brims\*..... 336
Shipping and sailors, present condition of..... 336
Sunshine, power of..... 343
Telephone diaphragm, vibrations of..... 343
Telephone litigation, patent lessons from the..... 344
Telescopes, great, limit of available power of..... 344
Trees, shade, protection of, against insects..... 336
Varnish resins..... 340
Worms, cotton, myriads of..... 341
Worms, shower of..... 341

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 595.

For the Week Ending May 28, 1887.

Price 10 cents. For sale by all newsdealers.

I. BOTANY.—The Relation of Tabasheer to Mineral Substances.—The composition of this curious secretion of the bamboo.—Analysis and properties of the material, according to various observers.—Its appearance under the microscope.—1 illustration..... 3509
II. CHEMISTRY.—Apparatus for Drying Flour.—An apparatus for determining the moisture in flour.—1 illustration..... 3502
III. ELECTRICITY.—Automatic Commutator for Incandescent Lamps.—An apparatus for lighting automatically a new lamp to replace one that has failed.—1 illustration..... 3504
Definitions and Designations in Electro-Technics.—Mr. Jamieson's proposed code of electric symbols—literal and graphic.—4 illustrations..... 3504
IV. ENGINEERING.—New Dredging Machinery.—The dredger Ajax, recently built in California.—Its dimensions and capacity.—1 illustration..... 3500
Reservoir Dams.—By DAVID GRAVELL.—The engineering details of dams.—Typical masonry and earthwork dams of the world.—23 illustrations..... 3496
The Flexible Girder Tramway.—A new type of suspended railway—a modification of the wire tramway system.—21 illustrations..... 3500
V. HYGIENE.—Climate in its Relation to Health.—By G. V. POORE, M.D.—The third lecture of this series.—Consideration of the floating matter of the air and diseases caused thereby.—Causation of hay fever..... 3505
VI. MATHEMATICS.—Radii of Curvature Geometrically Determined.—By Prof. C. W. MACCORD, Sc.D.—No. VII. Path of a point on a connecting rod.—3 illustrations..... 3508
VII. MICROSCOPY.—Improved Microscopical Settling Tube.—By F. VANDERPOEL.—New tubes for use in urinary analysis.—4 illustrations..... 3504
VIII. MISCELLANEOUS.—Apparatus for Manufacturing Bouquets.—An ingenious machine for facilitating the construction of bouquets.—1 illustration..... 3502
Bozerian's Refrigerant Punks.—A fan worked by the feet, a substitute for the Indian punka.—2 illustrations..... 3501
How to Make a Kite without a Tail.—An improved form of kite described and illustrated.—1 illustration..... 3502
Punks.—By J. WALLACE, C.E.—The mechanics of punks; experiments on their rate of swing..... 3502
The Edible Earth of Java.—An account of this curious substance, its taste and appearance..... 3510
IX. NAVAL ENGINEERING.—Another Remarkable Torpedo Boat.—Over twenty-eight miles an hour.—Full particulars of the trial of one of the new Italian torpedo-boats, built by Yarrow & Co..... 3495
Copeman & Pinney's Life Rafts.—A new life raft for use on steamers, folding into deck seats.—3 illustrations..... 3495
X. PHYSICS.—Sunlight Colors.—By Capt. W. DE W. ABNEY.—A valuable lecture on the cause of the colors of the sun, and their relative intensities.—3 illustrations..... 3506
The Wave Theory of Sound Considered.—By HENRY A. MOTT, Ph.D., LL.D.—Arguments against the generally accepted theory of sound..... 3506

THE PROTECTION OF SHADE TREES AGAINST INSECTS.

For many years the destructive effect of insects upon the shade trees in our city parks and in some parts of the country has been very marked. While an absolute destruction of the tree is rarely brought about, yet in many cases it is so completely denuded of foliage in the course of a season that it loses all its beauty and utility. Of the ordinary trees, the elm is perhaps as badly attacked as any. Certain species are particularly affected by insects, and it has now become a question of widespread interest how to deal with them. New Haven, famous for its elms, has suffered a great deal. Various means have been adopted to protect the trees. Annular troughs filled with coal tar or straw ropes coated with the same have been placed around the trunks near the lower branches, in order to intercept the march of the destroyers. Sometimes lime is scattered around the roots, or the trunk is scraped and whitewashed. These remedies have proved of value, but are far from complete.

Recently the attention of the U. S. Bureau of Entomology has been called to the condition of the trees in the park and capitol grounds in Washington. This brought forcibly before them the fact that a problem of much importance was to be dealt with, because the trees of other Eastern regions manifestly were exposed to the same influences that were so destructive to those in Washington. Accordingly, the chief entomologist, Prof. C. V. Riley, devoted considerable attention to the causes of the trouble, the natural history of the destructive insects, and to the most effectual way of dealing with them. The results are embodied in a pamphlet issued by the U. S. Department of Agriculture.\* In it the subject is treated in an admirable manner, and the pamphlet should be in the library of every one interested in forestry and arboriculture.

Four kinds of insects are accredited with most of the injury. Their popular names are the elm leaf beetle, the white-marked tussock moth, the bag worm, and the fall web worm. The importation of the English sparrow it was hoped would lead to the destruction of many of the tree insects, but the most injurious insects have not been attacked by the birds. It is rather to be feared that the sparrow in driving away our native birds has favored the increase of the insects formerly devoured by the latter.

Various methods, as already alluded to, have been suggested for dealing with them. The elm leaf beetle (Galeruca xanthomelana) may be intercepted on their travels up and down the tree trunk by some adhesive girdle or trough. Sheets may be placed under the branches, and the larvæ and adults shaken into them by jarring the branches. The larvæ descend the tree trunk when they are fully grown, and, on reaching the ground, establish themselves near the tree and develop into pupæ. In the two weeks of larval life between the egg and pupa stages, they do their destructive work. This habit suggests one treatment. It is to build low boxes around the base of the tree. These may be a foot or eighteen inches in height, with their bottom edges sunk in the earth and the area within them cemented. The larvæ will accumulate in this space, and will change into pupæ. While thus confined, they can be killed with scalding hot water.

As a palliative of the evil, much may be done by a proper selection of trees. Thus the native American elm (Ulmus Americana) is practically free from the ravages of the beetle. But the question is one of present importance, and the trees, as now standing, must be dealt with.

The web worm is, perhaps, of equal or greater injury than the elm leaf beetle. Its webs on the branches of wild cherry trees are most disagreeably familiar to dwellers on Long Island. But they are nearly omnivorous. Over a hundred species of trees and shrubs attacked by them have been catalogued. They are easily disposed of when nested in their webs by burning. A convenient form of torch has been described by Major Key, agent of the Humane Society of Washington.

A piece of soft brick (salmon brick) is cut into an egg shape, and is suspended by wire to the end of a pole. This is saturated with kerosene. When lighted, it is held against the nests, and effectually destroys them by burning. One soaking will last long enough to destroy a number of nests. This is manifestly an improvement on the old kerosene-saturated newspaper with which destruction used to be wrought upon the webs. With no better weapon than the latter the writer has burned out many a nest of web worms.

Less is to be said about the other insects, and the importance from a practical point of view of distinguishing between them has, to a great extent, disappeared. The reason for this is that one effectual way of destroying them all has been developed. It consists in spraying the trees with arsenic compounds suspended in water. A spraying in the middle of May, followed later by one or two more at intervals of two weeks, will protect all kinds of trees from the four insects, and presumably from others also. White arsenic or Paris green

\* "Our Shade Trees and their Insect Defoliators," by C. V. Riley, Entomologist, Washington, 1887; U. S. Department of Agriculture, Bureau of Entomology, Bulletin No. 10.

may be employed, but "London purple," a residue from the manufacture of coal tar dyes, is recommended as less liable to burn the leaves than either of the others. It also is easier to suspend in water than is Paris green, settling out more slowly therefrom, and owing to its color, poisoned trees can be distinguished from those not treated—a matter of some importance. From one-quarter to three-quarters of a pound is enough for a barrel (40 gallons) of water. With it should be mixed three quarts of cheap or damaged flour. This makes the poison adhere, and prevents it from burning the leaves. For young and delicate trees, not over half a pound to the barrel of water should be used. If Paris green is employed, as much as one pound may be mixed with the barrel of water.

A good spraying nozzle, several of which are described in Professor Riley's monograph, is mounted on a rod and connected by a hose with a pump in the barrel. The mixture is constantly agitated, and pumped up through the nozzle over the leaves of the trees. On the large scale the water may be carried in a special watering cart, and may be applied by three or four men to the trees on each side of a street or avenue. On the smaller scale a pail may be used to carry it about from tree to tree, and one of the well known hand pumps will answer to distribute it. The form of the nozzle and proper stirring of the powder in the water are the important points in the process. The operator should also remember that he is dealing with a deadly poison, and take every means to keep it from his person. A circular disk of leather should surround the pole near its top, to intercept any water running down it. A calm day should be selected, and due regard paid to any wind, in order that the spray may not be blown away from the trees, and upon the men applying it.

PRESENT CONDITION OF SHIPPING AND SAILORS.

Those who think our ocean freight ought to go in native ships may find no lack of evidence just now to prove how undesirable is the deep-sea carrying trade. A great fleet of ships lies idle at the London and Liverpool docks and along the Clyde; and those afloat engaged only in freighting which, during the past twelvemonth, have brought their owners more than 2½ per cent are said, on good authority, to be the exception rather than the rule. Commander Chadwick, of the navy, in an interesting article recently printed, says that English ship building fell off 50 per cent in 1884 from the tonnage turned out in the preceding year, and decreased another 50 per cent in 1885. For several years there has been a tendency to build sailing vessels, and at the present time it is the construction of such craft which alone suffices to maintain English tonnage above the declining scale. The chances of doing a profitable business in ocean freights are, it seems, better among the sailing than the steam fleet, because, during that part of the year when there is not enough freighting to go around, there is no such loss on a sailing vessel when tied up as on a steamer; and even during the best months the coal bill which a steamer runs up when afloat makes a big hole in such profits as can be made with the rates that have ruled during recent years.

It is, however, when we consider the means employed in the average freighter to keep down running expenses and to meet the fierce competition now obtaining that the carrying trade seems least desirable. The ships are undermanned, the crews underfed, overworked, and underpaid. Steam winches are used for hoisting the sails of the fore and aft sailing ships, and when they give out, both watches must be called. Indeed, it is usual in stormy weather to keep all hands on deck, because there are not enough men in a watch to man the tacks and sheets, and to work the ship. This constant exposure, with no rest, will break down the best crew, and when, besides this extra call upon their energies, the food served is bad or insufficient, illness invariably ensues. We had a striking illustration of this quite recently, when the British merchant ship Albania arrived at the port of New York from Manila, reporting three dead and all hands ill. The men complained that the food they got at sea was so bad they could not eat it. The flour was sour, the bread mouldy, and the corned beef, served twice a week, simply "revolting." Pea soup was occasionally served, but this was generally full of worms.

It would seem as if the master or owners, following a custom by no means unknown in the Atlantic trade, fed his men on food that had been bought cheap, because damaged. This, then, is the condition now prevailing in the trade which many zealous, but unformed, persons insist should be ours. American sailors are not to be had to-day to man our war vessels, where the food is always good and plentiful and the pay \$21.50 a month—not so bad when the general conditions of service are considered. Our war ships are manned by foreigners—Danes, Swedes, Norwegians, and Hollanders; and in order to encourage the Yankee to take again to the seas, the old and liberal wages of \$30, \$35, and \$40 for able seamen must be offered, and a first class mess provided. Given such wages and food, the Yankee skipper could not compete with the

"lime-juicer" and the "tramp" steamer. When another Plimsoll shall appear, and the welfare of sailors be as carefully looked after as the "load line," then perhaps the fisherman and the "beach comber" will be induced to ship. Until then we are likely to let foreigners carry our ocean freights, for the rather good reason that they seem willing to carry them cheaper than we can afford to carry them ourselves.

#### The Black Bees of Tasmania and their Medicinal Honey.

In a recent communication to the Paris *Académie de Médecine*, which is published in the "Progres Medical" for April 16, Dr. Thomas-Caraman, of Forges-les-Eaux, reported upon a matter which must be regarded as among the most notable of the therapeutic novelties of the day, being nothing less than the discovery of a sort of honey possessing in a remarkable degree the medicinal properties of the *Eucalyptus globulus* or of some species of *Eucalyptus*.

It seems that, about three years ago, a distinguished French naturalist, M. Guilmeth, who was traveling in Tasmania, came suddenly upon a grove of gigantic eucalyptus trees, from 260 to 390 feet high, and with a trunk so large at the base that it took forty of his Kanackas, joining hands, to reach around one of them. High in these lofty trees he discovered what he at first took to be enormous galls, but which he soon ascertained were the dwelling places of swarms of small, black, wild bees, of a variety before unknown to him. Dr. Thomas-Caraman proposes for this bee the provisional name of *Apis nigra mellifica*. Besides being black and smaller than the ordinary honey bee, this wild bee has its languet rather more developed than that of the domestic bee. M. Guilmeth attempted, unsuccessfully, to domesticate it in Tasmania. He caused some of these immense trees to be felled, and secured the honey. The largest individual store of honey weighed as much as 11,000 pounds avoirdupois.

The honey is described as a thick, homogeneous, somewhat transparent, sirupy liquid, of a deep orange color; having an odor suggestive at once of its containing eucalyptus principles; very soluble in water, in milk, and in wine, but much less soluble in alcohol; and very difficult of fermentation. Its specific gravity is 1.44, and it rotates the polarized ray 22°. In round numbers 1,000 parts contain 611 of invert sugar (mostly levulose), 2 of ash, 215 of water, and 171 of active principles, including eucalyptol, eucalyptene, terpenes, cymol, and odorous, resinous, and coloring matters. Its taste is described as very pleasant. Administered to dogs, to the amount of from two ounces and a half to five ounces a day, it slows the heart's action, and this effect soon becomes so pronounced as to suggest, in Dr. Thomas-Caraman's words, a struggle between the pneumogastric nerve and the cardiac ganglia. At the same time the temperature falls about 1° C. The effects last for at least twenty-four hours, and include a slight tendency to sleep, but without any symptom of toxic depression. As the result of experiments on himself and on one of his friends, Dr. Thomas-Caraman states that, on taking a tablespoonful of the honey in a little tepid water or milk, after a few minutes one perceives a gentle, agreeable warmth take possession of the whole person. At the end of half an hour, the elimination of the active principles by the air passages having begun, the voice becomes clearer and the breath perfumed; the lungs feel more elastic, more supple. Having continued the use of the honey for a week, four tablespoonfuls daily, the author, who speaks of himself as respectably fleshy, found that he could go up two pairs of stairs, two steps at a time, without stopping to take breath or feeling at all blown. At the same time there was slight diuresis with an increase of urea, and the urine had a decided odor suggestive of that of the *Acacia farnesiana* (the plant from which the perfume called "new mown hay" is made).

Besides his observations of the physiological action of the honey, the author cites certain trials of it as a medicine. These data lead him to consider it a valuable aliment, an efficient and palatable substitute for cod liver oil; an antiscorbutic; an agent affecting the heart in a manner comparable to the action of digitalis, but free from the inconvenient properties of that drug; a febrifuge; an antiparasitic specially applicable to the destruction of the micro-organisms of tubercular and scrofulous neoplasms, the *Leptothrix vaginalis*, and oxyures; and, finally, an antibleorrhagic, by virtue of its being more actively eliminated by the urogenital tract than either copaiba or sandal oil. It is destined, he thinks, to play a great part in the treatment of laryngeal, bronchial, pulmonary, cardiac, and scrofulous affections; in malarial and typhoid fevers; in whooping cough and influenza; and in renal, vesical, and vaginal troubles.

It may be said that Dr. Thomas-Caraman holds up to our view a somewhat rose colored picture, but it must be confessed that there is no inherent improbability in the notion that an animal organism like that of the bee may be able to elaborate the medicinal principles of the eucalyptus in greater perfection than the art of pharmacy can furnish them. Should his im-

pressions be confirmed, however, the practical question at once comes up as to the extent to which commerce can supply us with the genuine wild honey of Tasmania, and it is much to be feared that, in case of any considerable demand, we shall witness a repetition of what took place in connection with the supply of Chian turpentine and, more recently, that of alveloz—the substitution of products more or less adulterated, if not wholly factitious. It would be interesting to know to what particular species of the genus *Eucalyptus* the gigantic trees found by M. Guilmeth belong. Perhaps the active principles of the tree may yet be made available without the intervention of the *Apis nigra mellifica*.—*N. Y. Med. Jour.*

#### Brotherhood of Locomotive Firemen.

Some of the lodges of the thirty thousand locomotive firemen held a meeting in Tammany Hall, New York City, on Sunday afternoon, May 15. Addresses were made by Mayor Hewitt, Chas. A. Dana, and others.

Mr. Chauncey M. Depew, introduced as president of the New York Central, was received with enthusiastic and prolonged applause, renewed again and again. He said in substance:

"I have been led to believe that the fireman is the most popular of all the employes in the railroad service. Out of every hundred applications I get for positions, ninety are for 'fire.' If I get off at a way station anywhere, the farmers' boys who want work all ask for never anything else but 'fire.' The American boy wants excitement, work, and opportunity to rise; and when he sees the train hurrying across the meadow, the fireman before the open door of the furnace, glowing like a demon in the red glare, is to him a type of progress. He knows it is exciting, he knows it is hard work, but isn't afraid of it, and he knows there is promotion when the time comes and he is worthy of it. (Applause.)

"I believe in organizations like yours, and I like your motto, 'Protection, charity, industry, and sobriety.' The two best anti-poverty medicines in the world are industry and sobriety, and the two best anti-poverty societies in the world are the Brotherhood of Locomotive Engineers and the Brotherhood of Locomotive Firemen. (Tremendous applause.) They have already abolished poverty so far as they are concerned.

"We hear a great deal nowadays about the bloated capitalists and monopoly. Into the New York Central Railroad a few capitalists put their millions, the farmers put their few thousands, and the widows their \$400 or \$1,000. And this is the 'grasping monopoly.' It is a co-operative society for running a railroad, and you and I are its employes. I have come down to talk to my fellow employes, and have put on my best Sunday clothes. (Laughter.) Now, this road will earn about \$34,000,000 this year. The 'spouter' hears this, and declaims about its being taken out of the people and put into the pockets of the capitalist. But out of it comes \$12,000,000 for wages—you and I get that; \$8,000,000 for taxes, and \$10,500,000 for repairs, mostly for labor, leaving something over \$3,000,000 for dividends. So that the bloated capitalist pays out \$31,000,000 for labor and bloats on \$3,000,000. None of 'em have burst yet, I believe." (Laughter.)

Other addresses were made by Mr. J. J. Hannahan, the Vice Grand Master, and E. V. Debs, the Grand Secretary and Treasurer of the Brotherhood.

#### An Invention Wanted.

At a recent meeting of the Engineers' Club of Philadelphia, the secretary presented, for Mr. Edwin Ludlow, notes on the preparation of anthracite coal. Mr. Ludlow says:

"I desire to call the attention of the members of this club, and especially those who are mechanical engineers, and have the bump of inventiveness well developed, to one of the greatest needs now met with in the preparation of anthracite coal. While engineering ability and mechanical skill have done wonders during the last decade toward putting the mining and preparation of coal on a scientific basis, making it possible to ship as high as 2,600 tons of prepared coal from one breaker in a single day, still in every breaker, no matter how modern it may be, one will find the chutes, through which the coal passes from the screens to the loading pockets, lined with boys from twelve to fourteen years of age, who sit there ten hours a day picking by hand the slate from the coal as it passes along. The atmosphere of this screen room is, in many cases, so laden with fine coal dust that objects cannot be distinguished twenty feet away; and while the breathing of this coal dust does not seem to have any immediate effect on the boys' health, it undoubtedly lays the seeds for the bane of the coal region—miner's consumption. Its strikes every thoughtful man who looks down on from one hundred to two hundred boys working in a single breaker, that it is a very crude and expensive way of preparing coal.

"Various appliances have, of course, been designed, but the only really successful one, as proved by actual experience, has been the water jig. This undoubtedly removes the slate with a small percentage of waste of

coal; and where the product of the mine is wet, and water has to be used on the screens to effect a separation of the dirt from the coal, it is the best and most economical appliance that can be employed. But the greater part of the coal going to market comes from dry mines, where it would be a detriment to the quality of the coal, and a great expense, to use water.

"The waste water from the jig is also expensive to take care of, as in most localities it is no longer allowable to let it run, with the fine dirt it holds in solution, into the nearest creek, as the sediment will carry a long distance, and invariably deposits itself where it will do the most harm, and entail a heavy suit for damages. Enough tanks have therefore to be provided to allow all the waste water to thoroughly settle, so that the water and culm can be removed separately. Water itself, or rather the pure article, is both scarce and expensive during a part of each year throughout nearly the whole region.

"And if mine water is used, as is generally the case, the acid contained in it attacks the iron work of the jig and makes frequent repairs necessary.

"The principle the jig works on is based on the difference in specific gravity between coal and slate. The two enter the bottom of the jig together, and by the pulsations of a large plunger in an adjoining compartment, water is forced up through the coal, lifting it, and allowing a fresh supply to come in. The coal is forced to the top and runs off with the water, while the slate, owing to its greater specific gravity, passes out through a separate opening in the bottom.

"Now what is needed, and what I hope some member of this club will devise, is a dry jig, in which this separation will be effected by the use of air instead of water.

"One of the difficulties encountered in getting up such a jig is caused by the care with which coal has to be handled to prevent its chipping or breaking. It cannot be dropped on to iron or wire or to itself without producing an appreciable percentage of waste. With the most approved rolls, the loss in rebreaking any size to a smaller one amounts to from 10 to 15 per cent.

"While the difference in specific gravity between coal and slate of the same sized pieces is very great, still trouble would be experienced in any separation by an air current with flat pieces of both slate and coal, on which the action of the air would vary according to whether it acted on the edge or the whole side.

"The man who invents a successful dry jig that will stand the test of actual trial will undoubtedly make a very handsome thing by it.

"Not to be too cumbersome, a single jig should not have a greater capacity than 500 tons per day; and as the shipping capacity of the anthracite region is about 200,000 tons per day, it would take about 400 to supply the trade.

"I shall always be most happy to furnish any information or give any assistance in my power to any one desiring to work on this matter."

#### The Grant Relics.

The Grant relics, which have been for several months safely guarded in one of the private rooms of the National Museum, are now on public exhibition. Recently, two handsome plush lined cases, filled with articles from the collection, were placed in the north hall of the museum, near the main entrance. They contained the presentation swords, gold headed canes, caskets, medallions, and many other costly and elegant articles presented by different people at different times to General Grant. Many of these articles are souvenirs of his trip around the world. There is a splendid collection of Japanese coins, one series of seven pieces, old Japanese gold coins of huge size, being valued at \$5,000. There are also invitation cards, menu cards, and reminders of entertainments given in his honor, engrossed on gold plates. One invitation card to a masked ball given at San Francisco upon General Grant's arrival at that city, on his return from his famous tour, is engraved on solid gold, and was inclosed in a silver envelope, with the address engraved upon it. In the right hand corner is a two cent stamp and in the left the usual "If not delivered in ten days return to," etc. The articles shown, besides their historical interest, are of great intrinsic value.

WE never can tell, says the *American Railroad Gazette*, what arguments will have weight with some men. The latest number of the *Memoires de la Société des Ingenieurs Civils* gives a long discussion of the project for a metropolitan railroad in Paris, and the most serious reason given for an elevated rather than an underground route is that "the people of London are very different from those of Paris. In London, for two-thirds of the year, the climate is gloomy, cold, and unwholesome, above as well as under ground. The streets are almost always muddy, and these reasons, which make the underground way quite endurable there, do not apply to Paris." Another speaker reasoned that Parisians "would rather be swallows than moles."