AGRICULTURAL INVENTIONS.

A novel combination, with the seed dropping slide of a corn planter, of a pair of rimless wheels, a shaft, a series of elastic arms, and a cam, whereby provision is made for dropping the corn at regular intervals, has been patented by Messrs. Nimrod J. Curtis and W. J. T. Curtis, of Martelle, Iowa.

An improved combined harrow, seeder, and roller has been patented by Messrs. Robert Lang and James B. Lang, of Lindsay, Ontario, Canada. The object of this invention is to till or mellow the soil, sow the seed, and smooth or roll the land at one operation.

Mr. John C. Waddell, of Union City, Tenn., has patented a broadcast seed sower for sowing clover seed and other fine seeds, so constructed as to sow the seed in uniform quantities; and so stop the escape of seed automatically when the mechanism comes to a state of rest, and which can be readily adjusted for sowing any desired quantity of seed per acre, and finer or coarser seeds, as may be desired.

A New Exhilarating Substance.

Dr. Luton, of Rheims, calls attention in a French medical paper to the exhilarating properties of the tincture of ergot of rye when associated with phosphate of soda. The circumstances of the discovery were as follow: A woman of 62, at the infirmary of the *Maison de Retraite*, in Rheims, was receiving tincture of ergotof ryefor disease in the knee. Fearing an unfavorable turn, the doctor thought to strengthen the action of that medicament with phosphate of soda, and accordingly combined a little of the two substances in a quarter of a glass of sweetened water. The patient, about three-quarters of an hour after taking this, surprised the inmates by bursting into loud laughter, without obvious reason, and this continued for more than an hour, with brief intervals. The laughter seemed to be associated with merry ideas, and to indicate a kind of intoxication. For some time after it died down the woman was in great spirits and good humor. Dr. Luton had not witnessed the scene, but the consequences to the patient being good, he administered the substance again, and a third time, observing the same effect. The experiments were further repeated on seven or eight women and girls with like results. In the case of men the action of the substance is less marked; it appears only in coloring of the face, giddiness, and slight headache. The effects in question have probably a common origin, it is thought, with those from eating rye bread when, in rainy years, the cereal contains as much as five per cent of ergot. A sort of intoxication is produced which the consumers by no means despise.

Increased Occupation for Women.

Mrs. Mary A. Livermore says that one evening twenty years ago a few ladies, interested in the welfare of women, discussed the employments open to women. They counted eleven and could think of no more. Recently the same ladies repeated the enumeration, and were able to point out 287 employments which women could engage in.

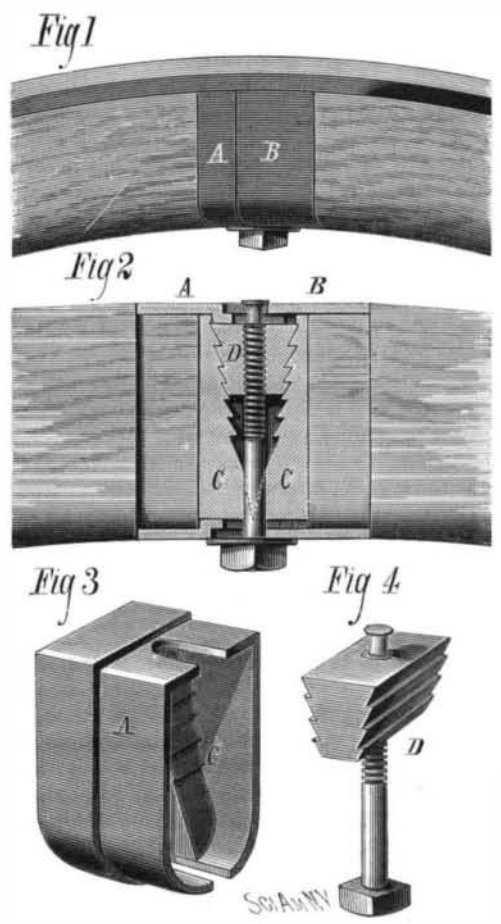
A Gift to the Museum of Natural History.

Mr. Robert L. Stuart, President of the Metropolitan Museum of Natural History in Manhattan Square, has presented to the museum the valuable "De Morgan" collection of prehistoric stone implements from the river gravels and peat beds of Northern France. The series of specimens representing the Stone Age in Denmark at the Centennial Exhibition were already in the possession of the museum; and the gap between that collection and the one just acquired is filled by the magnificent collection deposited by Mr. G. L. Feuardent, which in itself includes a series of objects belonging to the period of the river man in England, the cave man of Southern France, the latter from excavations made by the Marquis de Vibraye, from the tertiary and quaternary habitations of the Lovie Valley. The lacustrine period is fully represented in the Feuardent collection by the finds of Dr. Gross in the Swiss lakes, comprising stone implements with their original handles of stag horn, jade axes, chisels, etc., pottery of all sorts, and finally, numerous tools and ornaments of the bronze age from the same locality. This collection is completed by the ovidian implements from Greece. Prof. Spencer F. Baird, speaking of these two collections, says that no museum on this continent, the Smithsonian included, possesses anything equal to those now brought together at the Museum of Natural History. The museum is also rich in American antiquities.

CARBON tracing paper is prepared by rubbing into a suitable tissue a mixture of 6 parts of lard, 1 part of beeswax, and sufficient fine lamp-black to give it a good color. The mixture should be warm and should not be applied to excess.

NEW TIRE TIGHTENER.

The engraving represents a novel device for expanding the fellies of wagon wheels, so as to tighten the tire and prevent the wheels from being wrecked, as they frequently are when the tire becomes loose.



WILKIN'S TIRE TIGHTENER.

A, B, are telescoping metallic ferrules, provided with recesses, into which the ends of the felly sections are fitted. These ferrules are provided with diagonal toothed faces, C, having between them a wedge-shaped opening, when the ferrules are fitted together. An endless screw carries an elongated nut, D, having diagonal toothed edges, the inclination of which corresponds with the incline of toothed faces, C. The screw is fitted through the ferrules, as shown, so that it has a bearing in the upper plate of ferrule, B, and a projecting head on the inner side of the felly, by which the screw may be turned.

When the wheel is constructed the device is inserted at the joint with the ferrules, telescoping as far as possible, and with the nut at the top of the wedge-shaped opening. When the felly needs tightening the screw, D, is turned, and the nut, E, travels toward the head of the screw and forces the ferrules apart, and with them the felly-sections. As the nut travels along the faces, C C, of the ferrules, the teeth on its edges ride over the teeth on the faces, the teeth interlocking when the nut is stationary, so preventing it from being moved back toward the tire by jar or vibration. The expansion of the fellies caused by forcing apart the ferrules tightens the joints of the wheel and expends it so as to tightly fit the tire.

This invention was lately patented by Mr. Alfred Wilkin, of Toledo, O, who may be addressed for further information.

COLLAPSE OF A STEEL BOILER FLUE.

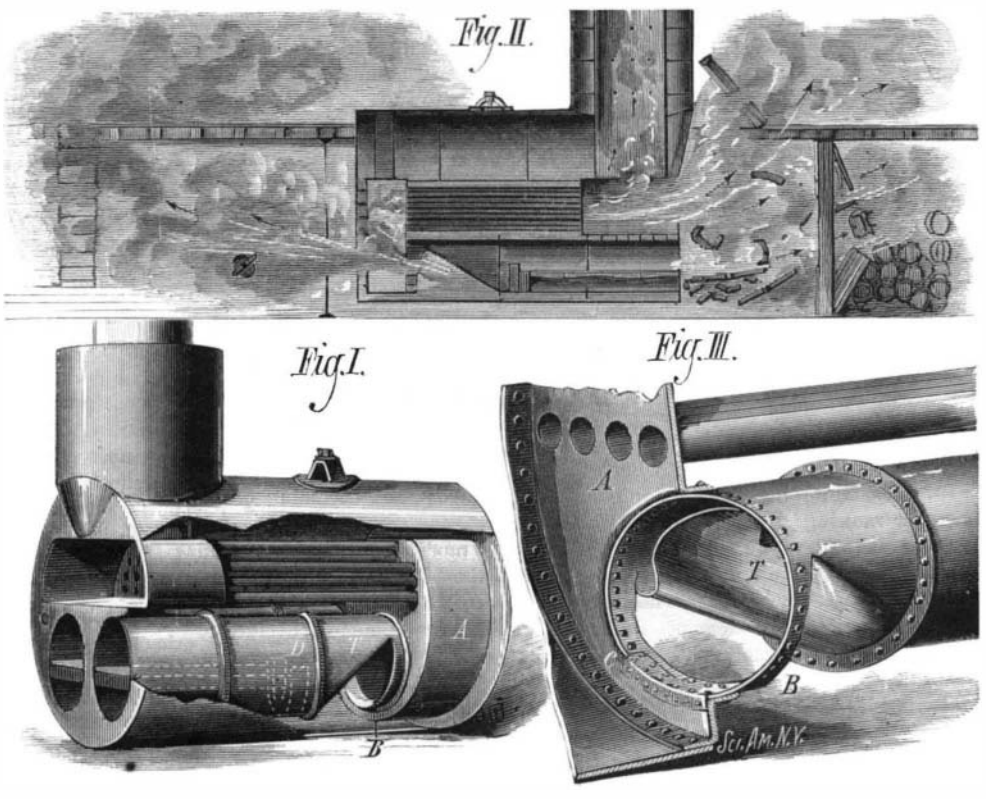
BY S. N. HARTWELL.

On Sunday morning, the 12th of June, 1881, one of the large flues in the boiler of the wrecking steamer B. & J. Baker collapsed while the vessel was lying at anchor off the coast of Virginia. The accident resulted in the death of three men and the scalding of one or two other men. Very little damage was done to property other than to the boiler itself. The vessel was owned and used by the wrecking firm of Baker & Co., of Norfolk, Va., but with other property of that company it is believed to have since changed owners. The vessel is described in the government certificate of inspection, which expires January 22, 1882, as a small passenger steamer, built of wood at Baltimore, in 1864, 212·67 tons register, rebuilt at Norfolk in 1870, having one low pressure (?) engine, 22 x 24 inches, and one iron and steel boiler, built in 1877, 16 feet long by 7 feet diameter, and allowed to carry 50 pounds steam pressure per square inch. There were on this boiler, according to the same authority, the usual safety appliances, namely, two safety valves, three gauge cocks, two steam gauges, and a fusible plug. This vessel is a propeller, and was used for towing and lightering.

It was a tugboat boiler, of the return tubular type, shown in Fig. 2, where the boiler is represented with its port side toward the observer, part of the shell being omitted to show the broken furnace tube. The diameter and length of the boiler are given above. It had two 27 inch round furnace tubes, straight from the boiler front to the back connection, each made of three steel plates about quarter inch thick, which were secured together by outward-turned riveted flanges. A fire-brick bridge wall in each tube at about two-thirds the length from the front, upon which the fire grates abut, divides the tubes into furnaces, ash pit, and flue leading into the back connection, whence the gases return to the up-take chamber and chimney above the furnaces through seventy-five small tubes. Cast iron doors, with door-frames bolted to the front boiler head above the grate level, formed the front walls of the furnaces.

The facts contained in this report were obtained through the politeness of the owner, Mr. J. Baker, who gave the writer permission to examine the interior of the vessel and the broken boiler, which was done before anything involved in the explosion had been moved. Men and means to facilitate the examination were placed at his disposal, in the belief that something would be brought to light in explanation of the accident that came upon them so unexpectedly after having done all in their power to make the vessel safe and efficient.

Fig. 1 is a sectional view of the boiler and fire room. It is intended to explain the course of the escaping contents of the boiler, and the effect on objects in the vicinity. The engraving, by means of the arrows, sufficiently explains the direction taken by the broken objects, which consist of the boiler hatch beam, the bulkhead forward of the boiler, which separated the fire-room from the forward storage room in the hold, the cast iron doors and their frames, all burst off and broken from the front head. The bridge wall and grate bars from the port furnace, and the back connection door from the rear end of the boiler. Hatches and skylights were blown off. The whole interior of the vessel's hold bore marks of the force with which things were driven before the scalding torrent that was impelled by its contained heat with terrible velocity.



EXPLOSION OF THE BOILER OF THE WRECKING STEAMER B. & J. BAKER.

Fig. 3 is a sketch on a larger scale showing the rear end of the collapsed tube and a part of the tube head in section. Also the patch upon the lower part of the tube.

The thickness of the plate, T, at the thickest margin of the rupture where a gauge could be applied, was found to be 0·220 of an inch, near the extremity of the torn edge, about half way up the side of the tube. From there to the point, B, the lowest part, the thickness decreased, the metal having wasted by corrosion on the water side, so that after rupture it showed a ragged knife-edge. Near the edge, on the bottom, holes were corroded entirely through. On the lower exterior surface of the other tube were found broad shallow pits of irregular shape extending over a large area, indicating that this tube was thin also, but not as far gone as the port one.

The patch at C, Fig. 3, covering the lower part of the flanged seam, and the rear end of the longitudinal seam of the broken tube, is sufficient proof that the engineer had been warned by a leak that a weakness, or at least a defect, existed here, and it was his duty to have tested with proper tools the surrounding parts before applying a patch. Drilling his bolt holes in the flue should have shown him that the plate was too thin, and he should have reported the deterioration that was going on to his owners and the local inspectors. It is obvious that the man in charge of the boilers should watch for and report dangerous defects to the proper officers, otherwise how can they know of their existence and

be responsible for results that may occur in the interval between regular inspections?

The *Tribune* has the following relating to this explosion:

"The report of the United States local inspectors of steam vessels at Norfolk, Va., upon the accident to the wrecking steamer B. & J. Baker, was received by Superintendent Inspector-General Dumont on the 23d of June. It states that the accident was the collapse of the port flue caused by over-pressure. The evidence of one of the deck hands shows that the engineer on watch was asleep in his berth at the time of the accident, and this evidence is corroborated by the fact that his body was found in his berth. The condition of the boiler shows that all the doors were closed."

This is the whole of it; overpressure meaning a pressure a little too great for the weak flue. It may, however, have been within the limit of fifty pounds per square inch allowed by the certificate, which was written less than five months before, or else what good were the safety valves, which should have been automatic in their action whether the engineer was asleep or awake? No theory is therefore necessary in this case to account for the immediate cause of the accident. The remote cause from which the deterioration of a strong flue of the best quality of homogeneous metal that is known to modern engineers, arose is not so clear, although much has been written and some indirect experiments have been made by the British Admiralty Boiler Commission for the purpose of finding a remedy for the rapid deterioration of boilers in the Royal Navy, since the introduction of surface condensation. Rear Admiral C. Murray Aynsley, a member of that Commission, contributed a paper to the Journal of the Royal United Service Institution, which was printed by Van Nostrand in November, 1880. From the part of the paper in which the Admiral summarizes the report of the Commission's Ocean Plate Experiments, it appears that a set of plates of bright but not polished steel and iron, four inches square by ⅜" thick from different makers in England were sent to "men of war in the Mediterranean, West Indian, Pacific, Australian, China, Brazil, Cape, and East Indian stations, troop ships of the home and foreign service, tugs in home ports, and merchant vessels belonging to as many as forty-five of the principal steam ship companies, trading in every part of the globe." A blank form was supplied with each set of plates to be filled in by the chief engineers. The following table is made from forty-two sets of these papers, all that were available when the paper was prepared, showing the loss in grains per square foot for each ten days the plates were in the boilers. The table is rearranged, so as to be intelligible as far as may be without the balance of the paper, space for the whole of which is not now available.

The point made by the author of this paper related to the effect of the presence or absence in the boiler, used in conjunction with surface condensation, of air (gas) which would be brought in with the feed water used to make up the waste in blowing off, and by leakage. The table is arranged from his data in groups such as they were divided into by him.

	Loss in grains per square foot in 10 days.
Group (1). Those that do not change any of the water at sea, mean of 10 sets of experiments	66·49
Group (2). Those that change 3 inches in depth of water in the boiler in 24 hours; mean of 9 sets of experiments	26·49
Group (3). Those that change between 3" and 12" in 24 hours; mean of 7 sets of experiments	149·87
Group (4). Those that change more than 12" in depth of water in the boiler in 24 hours; mean of 6 sets of experiments	323·75

From this it will appear that where the greatest amount of water was daily changed, involving the introduction of air, which contains the very active corrosive agent carbonic acid gas, then the experimental plates suffered most from corrosion.

The author of the paper states what does not appear in the table, that the plates in those boilers of group 1 that were emptied at the shortest intervals suffered more than the others in that group.

He next compares steel with iron plates as regards rapidity of corrosion, and the different brands of English steel, from which it appears that crucible steel suffered least, Bessemer next, and Siemens-Martin most under like exposures, while Staffordshire iron suffered least of all, Lowmoor ranking next to crucible steel. The extremes, however, between Staffordshire iron, 123, and soft steel, 155 grains per square foot in ten days, was not so decided as when they were exposed in boilers in connection with jet condensation, when the figures were, iron 119, and steel 179 grains.

Then fresh and sea water are compared as to their corrosive action, with the following results referring to the groups in the table. Group 2, fresh water, loss 49 grains; sea water, 102 grains; group 3, fresh, 73; sea, 166, while in the first group, no blowing off, fresh water was the most active as 28 is to 20. From all of which the author of the paper concludes that when no change of water is made sea water has the advantage, but when from 3 inches to 12 inches of the depth of the water in the boiler are daily blown out; then fresh water has the advantage. He cites a case of comparison of a boiler and a feed water heater where the loss in the heater was 93 grains, and in the boiler only 16½ grains, the air (gas) having been trapped in the heater. Without attempting to explain the corrosion that occurred on board the Baker, the writer desires to call attention to the practice that there prevailed, according to a letter recently received from her gentlemanly and obliging master, Captain Charles L. Nelson, in answer to inquiries. The substance of his answers are that the boat is fitted with a surface condenser, from which the water is returned to the boiler, entering the back head on each side a little below the center; that the habit was to blow twenty-four inches in twenty-four hours, and that when lying at anchor water was fed from the sea and passed through a heater entering the boiler at 80° to 100° Fah.

The *Norfolk Virginian* of current date printed the following: The investigation into the causes of the accident to the boiler of the wrecking steamer B. & J. Baker, off Cape Henry, on Sunday morning last, by which three colored men were killed and one white and one colored man were scalded, was concluded yesterday in Berkley, the coroner's jury consisting of George T. Hodges, J. R. Humphries, R. D. Cornick, G. W. Stell, Nathan Jones, and J. N. Etheredge, who rendered the

VERDICT

that the victims came to their deaths by an explosion of a flue of the boiler of the steamer B. & J. Baker, caused by an over pressure of steam resulting from gross neglect of the engineer, and, from the evidence elicited, we the jury fully exonerate the remaining officers and owners of said steamer.

A Model Manufacturing City.

Great manufacturing establishments are generally the result of growth from small beginnings. A shop is located in some cheap and undesirable region, the workmen find homes as best they may anywhere around, or sometimes hasty structures are erected for their occupancy, and the enterprise commences operations. There is no pretense of elegance, or taste, or comfort, either in the establishment or its surroundings. Noise, dirt, and discomfort characterize it from the start, and as the establishment grows, and the number of its employés increases, the same characteristics extend to the whole surrounding region. The streets are filled with cheap unattractive cottages or vast unwholesome tenement houses. The gutters overflow with filth, in which unwholesome children endeavor to find amusement. No spot of green grass, no bough of green tree is seen, a pall of smoke hangs over the settlement, and grime and squalor, and often disease, accompany the development of the great industrial establishments where labor finds employment and support. While it is true that there are many manufactories where the result of prosperity has been shown to some degree in the construction of excellent buildings and the adornment of the surroundings, still the vast number of our industrial works are anything but inviting to the eye, or indicative of care on the part of their proprietors for the happiness and the health of their workmen. Indeed, when a place has been started, as most manufactures are, without regard to appearances or comfort, and its growth has taken the same form, it is almost impossible ever to regenerate it.

To build up a modern manufacturing village, the work must be begun at the bottom. While there are examples in this and other countries where this has been done, there is nothing anywhere to compare, either in perfection and breadth of plan or rapidity of execution, with the new town of Pullman, which, within a few months, has sprung up on the shore of the little lake Calumet, a few miles south of Chicago. While the car works which are being established here are remarkable for their size and perfectness, it is not the manufacturing aspect of the matter of which we wish here to speak. It is in its relation to such a village or city as is here being built up by a single organization, to the army of men whom it will employ, to their families, and to society, of which they form a part, that this enterprise shows its grandest phase. Here we are to have an illustration of what a man with unlimited means, and actuated by a broad philanthropic sentiment, which at the same time is backed by an eye to business prudence, can accomplish.

The town of Pullman is not a public charity. Its workmen are not to be supported as paupers or amused as children. They are to be treated as men who can appreciate what it is for themselves and their families to be surrounded with the comforts and luxuries of modern civilization, and who are glad and willing to pay something for it, and who will show their appreciation by rendering better service to their employers, and becoming useful and self-respecting citizens.

June, 1880, the site of this model town was a broad stretch of prairie over which the high grass waved undisturbed by wheel or foot. Here Mr. George M. Pullman, President of Pullman's Palace Car Company, decided to undertake the grand work of founding a model manufacturing town, which had been for years his dream.

The work once commenced was pushed with extraordinary energy. All through the bitterly cold winter the walls were arising, when the workmen were obliged to have fires burning upon them to keep themselves from freezing, when the stone and brick had to be picked out from the drifts of snow and the packing of ice in which they were buried, and when the workmen, to the number of a thousand or more, had to be carried to and from the city a dozen miles every day. But in spite of the elements the work went on, and to-day there stands a group of vast and imposing buildings, forming a manufacturing town for workmen such as is not seen anywhere else. The houses are handsome, even elegant, brick structures with stone trimmings and slate roofs, and from one to two and three stories in height, supplied with perfect sewerage, running water, gas, baths, marble fireplaces, and many other forms of modern improvement in dwellings, equally as complete as those which a millionaire can obtain. A beautiful park adorned with trees, choice shrubs, and winding walks fronts the new city. A little lake whose bed was formed by excavating the earth for filling other portions, shines like a gem in front of the great manufactory. The railway station where the visitor gets his first impression of the place is not a dingy weather-beaten shanty, but a gothic structure of brick, itself a model of taste and elegance. There are rapidly arising a hotel 100 feet square; a market house of equal size, where various articles of food can be cheaply obtained; an arcade building, which will contain a public library, art gallery, association rooms, and some fifty stores and business offices. Plans are being devised by one of the leading educators of the country for school accommodations, and churches will quickly appear.

On the whole vast tract of some 3,500 acres owned by Pullman's Palace Car Company and the Pullman Land Association, where this great scheme of a model manufacturing city is to be worked out, not a single liquor saloon will be tolerated to corrupt the morals and deplete the pockets of the inhabitants. The character of the enterprise itself removes the excuse which is often urged for the existence of saloons—that they afford the poor man his only place of amusement and his only solace. When the day's work is over the workman will not be tempted to seek refuge in the saloon from filth and disease and discomfort at home. His home itself, the beautiful surroundings of park and lakes and shady groves, the library, the reading room, the indications all about of peace, order, cleanliness, and health, will tend to make repugnant to him the thought of the squalid saloon and its imbruted frequenters. All his surroundings will impel him to take high views of life in its possibilities and move him to set a worthy example to his children.

Before the first year shall have elapsed, not far from two millions of dollars will have been poured out in the development here of this remarkable and philanthropic scheme. At the same time it is not a Utopian enterprise. While the workingman can obtain a charming home for from $9 to $16 a month, with all the conveniences and luxuries of modern house architecture, the rental will pay a handsome interest on the cost of the building and also on the value of the land at a figure vastly enhanced over the original cost, so that in helping the thousands of workingmen and their families who will form the nucleus of this new city the projectors will at the same time receive a fair return for their financial risk and expenditure.

The result of this remarkable enterprise will be watched with great interest as inaugurating a new era in the foundation and development of manufacturing industries, in which the condition of the workingman will play a far more important part than it generally has hitherto. It will show that it is not only a kind and benevolent thing for employers to make the workingman comfortable and contented, but a profitable thing, because it makes him a better workman and removes from him the feeling of discontent and desire for change which too often characterizes our working population. The town of Pullman is an exemplification of practical philanthropy based upon business sagacity. May its leading characteristics and the motive which prompted its public spirited projector prove examples which shall have many emulators!—*Railway Age.*

A Durable Whitewash.

To the Editor of the Scientific American:

In regard to the query of C. B. C., in your last number, in relation to whitewashing, I believe I have tried every known wash. The so-called White House stucco wash is no better than any ordinary whitewash. No brick wall that ever is intended to be painted should be whitewashed. All washes absorb water, and in damp weather lose their color.

The best wash that I have ever heard of is made as follows: For one barrel of color wash—Half a bushel white lime, 3 pecks hydraulic cement, 10 pounds umber, 10 pounds ocher, 1 pound Venetian red, quarter pound lampblack.

Slake the lime; cut the lampblack with vinegar; mix well together; add the cement, and fill the barrel with water. Let it stand twelve hours before using, and stir frequently while putting it on.

This is not white, but of a light stone color, without the unpleasant glare of white. The color may be changed by adding more or less of the colors named, or other colors. This wash covers well, needing only one coat, and is superior to anything known, excepting oil paint.

I have known a rough board barn washed with this to look well for five years, and even longer, without renewing.

The cement hardens, but on a rough surface will not scale.

T. G.

Cincinnati, Ohio, July, 1881.

THE trust fund created by Professor Tyndall upon his departure from this country has accumulated sufficiently for the purpose to which he devoted it: The assistance of needy American students in physics who should show aptitude for original study and should wish to complete their education in Germany. The fund will now furnish a moderate income to two students.