PARSONS' HOROLOGICAL INSTITUTE.

It is comparatively a short time since the manufacture of watches began to be carried on extensively in the United States, although the "Yankee" clock has been well known the world over for many years. While timepieces of foreign make were mainly sold and used, the watch repairer needed peculiar fitness for his work, which could be acquired only by long apprenticeship and familiarity with the various types of timepieces. When American watches became popular, watch making as a trade began to decline. Materials of every description became plentiful, easily obtained and readily used, and any difficult job was naturally turned over to the manufacturer. Still these conditions, as regards American watches, afforded no reason why watchmakers should degenerate. On the contrary, every improvement and modification of timepieces and every additional form of movement calls for higher skill in handling these delicate machines.

MRS. LYDIA BRADLEY.

Recognizing these facts, Mr. J. R. Parsons, of La Porte, Ind., started the La Porte school for watchmakers, the development of which was so rapid as to render it difficult for the founder to keep pace with the requirements. After the success of the school had been assured, several offers of considerable sums of money were made to remove the school to other places. At this time Mrs. Lydia Bradley, of Peoria, Ill., offered to provide a fine building, with all the tools and appliances necessary, for the use of any number of deserving young men and women who wished to learn a trade; and through her agents, Mr. W. W. Hammond and Mr. F. F. Ide, arrangements were made for the purchase of a large watch factory building in Peoria, Ill., with all its tools and machinery. The school was removed to these new quarters and started afresh, with the building and apparatus paid for and plenty of money to insure the success of the enterprise. The school was not only fortunate in being placed in such ample quarters, with sound financial backing, but also in securing the services of Mr. F. F. Ide, whose mechanical knowledge and skill have proved a valuable acquisition.

The object of the institute is not to make money, but to turn out competent watchmakers and jewelers. The tuition is only sufficient to make the institute self-supporting. We understand the attendance is very large, nearly equal to that of all the other schools of the kind combined. The institute gives the student a thorough education in horology, including instructions in making watches, chronometers, clocks and horological machinery in general and repairing the same. It gives a course in optics, and in this department graduates receive a separate diploma. Ladies are admitted to the institute on the same terms as gentlemen, and the list of students includes the names of a number of ladies who are taking the course, as well as some who have already graduated.

To acquire a thorough knowledge of watch making requires a certain amount of time, which cannot be shortened without detriment to the student. Long experience has shown that the length of the course in Parsons' Horological Institute is sufficient for imparting a thorough practical knowledge of the subject, and it has also shown that a shorter term is not advisable.

One of our engravings gives a clear idea of the buildings of the institute, while another shows a room devoted to practical watch making.

PRACTICAL WATCH MAKING.

MAKING wrought iron pipe direct from bars is the process recently started in a rolling-mill at Stubenville, O. If it works it means a complete change in pipe manufacture.

Electric Root Grubber.

Grubbing is the term for pulling up tree stumps by the roots, and this operation is now being accomplished at Otford, in Kent, by electricity. The inventor of the electric grubber is Mr. Freeman, whose Invicta Works are very pleasantly situated at Otford, on the River Darenth, the water of which in passing yields the necessary power for driving the generating plant, as well as the many other machines connected with his business. This business is a varied one, as the proprietor says "there are few jobs turned away, and the more out of the way they are, the better we like them, as yielding greater interest and profit." The works are unpretentious, Mr. Freeman having taken them as an old, ruinous, and dilapidated flour mill, simply on account of the water power, which is now being turned to such interesting and profitable use. The lighting machine is a small Gramme of the old type, installed some four or five years since, during which time it has done good service. A second generator is used for experiments in electrical plowing, thrashing, etc. Mr. Freeman is an enthusiast in these matters, and thinks electric agriculture has a great future before it, as it will undoubtedly prove itself to be more efficient and economical than either horse or steam power as at present applied, saving the carting of all coal and water, and where water power can be turned to account being very much less for running expenses.

The third dynamo, giving fifteen to nineteen kilowatts, is used for generating current for supplying the grubbing apparatus at the top of the Polhill, some two miles distant. It requires about twenty-five horse power to drive it at its maximum, although not more than one-third of this is usually required. The current is taken by overhead wires on telegraph poles to the motor on the grubber carriage. At the top of the hill several acres have been already grubbed. The ground is being cleared for the purpose of constructing one of a series of large forts for the protection of London. The motor drives, by means of belting and suitable gearing, a capstan upon which is coiled a few turns of a very strong steel wire rope. A heavy chain is attached to the tree roots, and as the motor is set to work and the rope exerts its force, the roots come up quietly one after the other. The installation is an interesting example of the application of electric power to country work.—*Elec. Eng.*, *London.*

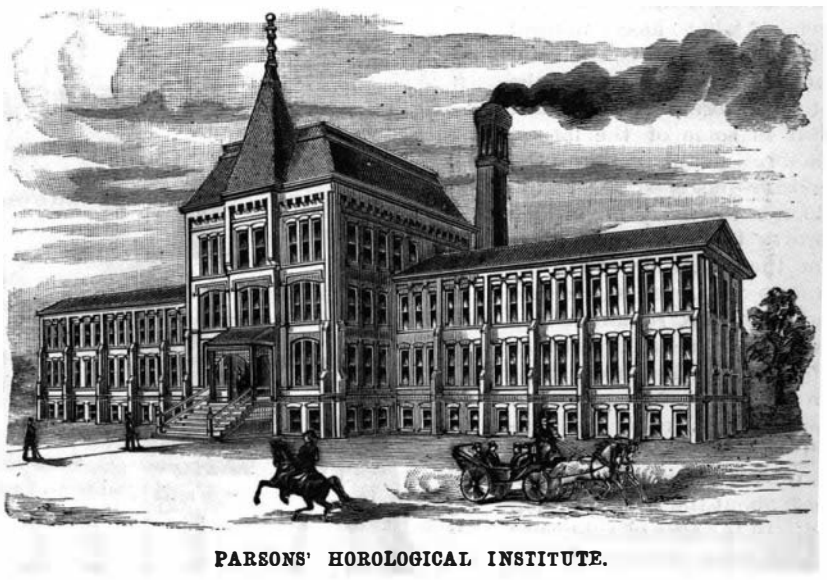
Items from "Science Gossip."

In the last number of the *Journal of the Royal Microscopical Society* there is an elaborate paper by Mr. C. H. Gill, giving the natural history of a parasite on diatoms. Diatoms are prettily shaped, prettily marked, single-celled plants, with a silicious or glassy skin. In this instance the host plant is only the three-hundredth part of an inch in length, but, minute though it be, it has a parasite all to itself, of course infinitely smaller, and Mr. Gill has carefully worked out its life history in his paper, which is illustrated by nine photographs, showing the different stages of the parasite's development.

At the last meeting of the Royal Society, Professor Dewar stated he had succeeded in freezing the atmosphere into a clear, transparent solid, although at present it has not been sufficiently proved whether the mass was a jelly of solid nitrogen containing liquid oxygen or a true ice of liquid air into which both these well known gases have been equally solidified.

Professor Crookshank recently gave a lecture on "Bacteria" (the microscopical funguses we have hitherto regarded as only baleful, but which are actually among mankind's best friends). One great group produces fermentation, so that without them we should have neither wine nor beer. Another division is the cause of organic decomposition, among which must be reckoned the nitrifying bacteria of the soils. If it were not for the latter group every animal that died would be as indestructible as an Egyptian mummy, inasmuch as the art of "mummifying" consisted in keeping away the decomposing bacteria. If it were not for the latter the surface of the earth would be piled with dead bodies, stacked in heaps or choking the rivers; not only that, but in time all the elements capable of building up living bodies would be used up—locked up in these corpses—and life would cease for lack of material to support it. The greatest enemies to this class of bacteria are the undertakers!

Jupiter is thirteen hundred times larger than the earth, so we take a great deal of interest in it, and its



PARSONS' HOROLOGICAL INSTITUTE.

careful study of recent years has thrown a great deal of light upon the history and manufacture of worlds. One of the keenest astronomers, who was taking special charge of this huge globe, is Professor Pickering, the distinguished American scientist. In order to study the planet more definitely he has been residing on the top of Arequipa, in Peru, on account of its clear and cloudless atmosphere. He writes from there to state that the surface of Jupiter seems to consist of a uniform white mass of cloud, over which is stretched a gauzy and thin veil of brown material. The well-known belts of Jupiter, he says, are simply dense masses of this thin brown material, and the white spots merely holes seen through it. The most remarkable thing about Professor Pickering's observations concerns the moons or satellites of the planet. He has arrived at the conclusion that Jupiter's four moons are not solid, like ours, but merely condensed masses of meteorites, like those which compose the belts of Saturn.

New York and Boston now only Five Hours Apart.

For several years past the railway companies have regularly set apart a large share of their earnings in the straightening of their lines, strengthening of bridges, improvement of roadbeds, engines, signals, and other equipments. The good fruits of these efforts are seen in the better accommodations for the public, greater regularity of trains, and increased speed. A recent example is that of the New York, New Haven & Hartford Railway, which has reduced the time between New York and Boston to the extent of an hour or more. The fast express, over the Shore line, now makes the journey in five hours. One may now take breakfast at home in New York, dine and do business in Boston, and return to the metropolis by early bed time.

Pomade for Dandruff.

Salicylic acid	30 grains.
Powdered borax	15 grains.
Peru balsam	24 minims.
Oil of anise	5 minims.
Oil of bergamot	15 minims.
Vaseline	3 ounces.

The Rule of Contrariety in Inventions.

There is apt to be a fine irreverence about the inventor which leads him to suspect that any old way of doing a thing is for that very reason not the best way. Often he observes some time-honored plan of working, audaciously makes up his mind to do the exact opposite, and hits upon success. Guns were loaded at the muzzle for ages, until one day a man of originality thought of loading them at the other end, the preferable end on many accounts besides that of manifest convenience. The same path was trodden by the Frenchman who first put the eye of a needle near its point instead of away from its point. He little knew that he was doing a great deal to make the sewing machine a possibility. One of the notions of the pioneer railway engineers in England was that their rails must be flanged so that the wheels of locomotives and carriages should not get off the track. But some one of skeptical mind inquired: Why not leave the top of the rail flat, or nearly flat, and put the flange on the wheel, an easier thing to do? Accordingly the flange was taken from the rail to the wheel and remains there to this day, to remind the traveler that an Eastern philosopher said long ago: "To him that is well shod it is as if the whole earth were covered with leather."

It is a good many years now since steam was first used for heating buildings, and as air when warmed ascends, what more natural than that steam coils should hug the floors just as the stoves before them had done? But in some of the largest factories in this country the coils are fastened, not to the floor, but to the ceiling, which proves to be a better place for them. As everybody knows who ever sat before an open fire, radiation is a pleasanter means of warmth than convection, than heat carried along by currents of air; floor space is incidentally saved, and the risk of gathering combustible rubbish about the coils is avoided. In the ages of simplicity which came down to Watt's time and the invention of the steam engine, when a kettle was to be heated the proper place for the fire was thought to be outside. But when big boilers came in, with pressing need that their contents be heated in the shortest time possible, it was found gainful to put the fire inside. Stephenson's locomotive, the Rocket, derived no small part of its efficiency from his knowledge to which side of the boiler to apply flame.

On somewhat the same principle Lord Dundonald, one of the early improvers of the steam engine, forced the hot-air currents under his boiler from above downward, against their natural tendency to move from below upward. In this way he made available much heat that otherwise would have been wasted. The steam engine, whether mounted on wheels or not, always keeps its fuel outside; furnace and cylinder are distinct. To-day the steam engine's primacy is challenged by a motor which uses its fuel inside, the furnace being no other than the cylinder, precisely as in the barrel of a gun. So much more work does a gas engine yield than a steam engine, in comparison with the heat applied, that only the dearness of heat as supplied by gas prevents the speedy supersedure of steam for motive power. As gas engines grow steadily larger, their margin of economy becomes so decided that it begins to pay to make gas on purpose to burn in them.

In the reduction of bauxite, the refractory ore of aluminum, it is necessary to maintain an extreme temperature. The melting point of the mineral is high, and only so much of the heat as ranges above that temperature does work. In the Mining Department of the World's Fair is an exhibit showing how the modern metallurgist reduces aluminum with new economy. Instead of employing the old crucible method, and applying the fire from without, he incloses the ore in a non-conducting bed, and by means of a powerful electric current applies the heat from within. Electric furnaces of this type now produce bronze and other alloys at prices which steadily fall as their market enlarges.

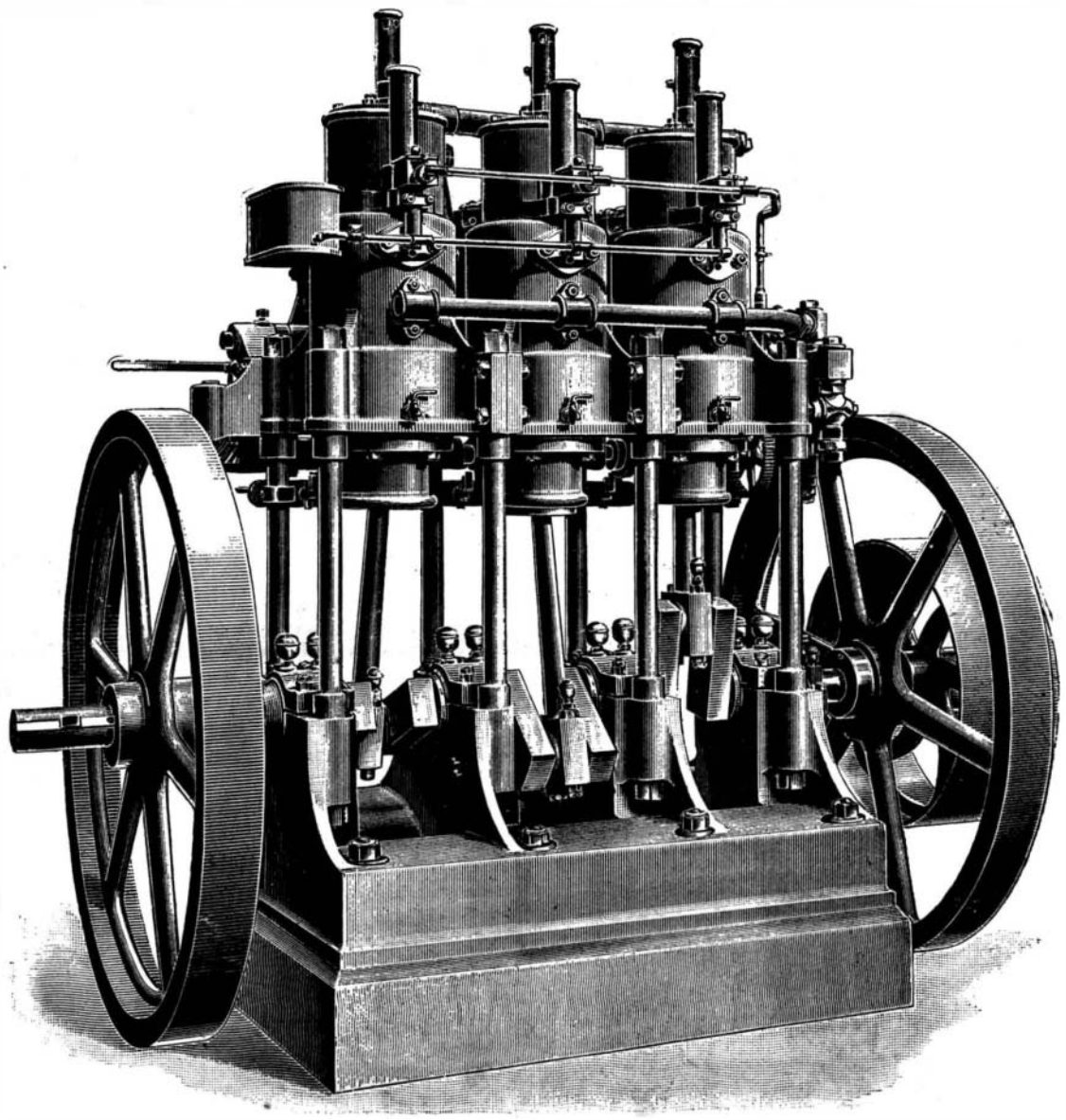
Not far from the mining exhibit at Chicago stands Machinery Hall. When its visitors see one of the largest steam engines driving machinery with a slack belt, they are wont to express surprise. Ordinary folks to-day think just what machinists thought a few years ago: that tightness is the effective and, indeed, the only feasible condition for belts. But in this case, as in a good many others, the rule of contraries has come, and with profit.

Architects, as well as engineers and metallurgists, have found it profitable to go into opposition where some ancient practices have been concerned. In latitudes of much fall of rain or snow, the form of roof which most obviously suggests itself is the common pitched roof, resembling an A, more or less broadened. Vexed by bursting rain conductors, by impromptu object lessons as to the force of avalanches, Northern architects take not A, but V, duly widened, for their roof type. In winter, ice and snow, caught as in a basin, cannot fall to the street. Icicles are banished, and in conductors carried through the heart of the building, and kept warm by the building, ice is gradually melted without a chance to do damage.—*N. Y. Sun.*

A Gigantic Irrigation Project.

Hardly has the South Gila Canal Company commenced the great work of damming the Gila River and building a canal 125 miles in length, through one of the best portions of Arizona, and before the Sonora Canal Company has completed the survey for its canal in California, when another project of the utmost importance to Yuma and the great area of arable land lying to the south and east of Yuma, in Arizona and the Mexican State of Sonora, is inaugurated. The plan is to dam the Gila River at the gorge, twelve miles east of Yuma, and create a reservoir thirty miles in length and eight miles in width. The dam, which will be of solid masonry, is to be 4,500 feet in length and 110 feet high. It will extend from the mountains on one side of the Gila to the opposite bank on a reef of bed rock, where three small islands rise out of the bed of the stream. These islands will form abutments to the dam, which will be built with such a slope as will carry the water away from the dam without cutting or wearing away the rock at its base. The flume, or canal, which will conduct the water away from this reservoir to the lands to be irrigated, will not be over a mile in length.

From the end of the flume to the south and west, canals will be constructed over the mesa and valley lands in different directions when the lands, which all belong to the United States government, are settled. The reservoir, it is estimated, will hold water enough to irrigate the 3,500,000 acres of land lying to the east and south of Yuma, which extends into the Mexican State of Sonora, and will also furnish water for 100,000 acres of the Sonora Land Company, lying between the dam and Colorado River, in the valley of the Gila. It is estimated that the dam alone will cost $5,000,000, and that it will take two years to complete it.



THE WORLD'S COLUMBIAN EXPOSITION—TWENTY HORSE POWER OIL ENGINE.
Fig. 1.—FRONT VIEW.

OIL ENGINES AT THE GREAT EXPOSITION.

The engravings herewith represent an English three-cylinder 20-horse power "Trusty" oil engine, exhibited, the *Engineer* says, in the Chicago Exhibition. The three cylinders are connected to a three-throw crank shaft, with cranks set at 120 deg., so that the work of the three cylinders is well distributed throughout the period of each revolution. The valve gear is worked from one cam shaft, driven by silent worm gearing. The engine is fitted and controlled with one governor of the rotative type, but either of the cylinders may be cut out at will, the valve gear for each being worked by separate cams. With the exception of the changes in form necessary to the vertical construction, the engine is composed of working parts which operate in the same way as those of the horizontal engine which was described in our impression of the 4th December, 1891.

Fig. 1 shows the front of the engine, and Fig. 2 shows the arrangement of the valve gear arms centered upon a fixed shaft and operated by cams, one of each set of which is controlled as to position by the governor, as in the horizontal engine. Fig. 3 shows the end of the engine, and thereby the valve levers and the double pump for supplying air to the ignition tube lamps, and for circulating water round the jackets. The engine is supported on a strong bed-plate of good form, carrying the cylinders on eight turned columns fixed by tight fit in holes on the sides of each bearing, and fastened by nuts which are accessible. The crank is carried in four large bearings and fitted with two flywheels. The engine is of good design, and works with ordinary petroleum lamp oils or with the heavier Broxbourne oil. It is made by Messrs. Weyman & Hitchcock, Limited, Guildford, and is exhibited in the Chicago Exhibition by Messrs. Baker & Co.

Enormous Enterprises.

The advancing years seem to produce an increase rather than a diminution in the number of gigantic schemes. We have all heard of the scheme for expending $40,000,000 in the construction of a monster dam in the vicinity of Newfoundland that would turn the Gulf Stream back on itself and give New England a tropical climate, so that the Granite State boys could climb palm trees to shake off the succulent cocoanut on their own bleak hillsides, while the Rhode Islanders would offer scant encouragement to the peripatetic Italian banana vender, as each and all of them would have a banana tree in close proximity to his own back porch.

A more recent scheme is the bridging of the English Channel between Dover and Calais. It is said that this scheme has gone so far that a company has been formed to secure the necessary concessions from the British and French governments. The cost of this bridge is something like $240,000,000.

The latest scheme is one for roofing London and other large cities, and thus doing away with the umbrella trust. The projector has not yet considered any such vulgar and insignificant detail as the matter of cost, and hence has not enlightened the public on this point.

Such schemes are, adds the *American Artisan*, of course, largely visionary; but they indicate a tendency to grapple with the most stupendous undertakings that is in a manner characteristic of the nervous and progressive age in which we live.

A FRENCHMAN declares that vegetation can be aided by electricity. Potatoes planted in the path of the electric current grew enormously, and electrified tomatoes became ripe eight days before the others.