Correspondence.

A Simple Boiler Packing.

To the Editor of the SCIENTIFIC AMERICAN:

I have read several articles in your valuable paper on different kinds of packing for boiler manholes; and I would like to offer one, which for cheapness and simplicity, I believe hard to beat.

Take three pieces of strawboard—more often called pasteboard—about ⅛ inch thick, each piece about 3 inches larger than the manhole. Glue these together, making ⅜ inch thick, altogether, then with pattern of manhole (this pattern with about 1-inch rim can be sawed out of a thin board and kept for future use) mark the strawboard when dry, and saw out with scroll saw.

This packing will not shrink and split open like the ones made of wood. I have seen it used successfully for nearly two years.

An old boilermaker, who is now boiler inspector for this part of the State, told me it was new to him, consequently it must be new to a great many.

Lafayette, Ind., March 30, 1905. R. B. GREGG.

Determining the Date of Easter.

To the Editor of the SCIENTIFIC AMERICAN:

Those who are mathematically inclined will find the following determination of Easter day interesting. First, find the golden number by adding one to the number of the year and noting the remainder on dividing by 19. For example, dividing 1906 by 19, the golden number for the present year is seen to be 6.

Subtract the golden number from 20, multiply by 11, add 16 (add 15 only for the year 1899 and preceding years) and subtract a multiple of 30. The result gives the day of March on which full moon happens. The Sunday following the full moon that happens on or after the 21st of March is Easter day.

For the present year the golden number was seen to be 6. The product of 14 by 11, with 16 added, is 170. Subtract 120, and we have March 50 (April 19) as the date of full moon. By reference to a calendar, the 19th of April is Wednesday. Sunday, April 23, is Easter day for the year 1905.

Readers may practise the rule by showing that in 1818 Easter fell on the earliest possible date, March 22, and in 1943 it will occur on the latest possible, April 25. F. L. SAWYER MITCHELL.

Ontario, Canada.

The Intellectual Selection of Dogs.

To the Editor of the SCIENTIFIC AMERICAN:

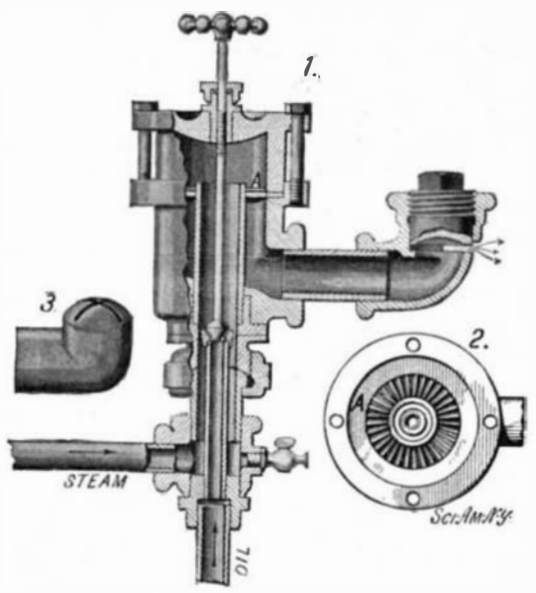
I was much interested in Mr. Washburn's criticism of Mr. Burroughs's article on the lack of intelligence in animals. One thing, however, I do not understand: Instead of being content with endless discussion of the matter, as in the time of Aristotle, why do we not resort, in this case as we do in other cases, to the experimental method? The cause of the divergence of opinion lies in the fact that the intellect of animals is exceedingly inferior to that of man, but the former can be raised by artificial selection. Why not apply it? Then we could easily see whether the gain consists only in increased reflex action, or whether there can be in animals anything like the complicated reasoning process which we witness in man. The dog would be a suitable subject for the experiment. That animal has been somewhat submitted to intellectual selection, especially by our prehistoric ancestors. In time of scarcity of provisions, man helped with a life-saving morsel mostly those dogs which were bright and affectionate. I have witnessed the process still at work among the numberless dogs of the *peons* of Spanish America. A selective process of another nature further improved our American dogs. Europeans notice that both dogs and cats are far tamer, brighter, and more affectionate in the United States than in Europe. It is evident that the average dog which, at the price of a pecuniary sacrifice and of some inconvenience, was carried across the ocean, was more loving and demonstrative than the average dog which was left behind. But all that selection was unconscious and thereby slow. Let some university found an institution for the intellectual selection of dogs. Let anybody who believes that he has an extraordinarily bright dog write to the institution, state the feats on which he bases his belief, and loan his dog for reproductive purposes. The careful selection of the offspring of such animals, their continual cross-breeding with all other available canine geniuses, would, after a dozen generations, create a race the form and color of which nobody can foresee, but the average intellect of which would probably be superior to that of any dog now living. That such a race would greatly help to solve many psychological problems is probable; that it would, in numberless cases, supply us with competent and faithful servants is certain.

GUSTAVE MICHAUD.

Springfield, Mass., March 22, 1905.

LIQUID FUEL BURNER.

In the accompanying engraving we illustrate an improved device for burning oil and other liquid fuel. The construction of the device is such that the oil will be thoroughly atomized and mixed with air and steam before reaching the burner. The mixture, it is claimed, will burn with a pure white flame entirely free from smoke. The oil is admitted through the vertical pipe at the bottom, and is heated by mixed steam and air, which enters through the horizontal pipe shown. Through a valve at the top of the oil pipe the oil passes in a thin conical stream into the air pipe, whence the combined oil and air pass up into the mixing chamber, striking the convex upper surface of the latter. From this point the mixture falls in a spray through the baffle plate *A*, which, as best shown in Fig. 2, is formed with radial arms and slots. In passing through this plate the oil and air are still further subdivided, producing a most intimate mixture of the two fluids before they pass to the nozzle of the burner. The nozzle consists of a slot cut into the outlet pipe. The thickness of the flame is regulated by a threaded plug, which may be screwed down into the pipe to close the slot to any extent desired. The mixing chamber is mounted to turn on the air pipe, so that the burner may be swung to any required position. The inventors have also designed a nozzle of the type shown in Fig. 3, which may be used to produce a vertical flame. We are informed that these burners have been put to a long practical test with heavy Texas oil, during which they were entirely free from choking. The device burns all grades of oil with equal facility, just enough steam being used to heat the oil and force the mixture through the burner. Owing to the simple construction, the apparatus may be readily taken apart for cleaning purposes or repairs. The inventors are



LIQUID FUEL BURNER.

Messrs. F. Richey and Thomas Daly, of 705 South Main Street, Paris, Texas.

The Duxbury Reef: A California Phenomenon of Singular Beauty.—Strange Curiosity of Bolinas Bay.

BY S. E. ST. AMANT.

Duxbury Reef, California, is familiar to people who seek the vicinity of Bolinas for hunting and fishing. It is not in the bay proper, but farther out, where it catches the force of the incoming breakers. Only when the tide is low can the reef be fully explored. Then its somber rocks rise to the height of sublimity. As the tide comes up, the reef seems to sink into the billows, until finally it is seen no more, and across its crest the waters pass unrestricted. The same is true of many a reef that mariners know and fear, but this reef is not of the common sort. It is not a pile of rock cast up only as a menace, but it seems to be connected with the fires that glow at the interior of the earth; a vent for the mysterious forces that press against the crust of the globe and thunder in the vast depths for exit.

The strata are similar to those of the mainland, being carbonaceous, interspersed with igneous rocks. A sticky substance exudes, that trickles down the little gullies, ever moving but deliberate as tar. This substance is inflammable. The touch of a match would set it in a blaze. But that the tides wash over the reef and clear it of the crude petroleum it would become so steeped in it that it would flare like a mighty torch, and, as cliffs on the coast of England have done, might smolder for ages.

There are human relics at Duxbury Reef, but they do not lend the strange spot any air of cheerfulness. At lowest tide there are exposed the timbers of a wreck, and beneath them are believed to be the bones of ten seamen, who perished when the vessel went down. Perhaps they had seen a beacon.

There are little fissures in many places on Duxbury Reef, where the strata have been wrenched apart. When fishermen visit the place they cook their meals over these fissures. They are not scientists, but they accept the facts of nature with imperturbable calm. They only know that on Duxbury Reef, where there is not a fagot or a pound of coal, fuel is provided without cost or trouble. They have only to apply a match to one of the fissures, and a steady blue flame appears.

They use it, and do not take the trouble to extinguish it. The waters do this for them. If the reef were only higher, its blue flame would be perpetual. But the tide is inexorable. It drives the fisherman back to his boat, and one by one it drowns the blue flames of his lighting.

There are traces of gold on Duxbury Reef. Once in a while prospectors visit it, and they never have trouble in finding color, but in a place that much of the time is under the sea there is scant chance for mining. The wealth of the reef must in all probability be found in some form of petroleum, or the products of nature always to be had where this material is abundant. When a match at a fissure in the earth starts a blaze that can only be put out by ducking, there is something worth investigation.

All this does not explain the beacon that flared and sputtered during the storm on Bolinas Bay. A party of prospectors had visited the reef. They had sat on its sterile outposts and caught gamy fish, which they fried over the fissures. They had marveled at the steady blaze, and in a wanton spirit of adventure had used matches here and there till the deepening twilight brought the reef into prominence. It seemed like an isle wreathed and crowned in fire. The fissures spurted flame. The dripping petroleum became tiny cataracts of flames. The very rocks glared with an incipient heat that awed the visitors. They feared that the reef would become a torch and themselves be consumed.

Yet there were bold spirits among them inclined to experiment. A piece of iron pipe was taken from the boat and driven deep into a hole. The spouting flame ran through it, and twelve feet higher than the highest light this place of lights had ever known a new beacon saluted the growing night and the gathering tempest. The prospectors left the reef and made for the shore. The tide climbed up and up. One by one the fires expired with a hiss and a steamy jet, but above the reach of flying surf the strange beacon remained. It was at this the people on shore looked with questioning eyes. They were accustomed to seeing the reef robed in fire, but the beacon puzzled and appalled them. The prospectors, too, watched. They saw the blue gleams die till the reef was not even a speck in the distance, and their beacon seemed a will-o'-the-wisp stranded.

Then it fell and was seen no more. The fury of the waves had undermined the pipe, and the fury of the wind had cast it down, while water had rushed into the enlarged fissures, and the last spark had gone out with an unheard hiss.

The men who had thrust the pipe into the fissure had a purpose. It was not to give the people of Bolinas something to stare at nor set mariners to searching their charts for a record of the light. They ascribed the possibility of igniting the opening in the reef not to the pressure of crude petroleum, but to natural gas that is often its accompaniment. They knew that at the discovery of such gas, factories and cities had sprung into existence. They knew that for heat and illumination, when it can be had, it is the cheapest medium ever discovered.

The tube proved this theory, but the reef is still untouched save by the sea fowl and the careless foot of hunter and fisher.

The Current Supplement.

The current SUPPLEMENT, No. 1528, opens with a scholarly and well illustrated article on the Mycenæan Palace at Nippur, by Clarence S. Fisher. The author shows the striking resemblance between the architecture of Mycenæ and of Nippur. Mr. R. Watson gives some very useful hints on pattern making. Carl George P. de Laval writes on "Pumping the Comstock Lode Mines." The effect of liquid air temperature on the mechanical and other properties of iron and its alloys is exhaustively treated by Sir James Dewar and Robert A. Hadfield. The recent experiments on the nature of magnetism conducted by Herr Zacharias are described and illustrated at length by Emile Guarini.

Approximation to Square Root of a Given Number.

A number between 10,000 and 100.—Divide the number by that multiple of 10 whose square is the nearest to but exceeds the number. Take one-half the sum of the quotient and divisor.

A number between 10,000 and 100,000.—Divide the number by 10/3 that multiple of 10 whose square is nearest to but exceeds in value 1-10 the magnitude of the half power of that which is desired. Take one-half the sum of the quotient and divisor.

Lead has recently been added to the list of effective ingredients of magnetic alloys, principally in connection with manganese and aluminium.