tar is a station on the Bosnia State Railway, and has 11,000 inhabitants, who are of many nationalities, Herzegovina having passed from Turkish rule to Austrian military occupation in 1878.

Mostar is situated on the Narenta, a brawling stream, thirty-five miles from its mouth. The banks are high and rocky, and are connected by a beautiful bridge, for which Mostar has always been celebrated and which forms the subject of our illustration. It is a single arch, the span being 95¼ feet, and at low water the parapet is 76 feet above the water and at high water it is sometimes only 44¾ feet from the water's surface. The breadth of the arch is 14·2 feet, the roadway 13·2 feet. On the north side is a stone conduit for conveying water to the eastern portion of the city. The bridge rises about ten feet in the center, giving an effect of lightness which was evidently not intended in the original designs. The building of the bridge is attributed to Trajan or Hadrian, about A. D. 120, but the Turks have carefully concealed the Roman masonry with small stones, which give the bridge the appearance of a Turkish construction. Both the inherent grandeur of the arch and tradition favor the belief that it was constructed by the Romans.

Entrance to the bridge on both sides is gained by gates flanked with towers which are supposed to have been erected on Roman substructures. There are some Turkish inscriptions on the bridge. The town is irregularly built, the streets being unpaved for the most part. The business of the town is chiefly done in the two bazars, which are arranged in true oriental fashion. The houses are built and roofed with stone. We are indebted for our engraving to L'Illustration, and for the greater part of our description to Wilkinson's work, cited above.

THE PLASTER CENTER PIECE INDUSTRY.

THE PLASTER CENTER PIECE INDUSTRY.

The center pieces, brackets, and moulding used in the decoration of ceilings in public buildings, dwellings, etc., are made principally of plaster of Paris. A model is first made of clay, from which a mould consisting of resin and beeswax is formed, into which the plaster of Paris center piece is cast. The first process is the modeling of the design in clay from a sketch or drawing. This is done by spreading out a quantity of finely tempered and plastic clay on a hard wood or marble-covered table, the design, if a floral or fruit piece, being modeled into shape by the fingers and by the use of a number of wood, ivory, bone and steel tools, the modeler using them for finishing off neatly and sharply the parts which cannot be reached by the fingers. The best workman is one who can do most toward producing the required forms with his fingers unassisted by artificial tools, as a greater degree of ease and freedom almost always results from the use of the hands alone. While the modeling is in progress the operator keeps the clay moist and plastic by adding water to it. A damp cloth placed over the design or model keeps it moist when not worked. In modeling bass-reliefs the operator applies the clay to a slab of slate or a metal-covered block, which can be raised and lowered at will. Some models are made of soft wood shaped out by the usual chisels, gouges, etc. The clay model when completed is allowed to become hard. A coating of shellac is then applied and the sides built up with a quantity of soft clay. A solution composed of melted beeswax and resin is then poured over the mould, the casting of which forms the wax mould from which the plaster of Paris cast is made. About 5 pounds of beeswax to about 7 pounds of resin are required to form a 12 pound mould, it taking about half an hour to harden. The moulds when cast are about 2 inches in height and ranging from ½ inch to 1 inch in thickness. The wax mould when a plaster cast is to be made is first greased thoroughly in every part with lard or mineral oil, the material being applied with a stiff long-haired brush, the greasing of which prevents the plaster from sticking to the mould. The dry plaster of Paris is first mixed with water by hand in a tin vessel. To form a center piece about 2 feet in diameter, the operator mixes from 5 to 6 pounds of plaster in about 3 quarts of water to the consistency of cream, an expert being capable, during the process of mixing by his hand, of judging when the solution is ready by the sense of feeling. The material is then poured from the vessel into the mould, which is placed on a raised wooden frame, the center of which is cut out. The center of the mould, which projects below the bottom where the gas pipe passes through, rests over the opening, causing the mould to set evenly on the frame. After the plaster of Paris has been in the mould a few moments, the operator takes a portion of the plaster out of the cast where it is likely to be thick and heavy and spreads it over the thinner parts. The edges are then fastened and the material smoothed over by the operator passing a smooth wooden bar or stick over the surface. The cast is then allowed to harden, which takes about half an hour. The next operation is the taking of the cast from the mould. This is performed by submerging the mould into a water box for a few moments, the cast coming in contact with the water causing the plaster to shrink and raise slightly. The mould is taken out as soon as the cast raises, and turned bottom up. The sides and bottom of the mould, which is elastic, are then pressed in and out by the fingers, the operation causing the cast to loosen and drop out. Before the cast is dry the back is scored with a knife, which causes it to hold when plastered to the ceiling. The cast is then trimmed and the center hole cut through with a gouge. Lukewarm water in winter and cold water in summer is required for loosening the casts from the moulds, the wax being very sensitive to heat and cold. The cost of the wax used in making the moulds ranges in price from 30 cents to 38 cents per pound, and the resin from 3 cents to 4 cents per pound. A single operator can make a cast about 2 feet in diameter in about one hour. Plaster of Paris center pieces run from about 1 foot in diameter upward and are sold to the trade at from 50 cents to $2 each, according to the design. The sketches were taken from the works of Charles Mattern & Son, Jersey City, N. J.

Earthquakes in Mexico.

The earthquake which visited the city of Mexico on November 2 was probably the most severe shock felt in that region since the famous earthquakes of 1858. An eye witness of the scene, who corresponds with the Boston Herald, has related some very interesting details concerning it. The shocks, he says, commenced with an upward movement of the earth of such violence that massive buildings rocked upon their foundations like children's cradles. Many roofs were completely wrecked and large cracks were made in walls of solid masonry. The cathedral also sustained serious injuries. During the most violent part of the earthquake the pictures on the walls swayed to and fro, and telegraph cables swung in the air like clothes lines. The horses on the streets were unable to keep on their feet, and water was hurled out of the public fountain basins. The rocking was accompanied by loud, rumbling sounds which added to the terror of the people. The actual loss of life has been fixed at fifteen lives, and long lists of casualties are reported. The earthquake was also accompanied by the eruption of the volcano Colima, which continued long after the shocks had subsided to emit clouds of steam. There is a theory that on both coasts of Mexico there are submarine volcanoes which are active during seismic phenomena on the land. The scientists of the region visited by the earthquake assert that the shocks had no connection with the great disturbances of the earth's crust in South America.

Electrical Effects on Wool.

Wool, says the Manufacturers' Review, after it is shorn and cleansed preparatory to the carding and spinning processes, is capable of being highly charged with electricity, and the phenomena resulting from this characteristic are familiar to all carders. Oftentimes the influence of this agent is so active as to interfere materially with the working of the wool.

Wool that is thoroughly wet, or that is well lubricated, either artificially or with its own natural grease, shows no effects from the presence of electricity, and it may be accepted as a well established fact that in all grades of wool the susceptibility to the influence of electricity increases in the ratio of dryness or absence of lubricating material in the fiber, or, in other words, to its freedom from the moistening effect of oil or water.

Sufficient moisture properly applied will not only prevent all of the ill effects of electricity in wool, but will destroy every evidence of its existence in both the picker and card rooms.

By making the feed light in bulk, speeding the feed roll and doffers faster for a quick feed and quick delivery, and reducing the speed of the main cylinders, tumblers, fancies, and the vibratory motions of the condenser, all of which results in diminishing the friction, the electrical effects are also done away with, either entirely or to such an extent that no injury results.

It is in a warm, damp atmosphere that the work of the card room is always at its best, if the stock is liable to electrical effects.

Thawing Frozen Meat.

A large portion of the supply of beef to the London market is furnished in a frozen condition, brought from great distances. A process for accomplishing the thawing of the frozen meat has been invented by Messrs. Nelson Brothers, who have an experimental chamber working at Lambeth. The chamber is provided with double doors, one of which is extremely thick, so as to shut out as far as possible all external atmosphere. The chamber has no windows, but is supplied with electric light. On entering one sees only some thirty quarters of beef hanging in rows on hooks, over a slightly raised open platform, with a canvas curtain at the back. Under this platform, however, there is a series of steam pipes, while behind the curtain there is a series of pipes filled with compressed ammonia, similar to those used in connection with the ordinary freezing processes. The steam pipes under the meat causes a current of warm air to ascend all round it, and as soon as this current reaches the top of this chamber it is drawn to the freezing pipes behind the curtain, by which all moisture is frozen out of it on to the pipes themselves. It accumulates there in the form of snow, which at the time of the visit of our representative was three-quarters of an inch in thickness. The snow has to be scraped off the pipes from time to time, and it is stated that the accumulation during five days, in the thawing of thirty quarters of beef, has resulted in no fewer than 168 pounds of water. During that same period the meat itself lost only one per cent in weight.

The purpose of the canvas curtain is, of course, to divide the ascending warm current from the descending cold current, and it is claimed that the effect of this incessant passing of the air first over the steam pipes and then over the freezing pipes is eventually to free it from all moisture, and so produce that "warm, dry air" which has been aimed at all along. When the meat is first hung the temperature of the room is almost at freezing point, but the steam is turned on gradually, until on the fifth day the temperature of the chamber has been raised to that of the air outside. By that time, it is claimed, the frost has all been thawed out of the meat, which is then in a condition to be sent to market for, if need be, immediate consumption.

Navy Yard Improvements.

A number of important improvements are about to be added to the Brooklyn Navy Yard at an expense of $500,000, and bids for the work have been asked for. There is to be a new concrete quay wall, 460 feet long, at the foot of Main Street, and a similar one 316 feet long is to be built along the Whitney Basin. A causeway 522 feet in length will also extend from the northeast boundary of the reservation to the cob dock across Wallabout Channel. Its walls will measure 1,045 feet, and the work must be completed by November 1, 1895. The causeway is to be 41 feet wide at the top, with a 20 foot driveway. Of the building improvements, the boiler shop is to be enlarged to twice its present dimensions. A new plate bending shop, 200 by 85 feet, to cost $70,000, will be placed near the stone dry dock to supplant the temporary wooden sheds now standing there. Probably the most important change, however, will be the modern three-story office building, which is to replace building No. 6. A large part of the money used in this work has been obtained from the sale of navy yard lands to the city of Brooklyn for market purposes.

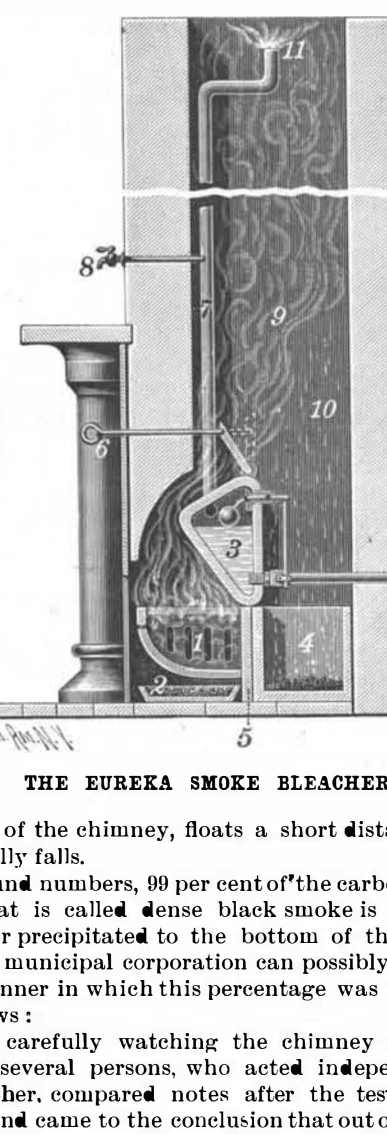
Correspondence.

THE EUREKA SMOKE BLEACHER.

To the Editor of the SCIENTIFIC AMERICAN:

In continuation of the subject matter of the illustrated article given in the SCIENTIFIC AMERICAN of October 27, I would add the following:

The theory or fact of dust in our atmosphere being the means by which light coming from the sun is reflected, and if there were no dust in the air we should be in continual darkness, and that the vapor in the air condenses on the dust and is precipitated to the earth in drops of rain, and that no rain drop forms and falls without having a particle of dust as the nucleus, seems to have a verification in the action of the Eureka smoke bleacher, for while the combustion in the furnace is perfect, nothing is visible as coming from the chimney, the steam which pours into the chimney four feet from the top, at a temperature of 212° F., is immediately met by the gases from the furnace at a temperature of not less than 360° F., and the vapor is absorbed by the air. If a bushel of coal is put in the furnace, a change immediately takes place, inky drops of water heavily charged with carbon are precipitated to the bottom of the chimney, while at the same time steam is visible coming from the chimney, and on the roof falls a shower of sparkling drops of water, which retain their form for a while and glisten in the shining sun. Place your finger on one of these drops that has fallen on a clean board, draw a line, and a black streak will follow the finger, thus showing that a particle of carbon formed the nucleus of each drop, which being lighter laden than those which fell to the



THE EUREKA SMOKE BLEACHER.

bottom of the chimney, floats a short distance away, but finally falls.

In round numbers, 99 per cent of the carbon entering into what is called dense black smoke is either consumed or precipitated to the bottom of the chimney. This no municipal corporation can possibly object to. The manner in which this percentage was obtained is as follows:

After carefully watching the chimney for over a month, several persons, who acted independently of each other, compared notes after the test had been made, and came to the conclusion that out of ten working hours per day the aggregate time when smoke was visible, varying at intervals of one-fourth to five minutes each, and varying in color from scarcely perceptible to 80 per cent of dense black, was one hour, and the color would not aggregate over 10 per cent of dense black, so that the amount of smoke escaping the chimney was 1 per cent, leaving 99 per cent to be either consumed in the furnace or precipitated to the bottom of the chimney, while much of the 1 per cent that escapes into the air is precipitated on the roof. Ninety per cent of the time perfect combustion takes place, as evidenced by no smoke coming from the chimney, and daylight in the carbon box so bright that a newspaper can be read. The nitrogen in the chimney probably absorbs and conveys the light from the top to the bottom, with the startling effect of its being much brighter than open daylight. When carbon enters the chimney the light disappears, an investigation of which is quite interesting. The drops are formed in the chimney where the steam strikes the carbon first; the heaviest loaded fall down the chimney apparently through the gases, the balance of the drops are thrown out of the chimney like spray from a fountain, the heavier drops curling gracefully over the sides of the chimney a few inches from the top and falling close to the chimney on the roof, while the lighter go higher in the air, some as high as ten feet, and fall a distance from the stack, really a beautiful sight to look at. The roof for ten feet around the chimney is very black, shading gradually another ten feet, where the roof is comparatively clean. In drops newly fallen on a piece of clean tin, particles of carbon, the nucleus of the drop, are seen floating around. The engineer's white jacket, on which fell a shower of these drops, absorbed the water and left the little black carbon spots to stand out in bold relief.

The old soldier's tale of rain always falling after a battle is no doubt true; the moisture in the air probably condensed on the particles of carbon in the powder smoke forming rain drops.

There is no oxidation of the iron lining of the chimney. It is perfectly dry and smooth. The only moisture in the chimney is these little inky drops of rain. Each drop seems to have an individuality of its own and to be about two-thirds carbon in moist and cold weather and nine-tenths carbon in hot, dry weather. The temperature six feet below the top of the chimney stood 360°, at steam pipe 285°, at top 205°, in carbon box 95°, the atmosphere 70°. It seems an absurdity to say steam at 212° will condense in a temperature of 360°; but when the law governing the formation of rain drops is considered, this does not seem so difficult.

Each raindrop seems to have an individuality of its own; millions of them fall side by side, never interfering; they fall at times through an atmosphere of 80 to 90 per cent density without being affected in the least. Whether they gather any additional dust particles in their fall is at present unknown; but it is possible, as the inky drops of water formed by the bleacher seem to gather carbon in their descent, and the principle of the bleacher is the principle of the making of a raindrop. It would be interesting to know just how high a temperature the principle would stand.

The device is easily adapted to stoves, ranges, and grates by means of a steam-producing hot water back, and pipe within the chimney to near the top. The grate would require a carbon pit in the rear of the hot water back, with drawer at bottom, as shown in the accompanying illustration.

1, grate; 2, ash pan; 3, steam-making hot water back, with or without automatic feed water; 4, carbon box; 5, carbon drawer, easily withdrawn after removing grate; 6, damper; 7, steam pipe; 8, tap in steam pipe to moisten air in the room, valuable to hospitals; 9, gases going up chimney; 10, carbon being precipitated; 11, point at which vapor condenses on carbon particles.

It should be remembered that the dark-colored matter called carbon or soot is more than one-half metal, which cannot be consumed. It is absurd for city ordinances to say it can. Fines will not effect it; the ingenuity of man is wasted in attempting it. What then can be done to rid the atmosphere of this disagreeable matter? The only solution is to stop it from entering the atmosphere after it leaves the furnace; this is done by the bleacher. JAMES T. SANDS.

St. Louis, Mo., 320 Roe Building, December, 1894.

Good Advice for Electric Car Builders.

An average of four or five cases of cars taking fire from electrical causes are reported to us every month, says the Street Railway Review. To this should be added three or four cases more of employes and passengers getting shocks from parts of the car which ought never to be alive. While we have never heard of a serious accident from this cause, there must be something radically wrong with the general run of car wiring which admits of so many cases of this kind coming to public notice. Car wiring is often not as carefully done as 50 volt incandescent light wiring, although it must stand ten times the voltage. Setting fire to cars and treating passengers to free shocks is not conducive to inducing traffic among the timid members of the community, and the money spent in repairs of cars that have been set on fire might be better spent in better wiring in the first place. In this connection it is a good plan when overhauling or building cars to see that all metal work within passengers' reach is permanently and positively grounded by a connection with the truck frame.

The Fox and the Eagle.

At Rondout, N. Y., recently, Samuel Jones set a trap for a fox at the upper end of the old Frazier clearing, in Seabury Settlement, and when he went to see if he had caught anything he found the trap was gone, notwithstanding it had been secured by a chain and a heavy staple driven into a log alongside.

The chain had been broken, and there was a rather plain trail in the dead leaves.

This trail Jones followed until he got to a small opening, about a dozen rods away, where on the moss lay his fox, dead, yet holding fast by the throat a dead eagle.

The eagle, in flying over the woods, had seen the entrapped fox and had swooped down upon it, but the fox, although crippled by the trap, had made a good fight, and had killed his assailant while yielding up his own life.