seen others completely narcotized by doses of morphine, that would only have quieted a cough in most; and so on to the end of the chapter.

We are well aware that book doctoring is held at its proper valuation by the leaders in the medical profession, and that to such, the really skillful, even the slightest peculiarity of temperament is not deemed unworthy of attention; but there are too many, far too many, who put all patients on the same plane, and confine themselves rigidly to one routine of treatment.

No less are idiosyncracies of mind and disposition to be regarded in imparting instruction to the young, or in our every-day dealings with our fellow men. Most mental peculiarities are easily discovered by the practiced student of human nature, and it as much our duty in our attempts to instruct and reform others, to avoid nauseating them mentally as it is that of the physician to avoid over-dosing those he is attempting to heal.

STEAM BOILER INSPECTION AND INSURANCE.

At a meeting of the Directors of the Hartford Steam Boiler Inspection and Insurance Company, held at their office in Hartford, March 31st, the following report of business done in the month of February, was read by the President: "Visits of inspections made, 180; number of boilers examined, 332; external examinations, 261; internal examinations, 84—while, in addition, 18 were tested by hydraulic pressure; number of defects in all discovered, 226; number of dangerous defects, 26; furnaces out of shape, 13; fractures, in all, 21—3 dangerous; burned plates, 20—2 dangerous; blistered plates, 53—2 dangerous; cases of incrustation and scale, 45; cases of external corrosion, 23—3 dangerous; internal corrosion, 3—1 dangerous; internal grooving, 6; water gages out of order, 6; blow-out apparatus out of order, 2—1 dangerous; safety valves overloaded, 22—3 dangerous; pressure gages out of order, 14—8 dangerous; boilers without gages, 1; cases of deficiency of water, 3. In the month's work four boilers have been found in such condition as to be positively dangerous, and beyond repair. These four have been condemned, and are being replaced by new boilers. In one of the cases of internal corrosion, noted above, an internal examination revealed to the inspector plates so badly weakened that upon sounding them with a hammer a hole was broken entirely through. This shows the importance of careful internal examinations. Many cases similar to the above have been found in localities where laws requiring annual inspections to be made are in full force. State and municipal inspection laws require only the hydraulic test to be applied; hence incrustation, scale and internal corrosion are defects which such inspections take no cognizance of.

"We must again revert to the subject of *overloaded safety valves*. Twenty-two have been found; while three were entirely inoperative—from excessive loading and neglect. One spindle was very crooked, and extra weighting was resorted to. In another the valve was corroded fast in its seat, and was raised with great difficulty. In another the fulcrum joint was corroded fast, and in raising the lever the connection was entirely broken out.

"Now, although a manufacturer may think he has a very careful engineer, and that inspection is hardly necessary, he must admit that a man whose business it is to thoroughly examine boilers, internally and externally, will discover defects which another would pass over. While many and serious defects have been discovered by the company's inspectors, no risk has been assumed except where the boilers have been put in good repair. Among the 2,500 boilers under the care of this company, slight damage has occurred to one in the city of Providence, during the month. Our inspector from this office visited the establishment at once, and made careful examination of the ruptured sheet; repairs were immediately made, this company assuming the expense."

DEATH OF JAMES HARPER.

The recent sudden death of James Harper, senior member of the celebrated publishing house of Harper & Brothers, of this city, has taken away from us one of our most honored and respected citizens. His death resulted from injuries received by being thrown from a carriage while taking a drive. His funeral, which took place upon the 30th of March, was largely attended by the most prominent citizens of New York, and was further honored by the closing of the different houses in the book trade throughout the city. He was, in many respects, a remarkable man, and his life was one long example of the beauty of all social and Christian virtues, combined with business and literary judgment, to a highly exceptional degree.

Applications of Steel Castings.

A few days ago we saw a number of specimens of steel castings imported by Philip S. Justice, of this city, which showed a degree of tenacity and ductility seldom found in steel forgings. The castings were of varying thickness, form, and weight, and had been subjected to forging, bending, percussion when cold, hardening, tempering, etc., all the tests that would be used to determine the toughness of the best wrought iron, and some that would be inadmissible with steel forgings. The result was wonderful. Cored castings were brought together under the hammer, and drawn out without showing any evidences of unsoundness. The castings showed no blow holes or evidences of want of homogeneousness, but were in all respects as sound as any forgings. They finished under the file or on the lathe elegantly. It is claimed they can be made as thin as one-sixteenth of an inch with facility. Their solidity may be conceived from the fact that hydraulic cylinders, unlined, of fourteen inches inside diameter, two feet ten inches long, and only two and a half inches thick, stand a test to which one of cast iron eight inches thick, would succumb.

These castings have been used in England for some time, but have only lately been introduced into this country. The applications of this method of working steel are numberless, or at least equal in number and similar in character to those of cast iron, and calculated to supersede wrought iron and steel forgings to a very great extent.

BEET ROOT SUGAR.

No. IV.

Technology.—Part I.

As a complete account of the various modern processes for manufacturing beet root sugar would fill several reasonably sized volumes, it will be impossible for us to exhibit them in all their multitudinous details in the pages of the Scientific American, where they would stand in the way of the publication of a large amount of useful and interesting reading matter of a more varied nature.

For this reason we shall have to confine ourselves to the illustration of the most recent and perfect methods of manufacture only, which we shall strive to do, as concisely as possible, without omitting any item of importance.

We will add, the specifications and detailed estimates for the establishment of a sugar factory, calculated to work an average of 150,000 lbs. of beet root per twenty-four hours, during a campaign of from four to five winter months, and corresponding in the United States to the average product of the cultivation of 500 acres in beets. This important subject has never, to our knowledge, been fully elucidated in any printed work on the making of sugar, and may be found of value to parties intending to start this branch of industry in America.

PRODUCTION OF STEAM.

Beet root sugar works consume a large amount of steam for driving engines which propel root-washers, hydraulic pumps and presses, pulpers, water pumps, centrifugals, etc. Steam also conveys the juice and sirups from one place in the building to another, and is the agent used for evaporating and boiling them.

The quantity of heating surface needed is generally estimated at about 250 square feet for every 10,000 lbs. of roots worked during 24 hours, or the H. P. is supposed to correspond to 50·8 lbs. of water evaporated per hour, or 6 lbs. of water for every square foot of heating surface of the boilers.

Practically, we have found that a well-managed modern sugar factory employing vacuum pans, both for the concentration of the juice and for its final boiling down, and capable of working 150,000 lbs. of beets every 24 hours, necessitates 120-H. P. boilers, and 17·216 feet of heating surface to the H. P.

The pressure of steam through the whole works ought never to exceed three atmospheres, or 45 lbs. to the square inch.

From the above, we derive the information that the steam department of a 500-acre beet root sugar factory and its cost in gold, will be as follows:

1. Three steam boilers of 40-H. P. each, with two internal pipes and one flue, calculated at 17·2 feet of heating surface per H. P., with fire boxes, grates, safety valves, gages, anchors, steam valves, H-pipes, etc., complete. Cost, $3,700.

2. Two steam drums, superposed over the boilers, with fittings complete, serving as reservoirs for the return steam from all parts of the works. Cost, $260.

3. One small 4-H. P. donkey engine, driving two feed pumps, each of which is capable of supplying a 120-H. P. boiler. Cost, $520.

The total valuation of the appliances for the production of steam in a 500-acre factory, is thus seen to reach $4,480.

WASHING AND PULPING OF THE BEETS AND EXTRACTION OF THE JUICE.

As soon as the works are in perfect readiness for a start, which will generally take place during the latter end of the month of September or during the month of October, the steam is "got up" in the boilers to 40 or 45 lbs. pressure, and the beets to be worked are at once, and regularly, carted in.

Each empty wagon or cart employed for the conveyance of the beets from the trenches to the factory is carefully weighed, and its number and weight noted. Every time this wagon reaches the factory with its load of beets, it is re-weighed, and the weight of the wagon being deducted from the total, furnishes at once the amount of beets carried in for consumption. The wagons and their loads are weighed on large platform scales placed on the roadside near the works. In this manner, during the whole campaign, an exact account is kept of every load of beet entering the works, and of every pound of beet consumed.

The quantity and percentage of sugar made is thus controlled, and in case of some fault in the processes of manufacture, it is at once made manifest. Much valuable information is also furnished by these data as regards the relative value of different fields or portions of land, and the amount of beets grown on them; information which may be made available during following seasons.

The beets as they are brought in are placed in piles alongside of the beet root washer. This is a long, cylindrical, slightly inclined revolving drum, constructed of parallel rods of iron, so distanced as to allow the water and small rootlets to pass between them without permitting the passage of large fragments or of small-sized beets.

This drum revolves in an iron tank, furnished below with a manhole door, which allows it to be occasionally cleaned out; this refuse being carted off as manure.

The proper speed for a root washer is from ten to twenty revolutions per minute.

The more water employed in washing the beets the better, but the supply of both roots and water must be as regular as possible.

Care must be taken that at the lower outlet of the root washer, where the beets fall on an incline plane, interstices be left wide enough for the superfluous water to escape before it reaches the pulper, where its presence would cause irremediable damage.

On leaving the root washer, or rather the incline below it, the beets are pitched into the jaws of the pulper, where they are seized between revolving cylinders, armed with spikes or or knife blades, which rapidly reduce them to a fragmentary form. These fragments pass into the pulper proper, which consists of a double revolving drum, driven by belting. It is constructed by *tightly* fitting into two circular iron end plates, alternate series of small saw blades with projecting straight teeth, and carefully-made wooden rulers 0·39 of an inch broad and 0·78 of an inch high. The saw blades are toothed on both edges, so that by reversing them, one side can be employed after the other has been worn off. The teeth are from 0·156 to 0·195 of an inch in length, and measure 0·078 of an inch from tip to tip in the same row. The thickness of the saws is about $\frac{2}{50}$ of an inch.

The steel of which these saws are made is tempered in such a manner as to cause them to be stiff and hard without being easily broken.

Immediately in front of the revolving drum, whose speed must be from 600 to 700 revolutions per minute, is placed a stout, finely-attached blade of steel facing the points of the saw teeth, and adjusted so nicely as to leave no holes or intervals through which any fragments of beet root would find their way.

This precaution alone prevents solid particles of beet from getting into the woolen sacks during the subsequent pressing, an accident which would be sure to be followed by the bursting of the sacks and wasting of pulp over the spots where the lumps are to be found.

A newly-set pulping drum always produces a rough pulp, in which a portion of the vegetable cells remain untouched; a consequence of this fact is that a larger quantity of juice is actually extracted from pulp made by a pulper which has had some usage, and whose teeth have become worn, than from a new one.

The pulp to be of good quality must be thin, and present no rough or angular "grain" when pressed between the fingers. A limit, however, exists to the advantageous divisibility of the beet root, which is reached when the teeth of the pulper are nearly worn away, and the pulp becomes "pasty," and will ooze through the meshes of the wool sacks when pressed, a circumstance attended with very serious consequences.

A small stream of water, regulated by a cock, is allowed to run constantly on the top of the drum, and to mix with the pulp, where it effects a partial maceration. The influx of this water is to be so regulated that the juice which is expressed will indicate 4·5 to 4·8 degrees of Baumé's densimeter.

The pulp is received in front of the pulper in a small reservoir.

At this point the further processes of manufacture may vary according to the system of extraction of juice adopted. Four of these are now practiced in Europe; they are as follows:

1. The use of powerful hydraulic presses.
2. The employment of centrifugal machines.
3. The method of maceration.
4. The diffusion process.

Without entering here into a discussion of the relative merits of these various processes, which, when well conducted, have in all cases produced the same amount of sugar from the same amount of beets, we shall simply state that the second materially increases expenses for the fuel used during evaporation, on account of the large quantity of water which has to be added to the juice, and that the two last processes need an amount of care and skill on the part of the laborers, which is difficult of attainment.

The system of extracting the juice from the pulp by means of hydraulic presses, worked by pumps driven by steam power, is simple, easily managed, and efficient. In order to effect this, the pulp is first put into bags made from the wool which grows on the bellies of sheep. These bags are 33 inches deep by 22 inches broad, and the quantity of pulp put into them is a shovelful, or a quantity which, when slightly flattened, will not exceed the thickness of a finger.

The sacks are piled up one over the other, separated by sheet-iron trays, and are first submitted to a preliminary pressure in a rapidly-working press, which extracts a large quantity of the juice contained in the pulp. They are then transferred to the hydraulic presses, where the remainder of the juice is squeezed out.

When working in the proper manner, the table of beet root sugar presses must ascend in from five to six minutes, and stop for several minutes before beginning to descend. Too rapid rising of a press destroys the sacks. If the pulp has been sufficiently pressed it will look and feel dry, and will not weigh more than 18 per cent of the weight of the beet root which produced it.

The expressed juice, both from the first press and from the hydraulic presses, is run through pipes connected with funnels or "chapels" into an iron reservoir united by means of a valve or cock, with an upright boiler, called a "*montejus*" which we shall describe in our next article.

Specifications and valuations in gold for the washing,

pulping, and pressing department of a 500-acre beet root sugar manufactury are as follows:

1. One horizontal 20-H. P. steam engine for driving the root washer, pulping drum, the hydraulic presses, and two pumps capable of delivering 37,000 gallons per hour. Cost, $1,700.

2. The beet root washer, 12 feet long, with iron drum and cistern. Cost, $350.

3. One pulping machine, with double drum, and capable of working 150,000 lbs. of beets in twenty-four hours. Cost, $660.

4. One spare double drum for the above. Cost, $130.

5. Spare saws for same. Cost, $40.

6. One sack filler, or "*palctteur*." Cost, $74.

7. One Lecointe press. Cost, $320.

8. Six hydraulic presses, with eight guides to each, two movable counterweights, twelve-inch pistons, and 40 inches stroke. Cost, $4,000.

9. One iron frame, with two hydraulic pumps, these alternate, with differential pistons, eccentric transmission of motion, and patent compensator, fitted to work the eight hydraulic presses. Cost, $1,200.

10. Six "returns," stops, and wrought-iron pipes for the hydraulic presses. Cost, $200.

11. Two sheet-iron gutters, and three large funnels or "chapels" for collecting all of the expressed juice. Cost, $150.

12. One "*monte-jus*" of a capacity of seventy-five cubic feet, with all its accessories, and a connecting reservoir of same capacity. Cost, $210.

13. Pulleys, belts, etc., for transmissions of motions to root washer, pulper, hydraulic pumps, etc. Cost, $520.

Total cost of washing, pulping, and pressing department of a factory which will work 150,000 lbs. of beet per twenty-four hours, will be $7,274.

VELOCIPEDE NOTES.

The velocipede has got into the highest court in England. A lower court has decided that it is unlawful for toll-gate authorities to charge toll for a velocipede; but the company against whom this decision was rendered, mean to carry the case up to the chief tribunal. The charge of toll was made under the clause empowering to charge for "a foot passenger driving a wheelbarrow."

It has also got into the magazines, into the theatres, and into the hearts of the sport-loving community so deep that it will take it a long time to get out. It has a language of its own, and a literature of its own, which is not confined to prose, but includes also rhyme if not poetry. Grave periodicals write dissertations upon it, humorous ones caricature it, the daily press tells very extraordinary yarns about it. For our part we simply endeavor to keep our readers posted upon its progress.

In Boston the municipal authorities have recently granted fourteen licenses for velocipede rinks.

Two new styles of velocipede, which conflict with no existing pattern, are reported from Worcester, Mass. One of these is to run entirely by friction and the other with common foot paddles.

Mr. Calvin Witty has just received the original velocipede —the one built by Pierre Lallement before he had received his patent. It is a good velocipede in every way and has a much better saddle than is manufactured to-day. Lallement was a machinist, and this velocipede proves that he was a good workman. From appearances Lallement has ridden it a good deal. As a curiosity it is very valuable to Mr. Witty.

A new style of velocipede was exhibited at Witty's school on Tuesday night. It is a wire velocipede, the wheels being formed of wire entirely. Small thin wire takes the place of spokes, and it is made strong on the same principle that makes a suspension bridge strong—each wire strengthening the others. It is exceedingly light, and there is a slight vibratory motion which is very pleasant; doubtless it would do exceedingly well on the street. When it was run last night upon the new spring floor which Mr. Witty has laid down, the spring was very great. It attracted much attention on the night spoken of.

The unreasonableness of prohibiting velocipedes from the public highways is thus satirically spoken of by the *New York Herald*:

"Man's own feet or crutches and a wheeled vehicle with a horse in front—these, it seems, must be the Alpha and Omega of locomotion in the city streets. A wheeled vehicle without a horse is a thing so preposterous to the eyes of aldermen that it must be forbidden altogether. Such is the experience of several cities, and our city promises to follow suit. Now, though the horse is favored by popular prejudice, a man may move his wagon with a mule, or a jackass, or a goat, or a dog; but he is not permitted to move it without one of these in front, or he will be fined twenty-five dollars. We recommend the sports to tie their tan terriers in front of the machine with a piece of pink ribbon, and go it on the same dodge adopted for the dummies, where an old blind horse trots in front of the locomotive within city limits. Although the aldermanic abdomen is a guarantee against any experiment of the Fathers on the velocipede, cannot some juvenile of aldermanic lineage convince the old fellows how ridiculous they are in endeavoring to prohibit what only needs regulation?"

WHEN the machine, or its parts, is beyond the operator's powers, the machine has usurped the place of its governor or manager. Every person running a machine should understand it, sufficiently at least to retain his natural superiority. If not, the machine is his master, which is reversing the order of nature.

ARE UTENSILS OF COPPER INJURIOUS FOR CULINARY PURPOSES?

Translated from the German "Aus der Nature."

Utensils of copper are held in high esteem by most ladies, because they form when well scoured, a kind of ornament to the kitchen. They do not however, take into consideration that food may be poisoned when cooked therein. It has been stated, though scarcely to be believed, that articles of food containing acids may be prepared in copper vessels without any injurious effect, if they be not allowed to remain in such vessels any length of time. This opinion has even been sustained by men of science, who maintain that the action of the acid upon the metal is prevented, because the vapors which are constantly generated in cooking prevent oxidation taking place. Recent investigations, however, have proved beyond doubt that this supposition is incorrect. Pleischl, in Vienna, showed that cabbage, fresh and dried plums, etc., absorb a quantity of copper sufficient to cause injurious effects within one hour's boiling in pans made of this metal. Meat also, because of the acids, it contains, is acted upon by copper. This is also the case with water when it contains chloride of sodium or salt, which is rarely ever lacking in spring water. Copper is also readily dissolved by oil. In placing a drop of oil upon polished copper, it will be seen that the oil soon assumes a dark bluish green color, which change is due to the fact that the oxide of copper formed, has combined with the fatty acids contained in the oil. The power of solubility is, of course, considerably increased when the oil or lard has previously been subjected to the action of heat.

Quite recently Dr. Wald asserted in a German periodical that copper is not poisonous and the objection to utensils of copper therefore unfounded. He asserts that no case of poisoning by salts of copper is recorded! The doctor certainly must be unacquainted with Orfila's toxicology or similar works.

Copper, as long as it remains metallic, is indeed not always injurious to the system. Instances are known where individuals have swallowed copper coins and discharged them again without the least injury, and Drouard has administered nearly one ounce of finely pulverized metallic copper to a dozen dogs, without observing any case of poisoning. Still, Orfila himself relates that an individual in swallowing copper powder was seriously affected.

It is also well known that braziers and electrotypers are often subject to a peculiar disease called copper colic. Its symptoms are fever with violent pains in the bowels. The sickness itself consists in inflammation of the stomach and the intestines, and is produced by the introduction of finely divided copper into the system. The late Professor Runge also mentions that a dealer of the oxide of copper, in Berlin, was unable to obtain laborers for collecting and packing it, because of the illness it occasioned among them.

Orfila relates several cases of poisoning which were produced by salts of copper. Five children, of from three to eleven years of age, were taken ill after eating bonbons which had been colored green by the vessel in which they were prepared. Drouard suffered three days from colic and diarrhea after having eaten a "ragout" prepared from the wine of a cask of which the cock was found to be oxidized.

Orfila says that a dog died in less than three hours from the effects of a dose of verdigris not exceeding fifteen grains. A small one died in sixty-five minutes from a dose of sulphate of copper of forty grains. Death, also, took place invariably when the sulphate of copper was applied upon wounds.

Renne in his treatise on judicial chemistry also relates a number of cases of poisoning by copper.

We admit that cooking utensils of copper very rarely cause sudden death; but are they, nevertheless, to be called harmless?

If the copper taken up by food acts but slowly, it does not act with less certainty, no matter whether this may at the time be positively proved or not. That utensils of copper may be dangerous in certain cases seems to be known to cooks, for we have never found any who used copper pans for frying omelets.

The distinguished French chemist Chevallier who treats upon this question in a memoir recently presented to the French Academy of Sciences has been led to somewhat different conclusions from those of Dr. Wald. After having quoted numerous instances of poisoning caused by food prepared in copper pans, concludes as follows: "All the facts which have come to my knowledge, prove positively that the use of utensils of copper for culinary purposes is dangerous, and that it is unwise to say that copper and its salts are not injurious, or that cooking utensils of this metal are harmless." Chevallier suggests that copper ware employed in the kitchen should always be coated with tin. In Paris, and the department *de la Seine*, this is already the case, but he demands that the respective decree be made a law in all the departments, or that the mayors of the cities direct attention to the great importance of tinned copper. We find that in Sweden, though copper is one of the principal products of that country, the use of copper vessels is prohibited for the preparation as well as for the preservation of food. In 1774, the *chef de police*, in Paris, forbade the dealers of milk to carry the same in vessels of this metal, and even before that date a large establishment was founded in that city for the making of iron utensils for culinary purposes. At first, however, they met with little success, but gradually they came more into use. In 1790 copper vessels were made, the inner surface of which were silverplated. It was also, recently proposed to silverplate iron.

The silverplating of copper, aside from the expense, cannot be recommended. The silver, because of its soft nature, is easily detached, leaving the copper surface exposed, and wherever this is the case the copper is more readily attacked than otherwise. The reason for this is found in the electro-chemical action which occurs. Cast iron vessels with enameled surfaces inside are better for culinary purposes. The enamel, however, should be free from lead.

The presence of copper in liquid food is readily detected by holding in it a knife blade for about ten minutes. If copper is present, it is thrown down upon the iron and can easily be recognized by its red color.

We find it stated in various cook-books that in order to restore the green color of pickled cucumbers, a copper coin should be dissolved in the vinegar. The evil effect of such a process must be apparent to all.

Chrome Green.

Oxides of chrome are prepared either in the dry or wet way; obtained thus, they vary from greenish grey to a more or less deep greenish yellow. They generally have neither brilliancy nor freshness. It is possible, however, to produce green oxides of chrome which are not devoid of beauty. One of the most intelligent chemists of the commercial world, M. Casthelaz, has, conjointly with M. Leune, prepared a chrome green, which is justly styled imperial green. This coloring matter of a superior brilliancy is obtained exclusively by the wet way. The process consists in slowly precipitating chrome salts by treating them with hydrated metallic oxides, insoluble, or but slightly soluble, in water, or by hydrated metallic carbonates, or hydrated metallic sulphides, or, again, by other salts of weak acids, which easily leave their bases; the action is only produced progressively, and the oxide of chromium is precipitated in the hydrated form; the color of the compound is magnificent, of a deep emeral green. For this preparation, it is convenient to adopt economical reagents, such as gelatinous alumina, oxide of zinc, carbonate of zinc, sulphide of zinc, etc., whose price is reasonable. The same result may be obtained by treating a chrome salt with the non-alkaline metals, which have a sufficient affinity to unite with acid of the chrome salt and precipitate the oxide. Iron and zinc will be more particularly used, as they are cheaper. It is necessary to select from among the metals, with their oxides and salts, those which, with the acid of the chrome salt, give soluble salts, as they should be removed by washing. If recourse is had to reagents forming, with the acid of the chrome salt, insoluble salts, it is only in order to modify the color and composition of the chrome precipitates and of the green color thus formed. As to the magnificent imperial green color obtained by M. Casthelaz, it possesses properties which will enable manufacturers ultimately to renounce the justly condemned and dangerous copper and arsenic greens. The use of the imperial green removes all danger from insalubrity; it is an impalpable substance, of perfect tenuity. It is believed that this property will cause the new green to be adopted for printing on stuffs, and for other purposes. The oxides of chrome known up to the present time, and generally obtained in the dry way, cannot, by pulverization, attain to the degree of fineness of the imperial green. It is expected that this substance will have great success in oil painting, colored papers, colors, and artificial flowers, printing, lithography, perfumery, and soap manufacture, as well as in the making of glass and in the ceramic arts.—*Moniteur Scientifique.*

NEW PUBLICATIONS.

APPLETON'S JOURNAL OF LITERATURE, SCIENCE, AND ART.

The first number of this new candidate for popular favor has made its appearance, and its mechanical execution is well calculated to invite the reader to "a feast of fat things," but we confess to a disappointment in the literary branch. Victor Hugo's new novel opens in a somewhat disjointed style, but the fame of the man assures us that the tale will progress with an increased power and interest; the opening chapters being the rougher work, which always precedes the more symmetrical structure. The general contents lack somewhat of that spicy flavor which necessarily must enter into all journals of a popular character; but the editorial department may improve with a little more experience.

THE ARCHITECTURAL REVIEW. Edited by Samuel Sloan, Architect. Published by Claxton, Remsen & Haffelfinger, Philadelphia.

The number for April contains a good article upon "Architecture in America, "The Cathedrals of England," beside several practical articles and illustrations of value to all who take an interest in the development of architectural taste in our country.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

A. J. S., of La.—Your inquiries relative to caloric engines will be found answered in our description of the Roper improved hot air engine, to be illustrated in our next issue, No. 17 current volume.

W. H., of Pa., is running a quarter-turn belt, 60 feet long and 16 inches wide, from a 48-inch pulley at the bottom to a 52-inch pulley above. It does not run well and binders are necessary. A 12 inch belt of the same length ran well for a time but subsequently required binders. He asks if there are any cases known where quarter-twist belts of these lengths and widths have run well without binders. We know of no such cases. In our practice we never attempted to run a belt of either 16 or even 12 inches wide on a quarter turn, and if compelled to do so would have insisted on a greater distance between shafts than that in this case—less than 15 feet. Where the limit is between widths of belts and distances between points for the quarter turn we are unable to determine. The millwright usually relies much upon his own judgment.

H. B., Jr., of Canada.—If an invention has been patented abroad, that will not prevent the original inventor from patenting it here—unless the invention has not gone into public use before the date of his application in this country; but the term of his grant here, in such case, would be limited to the expiring of the term for which letters patent were first issued to him abroad for such invention. If a patent exists in a foreign country, that fact would debar the granting of a patent here to another inventor, unless he could show that he made his invention before the date of the foreign patent.