

the work and the resultant and possible multiplication of Chanome dams along the Ohio would inevitably destroy the coal trade of Pittsburg, as far as river shipments were concerned. Within the past few months, however, this opposition has given way in marked degree. The change of feeling is mainly attributable to causes novel and unlooked for. Owing to almost unprecedented and long-continued drought laden coal craft, containing 20,000,000 bushels (760,000 tons) had up to the middle of November, 1879, accumulated at Pittsburg, when the article was bringing famine prices in Cincinnati. At the date mentioned timely rains permitted a third of the accumulation to pass down the Ohio. But the argument for an artificially improved river was potent in the extreme, and to-day even the river coal trade of Pittsburg advocates the "Davis Island Dam."

**THE ANGAMAR STEAM PASSENGER CAR.**

For ninety consecutive days during the past season the Angamar steam passenger car "Lillie" has been running upon the Third Avenue surface railway, part of the time hauling an extra car. The experiment continued long enough to make it clear that a proper steam passenger car can be used safely and successfully in summer time, even in crowded thoroughfares. There is probably no street railroad in the world on which cars are run at briefer intervals, or where the necessary stoppings and startings are more frequent than on our Third Avenue road, nor one where the necessity is greater for quickness of action and entire regularity in running. If the Angamar motor can meet the severe requirements of winter traffic with corresponding success, the car horse may look for a change of occupation, and the community be relieved of the growing nuisance of his presence in our cities.

Superior economy is claimed for this motor, as compared with other steam locomotives, on the following grounds: 1. The water is heated in a stationary boiler, thus making a great saving of fuel in comparison with locomotive boilers. 2. There is no water level to watch, no injectors to take care of, and no fire to attend to during a trip. Hence the motor does not require a high-priced skilled engineer to run it, any average man of the class of car drivers being able to do the work. 3. All the working parts are protected from dust and dirt by close-fitting boxes, thus reducing the wear to the minimum. There is a further advantage in the circumstance that the machinery is so arranged upon the truck that the ordinary cars in use can be easily converted into self-propelling cars.

The Angamar motor runs without any noise of escaping steam, is easily handled, and does not frighten horses. The boiler is supplied with hot water under pressure at the central supply station, where the furnace is filled with red-hot coal in quantity sufficient to keep up the initial pressure in the boiler during the trip. The amount of coal required for this purpose and for heating the water in the stationary furnace was, during the ninety days' test, one third of a ton of egg coal a day. The volume of water in the boiler is so large and the fire in the furnace so small that all risk of explosion is avoided.

**A NEW PLAN FOR HEATING HORSE CARS.**

The Third Avenue Company, of this city, have introduced a novel plan of heating their cars. Metal pipes about 4 inches in diameter are laid under the seats and filled with salt water. At one end of the car the pipes unite in a sort of box surrounding a chamber called the oven, about 13 inches long, 5 inches wide, and 4 inches high. The door to this oven is through the end of the car, just above the platform, and consists of a box of non-conducting material nearly filling the oven. The water is heated at the stables by means of a block of highly heated iron thrust into the oven, nearly filling it. When the car leaves the stable the iron is removed and the oven closed, the heated water in the pipes sufficing to keep the car warm throughout the trip. Salt water is used to lessen the risk of bursting the pipes by frost, should the car be kept overlong on the road. So far the plan contains nothing objectionable. To economize heat, however, the company have had the car windows fitted with extra casings, permanently closing them, trusting to the opening of the doors, in the admission and discharge of passengers, for the supply for fresh air. Unless the ventilators in the roof are kept well open this plan is liable to add a new terror to horse car traveling. The atmosphere of crowded horse cars is bad enough at best; if its renewal is to be left to chance they will be little better than pest holes.

**A HOT WATER RIVER.**

The projector of the Sutro Tunnel is of the opinion that the hot water which is so troublesome in the Comstock mines comes from a depth of ten or fifteen thousand feet, where the rocks are at a high temperature; also that there must be some connection between the water of the Comstock lode and that of the boiling springs at Steamboat, six or seven miles distant.

One of the great advantages of the tunnel is the means it affords for draining the mines. The tunnel discharges about twelve thousand tons of water every twenty-four hours. To lift this water to the surface would cost not less than \$3,000 a day. Some of the water has a temperature of 165° where all the water mingles; four miles from the mouth of the tunnel the temperature ranges from 130° to 135°. If left to flow through the open tunnel this water would so fill the air with steam as to make the tunnel impassable. In flow-

ing the four miles through a tight flume made of 3 in. yellow pine, the water loses but 7° of heat. At the mouth of the tunnel the water is conducted sixty feet down a shaft to a water wheel in the machine shop, whence it is carried off by a tunnel eleven hundred feet in length, which serves as a tail race. From this tunnel the water flows a mile and a half to the Carson River.

This large flow of warm water is now used for many purposes, the first to utilize it having been boys who made small ponds to swim in—pioneers, it may be, in establishing a system of warm baths, which may ultimately become a great sanitary resort. The water can also be turned to account in heating hot houses and for irrigation. The tunnel company have a farm of over a thousand acres which, when properly watered, is very fertile. In course of time there will probably be many acres of fruit and vegetables under glass at this point, all warmed and watered by the tunnel water.

**NEW YORK ACADEMY OF SCIENCES.**

At a meeting of the Academy, held December 1, President Newberry exhibited some very fine quartz crystals from Herkimer county, N. Y., and also two slabs of perfectly preserved fossil fishes from the extensive Eocene formation of Wyoming Territory. This formation, which is about 7,000 feet thick, shows evidences of three successive deposits, and is exceedingly rich, not only in the remains of fishes, but of birds and mammals. The abundance of fish remains is accounted for by the supposition that the fish were overtaken by some sudden disaster, by which great numbers perished at the same time; that they floated for a while on top of the great lakes they inhabited, and eventually sank to the bottom. The occasional great mortality of fish in the Gulf of Mexico, where the decaying remains sometimes cover a very large area, to the great annoyance of travelers, furnishes an analogy to these prehistoric catastrophes, and suggests the explanation that they were caused by the evolution of poisonous gases from the bottom during volcanic eruptions. In Oregon, where fish remains similar to those of Wyoming are found, there is also evidence of volcanic eruption.

Captain Blake stated that during the great eruption of Mauna Loa, in 1841, the surface of the water was covered with dead fish for miles. Dr. Martin suggested that numbers of small fish frequently perish near the shore by being cut off in lagoons left by the receding tide. As the water evaporates, the fish are brought more and more closely together, until, finally, there is not sufficient water left to keep them alive. The paper announced for the evening on

**THE PROBOSCIS OF THE HOUSE FLY,**

by Dr. George Macloskie, of Princeton College, was one of unusual interest to the comparative anatomist, as it embodied the results of original work in investigating and interpreting the organs of the house fly (*Musca domestica*).

The general structure of the proboscis is very similar in the house fly and in the other kinds of flies with which we are familiar. Indeed the analogies it is proposed to point out will apply with greater or less exactness to the whole order of diptera. The stomaxys, or piercing fly, which is sometimes very common in our houses, may be distinguished from the domestica by its brown, ringed proboscis, suggesting an elephant's trunk. It is only partially retractile, but able to pierce our skin, an offense which the domestica is incapable of committing. Another misdeed of the stomaxys, for which the house fly has been unjustly blamed, was found during these investigations. The piercing fly was often observed to have her head and proboscis crowded with eggs. That these were not her own eggs was evident from their different shape, and then they were in the wrong end of the insect. Further observation showed that these eggs developed into anguillula worms, resembling paste eels. Here then we have one of the ways in which the fly defiles articles of food, etc.

Dr. Macloskie then referred to large diagrams to show the structural resemblances of the cray fish, the cockroach, and the fly, calling especial attention to the number of segments in the body, the maxilla, the mandibles, and the calcareous tendons attached to the latter. In all the diptera the mouth parts are modified into organs of suction with or without piercing apparatus. The house fly alone has a retractile proboscis that folds up like a letter Z, and is drawn into the head when not used. It is traversed by channels connecting with the trachea, and is protruded, not by muscular action, but by the inflation of its chitinous membranes. The anterior end of the proboscis consists of a knob, and contains the lips and a series of forked half rings, by means of which the fly rasps the surface from which it gathers its food. The teeth of the house fly have three cusps, and form a single row of five or six on each side, while the blow fly and others have as many as thirty teeth, or three rows on each side, each tooth having only two cusps.

No difficulty was experienced in explaining the analogy of these and the other numerous parts of the fly's mouth apparatus to those of the crustacea, until the largest of them was reached, the organ to which the tendons, corresponding to the mandible tendons of the lobster, are attached. An opportune katydid, that flew into the room of the investigator at the critical moment, solved the difficulty, as a dissection of its head revealed the presence of an interior skull or endo-skeleton, a part not possessed by the diptera. The explanation laid before the Academy was that the organ in question represented a rudimentary internal skull in the head of the house fly.

C. F. K.

**Sorghum in the West.**

The first annual convention of the Mississippi Valley Cane Growers' Association met in St. Louis, December 3. The secretary reported that since the organization of the society last spring he had been in correspondence with persons in 35 States and Territories in regard to the culture of sorghum, and that a very great interest is manifested in regard to the matter everywhere, especially in the North. Colorado is particularly well adapted to cane growing, and Texas might raise two, perhaps three, crops a year. In the discussion of seeds and their culture several members gave their experience.

Mr. C. H. Miller, of Minnesota, thought the Minnesota-grown seed preferable for that climate, the cane from it being earlier than from seed raised in more southern regions. Southern-grown seed produced larger cane and more sirup, but the cane did not, as a rule, mature early enough for the extreme Northern climate. The weight of testimony seemed to be in favor of the early amber variety, but Honduras early, and orange Siberian, and one or two other varieties, were well spoken of. There is much enthusiasm among cane growers, and some of them believe that in five years this country will not only have stopped importing sugar, but will export large quantities.

**Advance in Leather Belting.**

A meeting of manufacturers of leather belting, at which were representatives of fully 75 per cent of the capital invested in this business, was held at the Astor House, New York, on the 4th inst. It was determined to advance prices ten per cent over those now ruling, such increase to take effect immediately. This is the third advance in prices which has been made since the 24th of July, the aggregate increase amounting to 40 per cent. By the new scale of prices, the charge for pure oak belting will be 33 cents per foot for 3 inch, 69 cents per foot for 6 inch, \$1.05 per foot for 9 inch; \$1.41 per foot for 12 inch, and \$3.22 per foot for 24 inch, with 100 per cent more right through for double belting; but with discounts ranging from 30 to 37½ per cent with the different firms. The belt manufacturers, although they do not form a close combination, have for a long time past made a common scale of prices, which it is generally understood they will all adhere to, except in such particular exigencies as may seem to call for variations in order that a house may protect its own trade or its customers as against outside competition.

**One More Number.**

The next issue will close another volume of this paper, and with it several thousand subscriptions will expire.

It being an inflexible rule of the publishers to stop sending the paper when the time is up for which subscriptions are prepaid, present subscribers will oblige us by remitting for a renewal without delay, and if they can induce one or more persons to join them in subscribing for the paper, they will largely increase our obligation.

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**Kitchen's Horse Detacher.**

In the illustrated description given in our last issue of the novel horse detacher recently patented by Mr. W. R. Kitchen, the address of the inventor was omitted. Persons desiring information concerning this much needed invention should address, Mr. Kitchen, at Willard, Carter Co., Ky.

**A Ten Years' Average of American Crops.**

The annual averages of the below-mentioned crops include the period from 1868 to close of 1877. The estimates are from the statistics of the Treasury Department:

	Annual average product'n bushels.	Annual average total value.	Average value per bu. cents.	Average yield per acre.	Av. value of yield per acre.
Oats.....	291,036,670	\$116,810,592	40 1/2	28	\$11 22
Rye.....	18,016,030	15,091,207	83 7/8	13 7/8	11 51
Corn.....	1,068,959,550	525,211,602	49 1/8	26 4	13 97
Wheat.....	273,583,174	301,431,541	110 2/3	12 1/2	13 40
Buckwheat.....	10,938,070	9,204,581	84 1/8	17 2	14 51
Barley.....	30,606,609	25,385,450	82 9/16	22 2	18 41
Potatoes.....	126,259,470	75,011,668	59 4	90 9	54 04
	Tons.		per ton.	tons.	
Hay.....	26,272,810	321,261,659	\$12.60	1 21	15 25

**Temperature of the Sun.**

Newton, Waterston, Ericsson, and Senchi have asserted that the sun's temperature cannot be less than from 1,000,000° to 2,000,000° (1,800,000° to 3,600,000° Fah.); Pouillet, Vicaire, Violle, and many others maintain that the temperature cannot exceed from 1,500° to 2,500° (2,700° to 4,500° Fah.). The French Academy, in 1876, offered a "Bordin Prize" for the solution of the question, which resulted in a reward to Violle, certificates of "honorable mention" to Vicaire and Crova, and a withdrawal of the prize, in consequence of the difficulty and uncertainty involved in the question. Senchi obtained more than 2,000,000° by Newton's formula, while Violle obtained only 1,500° by the formula of Dulong and Petit from the same set of observations. F. Rosetti, in a memoir crowned by the Royal Academia dei Lincei, discusses experiments and methods of his own, from which he concludes that the temperature cannot be much less than 10,000° (18,000° Fah.), or much more than 20,000° (36,000° Fah.).—*Ann. de Chim. et de Phys.*