efforts being in the direction of stupid attempts to escape.

If properly taken care of, there seems no reason why this animal should not take its place in our zoological gardens, and surely as the original mermaid it is imperative that it should be a part of the curiosities of the traveling menageries.

BIRMINGHAM CABLE RAILWAY.

Cable railways are now being introduced in England. We present herewith an engraving of the engines used for driving the Birmingham cable, for which we are indebted to the *Engineer*. This machinery has been made by Messrs. Tangye, Birmingham.

The engines have jacketed cylinders 24 in. diameter by 48 in. stroke, and run fifty revolutions per minute; they are fitted with Jefferiss' automatic expansion gear. The piston rods, 4 in. diameter, are of steel; the steam pipes 6 in. diameter, and exhaust pipes 8 in. diameter. A main equilibrium stop valve is placed in a convenient position, so that the engineer can have full view of his engines. Under each fly wheel a powerful steam brake is fixed, so that the engines can be stopped immediately any accident happens to the rope. The exhaust pipe from the cylinders has a by-pass, by means of which the exhaust steam, instead of going through the heater, can be utilized in the injectors for feeding the boilers.

The crossheads are fitted with gun metal adjustable soles; the pins are of steel, but the connecting rods are of wrought iron. The fly wheels are 15 ft. diameter and 2 ft. in width; they are made in two parts, secured together by turned bolts. They are turned on the face, and weigh about 8 tons each. The main shaft is of steel, and is 9¼ in. diameter at the bearings, which have wedge adjustment and are in three parts. The pinion on the main shaft is 5 ft. 4⅝ in. diameter, the large spur wheels are 13 ft. 11⅛ in. diameter at the pitch line; all these are in halves, planed and connected by the bolts.

The barring arrangement consists of a pair of Tangye's vertical Archer engines, with cylinders 6 in. diameter and 7 in. stroke, which drive a pinion geared into a spur wheel fixed to a shaft on which is a worm gearing into a worm wheel attached to a secondary shaft which can be coupled to either of the main engine shafts; and when the main engines are once started they throw the worm out of gear, and when once out of gear it is held there by a catch. Either or both engines may be thrown out of gear by means of clutches. The main pinion and the large spur wheels are fixed to the shafts, but the large grooved pulleys are made fast or loose by means of the clutches at the ends of the spindles carrying them and the hand wheels.

The rope driving pulleys for the Birmingham service are 10 ft. diameter, in halves, and are also provided with jaw couplings cast on the boss at one side. The periphery is grooved for the rope, and is lined with compressed beechwood, held in position by segments bolted on at one side.

The carry pulleys along the line are placed 28 ft. apart; the yokes are placed 4 ft. apart; the radius of sharpest curve, namely, that at Colmore row, is 45 ft. on a gradient of 1 in 20–28; a very awkward corner. The steepest gradients on the route, 1 in 20—Snow Hill. The permanent way of the extension to Handsworth, which will shortly be constructed, is about 1⅔ miles in length, and is also to be double line throughout.

There is a 6 ton overhead traveler, which runs the length of the building on beams supported at the side walls, and consists of two wrought iron end carriages mounted on wheels, two wrought iron girders, and a compact lifting gear or crab fixed at one end, so that all motions can be worked from the side. The crab is self-sustaining, and the weight can either be lowered by pulling the chains or releasing the brake. The span of the traveler is 37 ft. 9 in.

A Snake Siphon.

Old Sergeant Subers relates the following as strictly true, and says it can be vouched for by forty of the most influential citizens of East Macon:

Out on the plantation of Mr. J. G. Evans, near Macon, there are a great many moccasins, especially about the mill pond. One little pond near the mill is a favorite resort, and they congregate in great numbers about it. It is supplied by the rains, and last summer, during the protracted drought, it went almost dry, with a great number of snakes to mourn the loss of the water. The snakes did not like to be evicted by dry weather, so they crawled out in single file from the little pond that lay below the level of the mill pond. When the first snake, or leader, had reached the water of the mill pond a halt was called, and each snake proceeded to swallow the tail of the snake in front of him, until each mouth was filled with a tail, and then every snake in the long line proceeded to shed its skin and crawl out. The shed skins formed a long length of hose, which, acting like a siphon, drew the water from the mill pond and filled the little pond, and, what is better, kept it full all summer.—*Macon Telegraph.*

Correspondence.

A Letter Envelope Gum Moistener.

To the Editor of the Scientific American:

Referring to your article on page 224 of the SCIENTIFIC AMERICAN for October 13, 1888, where you say, "Any one who closes a letter in the ordinary manner finds the lips soiled and a villainous taste left in the mouth," a convenient device for making it unnecessary for any one to use the mouth in closing a letter is as follows: Take an ordinary glass alcohol lamp, having a glass cover; remove the metallic wick tube, fill the lamp with pure water and insert candle wick sufficient to close the opening, but allow sufficient moisture of the wick to moisten envelopes. If the cover is kept on when not in use, it will remain clean for some time, and the wicking is easily replaced when it becomes soiled.

However pure the gum on an envelope may be, no one should venture to moisten it with the tongue or lips, because disease germs may attach themselves to the cleanest gum. HENRY B. BAKER.

Lansing, Mich., Oct. 16, 1888.

Burners for Lamps—A Suggestion.

To the Editor of the Scientific American:

Will you please call the attention of those brass workers who furnish the burners of our kerosene lamps to a defect in their construction, the difficulty of rubbing or cleansing the lower surface, owing to the way they are constructed or put together. Civilization is, in great degree, a question of light, light is a question of combustion, combustion of draught. The draught in a kerosene lamp is, of course, through the holes in the perforated brass plate. Even when the plate is kept tolerably free from accumulations of dust, lint, and particles of the burnt wick, a film of oil is sure to form, which extends over the holes, and in great part closes them, unless it is carefully removed. A dull, red, smoky light is the result, owing to imperfect combustion. The cleansing is best done by rubbing with dry paper. But it is always troublesome to cleanse the under side, as burners are now constructed, either with paper, or cloth, or by machinery, owing to the rivets and the roughness of the brasswork. The film of oil is the consequence of evaporation from the wick and condensation on the cold metal. Consequently, some convenient way of covering the wick to prevent this evaporation, when the lamp is not in use, would be a valuable improvement.

HENRY U. SWINNERTON, Ph.D.

Cherry Valley, N. Y., October, 1888.

Our Fuel Supply.

To the Editor of the Scientific American:

In a recent number of the SCIENTIFIC AMERICAN there appeared an article, selected from a deservedly well known journal, upon the waste of anthracite at our mines and the early exhaustion of its supply, in which the following startling statement is made: "*At the present rate of production and present percentage of waste in mining, our entire supply of anthracite coal will last only 75 years.*"

However exaggerated, if at all so, the above statement may be, there is no reason to doubt, based as it was upon statistics from data by the Geological Survey of Pennsylvania, that there is much truth in it, and the sooner measures be taken to stop waste at our mines, the better.

But there is another view to take of the fuel question. In this utilitarian age economy in use forms an important factor, and in no material is this consideration of more importance than in the coal we burn, especially when we regard the increasing demand for the article in our works of industry, including those connected with commerce and travel, and last, not least, when we reflect upon the necessities of the poor, to whom cheap fuel and an economical use of it is a serious matter.

Now the question arises, Do we economize in the use of our fuel to the extent we might do? That there is much heat wasted in the combustion of fuel by our present methods is certain. Take our stoves and furnaces for domestic purposes by way of illustration. How much heat is lost by absorption in these structures themselves, especially in cast iron stoves of a heavy construction decorated with senseless ornaments, and from which radiation is too slow or imperfect to be appreciable! How much, too, is wasted by pipes conducting the heat to where it is needed, by radiation in directions where it is notfelt, by escape of the heated gases and smoke up the chimney, and by an imperfect combustion of the fuel itself, as also in various other ways! We have often heard of smoke-consuming furnaces as applied to steam boilers. Cannot some of your readers devise a smoke and gas consuming stove or heater that will render all connection with the chimney, except for the purpose of draught upon starting a fire, if even then, unnecessary; that will stand out in an apartment and do its duty in an isolated manner, possibly dispensing with chimneys to our houses; that will quickly radiate the heat generated within it; and that in the combustion of its fuel will leave no cinders to be wasted or to be burned over again, but will abstract, once for all, all the available heat to be derived? A new departure may be necessary to accomplish these results, or most of them, but generally important and profitable inventions are made by deviating from the beaten track.

Again, as regards fuel itself. If coal is shortly to become scarce and dearer, then substitutes must and will be found. There have been numerous attempts in this direction already, including the use of various combustible materials and binders with coal dust: gas, mainly used for illuminating purposes, obtained from water, which, strange to think, is composed of but two elements, one of which, in its gaseous state, when mixed with or exposed to atmospheric air, is one of the most inflammable materials in nature, and the other the most active supporter of combustion; various oils, too, and different materials; but none of these, so far, has been able to supply the want. Other available substances, however, may be found, or some chemical mixtures be discovered which, either alone or in connection with ordinary fuel, will accomplish the desired result. No one would object to the adulteration of coal, especially the free-burning kind, if the foreign matter added improved and economized the combustion of such fuel. We live in an age of progress and surprises, and there are chemical substances, both solid and fluid, which by being simply brought in contact produce heat; powders, too, which take fire on exposure to the air, and various materials that ignite and give out heat under the slightest provocation.

What is to be the fuel of the future would be a difficult question to answer, but the vast importance of the subjects I have broached makes them worthy at least of serious consideration. ENQUIRER.

Newark, N. J., Oct. 12, 1888.

The Mean Composition.

MM. Yvon and Berlioz have published (*Rev. de Med.*, Sept.) a series of tables of the analysis of normal urine. Their observations were very numerous, and made on healthy adults, male and female. Their results are contrasted with those of other authors, and in each case they give the maxima and minima, as well as the means. The latter are summarized thus:

	Male.	Female.
Volume (cub. centim.)	1360·0	1100·0
Density (sp. gr.)	1022·5	1021·5
Urea (in grms.) per liter	21·5	19·0
" " per 24 hours	26·5	20·5
Uric acid (in grms.) per liter	0·5	0·55
" " " per 24 hours	0·6	0·57
Phosphoric acid (in grms.) per liter	2·5	2·4
" " per 24 hours	3·2	2·6

Thus, with the exception of uric acid, the amounts are higher on each head among males than among females; but with uric acid the quantities eliminated are almost precisely the same for the two sexes. MM. Yvon and Berlioz desire also to correct, as resulting from these observations, the proportionate quantities of urea and uric acid given in their Manual of Urinary Analysis, which should be as 40 : 1 instead of 30 : 1; and of urea and phosphoric acid, which should be as 8 : 1 instead of 10 : 1.

Effect of Coffee.

Dr. Dumont, of Louvain, has undertaken a series of researches on the effect of coffee drinking on the urine, from which it appears that, though the diurnal quantity of urine is not seriously interfered with, the composition undergoes a very decided change. Dr. Dumont kept the subjects of his researches for some days on ordinary diet, the constituents of which were determined. During part of the time only was coffee added, the quantity being three cups—corresponding to about two ounces of roasted coffee—per diem. By regular and careful analyses of the urine, it was found that during the days when coffee was taken the urea passed was increased by about seventy-five grains. The effect on the urea was produced immediately the coffee was commenced, and as soon as it was omitted the quantity of urea returned to that which it had exhibited previously.

Cotton Fabric a Substitute for Jute for Bale Covers.

The new plan of using a cotton fabric for covering cotton bales, instead of jute, is finding favor at the South. The cotton cover, it appears, is the most economical, the saving being equivalent to a gain of 16 lb. of cotton per bale, as follows:

Difference of weight saved by using cotton fabric	8 pounds.
Saving by the better protection of this new fabric, at least	3 pounds.
Cotton saved which is now lost by sticking to jute bagging	1 pound.
Value of second hand cotton bagging, less value of second hand jute bagging	3 pounds.
Saving by use of cotton, on account of insurance, at least equivalent to	1 pound.
Total	16 pounds.

The Maginnis Mills, of New Orleans, and the Lane Mills, of New Orleans, allow ten pounds extra weight on every bale of cotton covered with the new cotton bagging.