Work and Wages in Holland.

A royal commission, composed of seven members, one of whom was a working carpenter, was appointed in Holland about two years ago to inquire into the condition of the working classes in that country. The commission sat for about eighteen months, and their preliminary report has recently been published. The report states that in Amsterdam the bakers work from fourteen to sixteen hours a day, in some cases for twenty-six hours at a stretch, this excessive labor being due to the competition of the large bread factories which have recently been opened, and in which the labor is from twelve to fourteen hours.

There are 5,000 working tailors, nearly all of whom work in their own homes, only one merchant tailor having shops in which the sewing machines are driven by steam, and give employment to 200 women and girls. Foreign competition is very great in the tailoring trade, and the Dutch tailors have to work very hard during the season, which lasts only three months. The workmen employed in diamond cutting—of whom there are 5,000, nearly all Jews—at Amsterdam are the best paid, as they earn from $16 to $18 and $20 a week, working twelve hours at a stretch. In the factories for making bread, vinegar, sugar, etc., in the breweries, sugar refineries, and steam mills, work is carried on both by day and night, there being, of course, two sets of workmen, though when a man belonging to one set is ill or absent, his place is taken by a man of the other set, who is thus obliged to work for 24 hours at a stretch. The royal commission, while admitting the difficulty of obtaining accurate information in all cases, states that, as a rule, adults work from thirteen to fourteen hours a day, and that out of 11,156 workmen in the province of Lemburg, which is taken as a typical case, 7,011 were men, 240 married women, 733 unmarried women, 365 girls between sixteen and eighteen, 614 girls between twelve and sixteen, and 2,193 boys under eighteen, 39 per cent of the total number being minors. A law passed in 1874 prohibits the employment of children under twelve, but the commission reports that it is not very strictly enforced, and, moreover, that children are made to work almost as long as adults. Nor does public instruction appear, despite the law passed in 1874, to have made much progress, for in Amsterdam alone 4,606 children did not attend any school at the beginning of last year, while the mean average of persons unable to read or write in Holland is 10 per cent, as against about 2 per cent in Germany. The commission states that the rates of wages may be taken at 4c. an hour for men, 3c. for women, and 2c. for children in the linen trade; while bakers earn 4c., paper makers 5c., sugar refiners 6c., painters and compositors 7c., for certain painters 12c., and engravers 16c. per hour. For ordinary workmen 6c. an hour may be taken as a *maximum*, which is 56c. a day, or $2.50 a week, supposing the man to work ten full hours. There are a good many mutual relief societies in Holland, especially in the factories, and the employers themselves subscribe in several cases. A Dutchman working twelve hours a day produces much less and is not nearly so well paid as an Englishman working fewer hours. The commission concluded its report by recommending the government: 1, to provide for the inspection of factories; 2, to execute more strictly the law relating to infant labor; 3, to prohibit women and children working by night or on Sunday; 4, to make periods of rest for both of them compulsory; 5, to prohibit women working for at least a month after their confinement. The Dutch government has introduced a bill which, in some respects, goes beyond, but in others does not come up to, the recommendations made by this commission.

Aluminum.

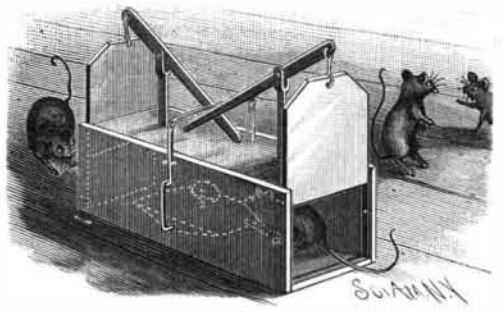
The process of Professor Curt Netto, of Dresden, now in experimental operation at Krupp's works, Essen, and in London, is a chemical process based on the displacement of aluminum from its ores by metallic sodium. The ore used is cryolite, a double fluoride of aluminum and sodium. This is ground to a fine powder, and is fluxed with common salt. The ore is then melted in a reverberatory furnace, and when quite liquid is run into a ladle. When in this condition ingots of solid sodium are forced to the bottom of the ladle, and are there held until they become volatilized, the work of a few moments only. The gaseous sodium rising through the molten cryolite displaces a part of the aluminum, which collects in a metallic form at the bottom of the ladle. The greater part of the slag is then skimmed off, and the remainder poured into an iron crucible to cool. When the mass is turned out, a solid ingot of aluminum is found at the bottom. The whole of the aluminum in the original charge of ore is not obtained at each operation, and the slag is therefore returned to the furnace with more cryolite. After the first charge the addition of salt is not required, as the slag serves the purpose of a flux.

For each pound of aluminum obtained there is required about 3½ pounds of sodium, so that it is important that this metal should be obtained cheaply. The Alliance Company, London, manufacture it at their works, the process, as described to us, being as follows, says *Engineering:* Pure caustic soda is melted in a pan, and then ground coke is stirred into it; 100 pounds of the mixture are ladled at a time into a long, narrow retort, lying in a furnace. The carbon effects the reduction of a part of the soda, metallic sodium being distilled off and caught in a condenser, while carbonate of soda is left in the retort. When the reduction is complete, the carbonate of soda is run off, and a fresh charge introduced, and so the process goes on. We were not informed what was the cost of the metal obtained, but it should not be greater than that obtained by the Castner process, which is stated to be 1s. a pound. Possibly it is less.

We saw a 5 pound ingot produced, the time occupied from charging the furnace to weighing the ingot being less than an hour. The cast was one of a series which had been going on all day, and was carried out by unskilled workmen with a small experimental plant. It is claimed that the metal produced is pure, and that in this respect it has an advantage over that obtained by the various electric processes. The cost of its production is set down at 6s. ($1.50) a pound, while the present selling price is 48s. ($12) a pound. Since aluminum bronze requires only 5 to 10 per cent of aluminum, while steel and iron only need to be alloyed with one-tenth per cent to obtain the full benefit of the combination, it is evident that aluminum at 10s. ($2.50) a pound would be a commercial article for which there would be a large demand.

AN IMPROVED ANIMAL TRAP.

A trap designed especially for use as a mouse or rat trap is illustrated herewith, and has been patented by Mr. Charles H. Mittler, of Marthasville, Mo. Within the box is mounted a tilting platform, to be turned either way by a slight touch from the animal, thus releasing a hooked catch and freeing an arm which holds down levers, by which the sliding doors, closing openings at both ends of the trap, are held up. A pin on which to place bait is fixed in the face of the tilting block. These traps may be made of either wood or metal.



MITTLER'S ANIMAL TRAP.

[SIDEREAL MESSENGER.]

Astronomical Notes.

Mars' Satellites.—It may be interesting to some of our readers to know how the tiny satellites of Mars look in the great Lick equatorial, as they have been observed night after night by Assistant Keeler, during the month of May. In conversation with a friend he recently said these minute bodies looked in the great refractor as bright as the companion to Polaris does in a three inch telescope. Mr. Barnard's estimate of their brightness in April was that they were equal to Jupiter's satellites when viewed with a glass of 1½ inches aperture. They are evidently easy objects to observe in the world's greatest refracting telescope.

Map of Solar Spectrum.—At the April meeting of the National Academy of Sciences, Professor Rowland, of Johns Hopkins University, presented two brief papers, giving further studies on certain spectra. With new and improved instruments, made at the university, it is claimed that he has succeeded in making a much more perfect map of the solar spectrum than his former one. Definition of the lines is better, and some single lines have been divided. He also claims the discovery that carbon is much more widely distributed in the sun than has previously been known.

Dearborn Observatory.—In a recent letter from Professor Hough, we learn that all the astronomical instruments belonging to Dearborn Observatory have been removed to Evanston, the new site of the observatory. Plans for the new building have been adopted, and its erection was to begin about the 1st of May, but the 18½ inch equatorial will not be mounted before January, 1889. The meridian circle has been placed in a temporary building, located 250 feet from the shore of Lake Michigan. Professor Hough says the lake seems to have no effect on nadir observations, at least a moderate storm does not disturb the images perceptibly. In case of a gale, he thinks it is possible that tremors would be felt. The site of the new observatory is to be 250 feet from the lake shore.

Professor Hough is now arranging for the time service for Chicago from his new location.

Denver University Observatory.—A recent letter from Professor H. A. Howe, of Denver University, Colorado, discloses the interesting fact that the observatory at that place is to have a new equatorial refracting telescope, the aperture of whose object glass will be 20 inches. This is good news for the university and for Professor Howe, who well deserves the recognition it implies. For so young a man it is a noteworthy stride in his favorite science to have a telescope that ranks fifth in size and power in the United States; for those at Lick Observatory, Washington, University of Virginia, and Princeton only now are larger. Another significant fact in this new enterprise is the altitude of the site, which has been chosen on the new "campus" of the university, about seven miles from the city of Denver, and is 5,000 feet above sea level. If memory serves us rightly, this site is higher than that of any other large telescope in the United States, the Lick site being next, at an altitude of 4,200 feet. The name of the generous donor of this large instrument is Mr. H. B. Chamberlin, of Denver, Colorado.

Paper Pulp from Cotton Stalks.

For several weeks, says the Atlanta *Constitution*, there have been on exhibition in the office of the clerk of the Superior Court samples of pulp made of the hulls and stalks of the cotton plant. The pulp is as white as snow, and can be converted into the finest writing paper. It is regarded as valuable, and is the product of parts of the cotton plant hitherto deemed valueless.

The process by which it is made is new. It is a process by which the ligneous substances of the hulls and seed are dissolved. By this process over fifty per cent of the fiber is extracted from the hulls, which have been regarded as fit only for fuel in the mills or for feed and fertilizing purposes, and which were sold for four dollars a ton. These, converted into pulp, will be worth about forty dollars a ton. From the stalks usually left to rot in the fields this new process utilizes about thirty-eight per cent of fiber at a very small expense. It has been settled that there are fertilizing properties in the oil of the cotton seed, and it is asserted that the fiber will not decompose for six years and cannot be used as a fertilizer. This is why the woody matter eliminated from the stalk and hull is much more valuable as a decomposing fertilizer than the entire seed. By the same process the ramie plant and its troblesome cousin, the bagasse stalk, is met and overcome. By the decorticating process the fiber was crushed and torn out by a slow and expensive process.

In the new process the ligine is simply dissolved out, and the snowy films of the ramie and the tawnier threads of the sugar cane are coaxed out as easily as the infantile kitten to its milk.

Alcohol.

Among the curious side issues of the current temperance discussion is the question whether alcohol is a natural product. This is, I believe, vigorously denied in some quarters. Alcohol, like bread, is manufactured artificially from a natural product. In each case fermentation, a natural process, is made use of. But while bread is known only as a product of manufacture, alcohol appears to be very-widely distributed in nature, though in extremely minute quantities. Nor is this at all surprising. If grapes or apples, or their juice, be exposed to the air, fermentation sets in, and the sugar and other carbohydrates are changed to alcohol. The ferments which cause the change are afloat in the air all about, and might not unnaturally attack similar compounds in other vegetable substances. Professor Muntz, of the National Agronomic Institute, in Paris, has, by refined chemical tests, discovered evidences of alcohol in cultivated soils, in rain water, in sea and river water, and in the atmosphere. He finds that vegetable moulds may contain considerable quantities, and it appears probable that the alcohol "originates in the soil, from the fermentation of the organic matters in it, and is thence diffused as vapor in the atmosphere." Another side issue of our temperance discussion is the so-called "Bible wine" theory, which maintains that the wine used in Palestine in the time of Christ was not alcoholic. I have been unable to find evidence that the composition of the juice of the grape, the laws of fermentation, or the practice in the making and using of wine were different in that country at that time from those in other countries, or in that country at other times; and believe it safe to say that the theory that Bible wine was different from other wine, that it had not the alcohol which other wines contain, is without any basis to support it, in the opinion of the student of science.—*Professor Atwater, in the Century.*

Meeting of the American Association for the Advancement of Science.

The American Association for the Advancement of Science holds this year its thirty-seventh meeting at Cleveland, Ohio, from Wednesday morning, August 15, to Tuesday evening, August 21. The date of meeting has been advanced one week from that decided upon at the last assembling, on account of a gathering of Knights Templar to occur in Cleveland the third week in August. For all matters relating to membership, papers, and business of the Association, the permanent secretary should be addressed at Salem, Mass.

Pebble Beach, Pescadero, California.

Officers of the coast survey have characterized the famous Pebble Beach of Pescadero as one unique of its kind and without a counterpart on the whole extent of our Atlantic and Pacific coast lines.

Its distinguishing feature is the mass of highly polished, pure silicious gravel bordering the sea at this locality, in which the topaz, carnelian, onyx, chalcedony, turquoise, agate, and jasper pebbles are found, buffed and perfected by ages of wave action as if by a lapidary.

Wave action has also eliminated all soft and angular minerals from the mass, save occasional fragments of abalone shells and chalcedony, and only the hardest stones survive the surf's eternal attrition.

Many of the topazes and carnelians are of rare clearness and beauty, and may be matched by patient search in size, form, and color for jewelry or for display in mineral cabinets.

Some fine pebbles of milk and fire opalescence are found; and the surf-polished crystals of pure, pellucid quartz gleam like dewdrops in the multicolored gravel.

The carnelians are of all tints, from blood-red to the palest pink or purple; and in some rare specimens the color is singularly confined to the middle of the stone, while the exterior is perfectly limpid.

Here, too, are found agates of every color and combination, the choice of which make handsome bracelets, watch charms, and other personal trinkets when cut and set. The smaller gems, however, of clear tint, perfect form, and suitable size, need no touch of art or lapidary's wheel, but in their natural state, set in contrasted colors, are jewels at once unique and of special interest. Stones of this class are generally small.

But chief among the mineral curiosities of the beach are the so-called "water drops," which are most abundant on a piece of sea marge north of the main deposit, known locally as "Agate Beach." These are chalcedony pebbles, more or less translucent, and usually about the size and form of a lemon drop, having a globule of water imprisoned in a central cavity, and an air bubble which, when small, looks dark by transmitted light and moves within like a living insect.

They are highly prized and much sought after by mineral and curiosity collectors. Mrs. General Dimond, of San Francisco, is accorded the credit of being first to discover and direct attention to these curios of the beach.

To the non-scientific the stone-imprisoned water is a mystery not less puzzling than the milk in the cocoanut. If it had percolated from without, it should be sea water; on the contrary, it is perfectly fresh.

The explanation is that the aqueous drop was inclosed by the silica during the process of crystallization.

These curios, though rare, are not unknown in other parts of the world. And they are occasionally met with in the vugs or cavities of quartz veins during mining operations.

It is evident, however, that only under exceptional conditions of temperature can they exist on the surface of the earth as at Pescadero, since either a temperature below 30° would freeze or powerful sun rays would expand the water within and fracture the silicious bulbs.

On other sea beaches, washed crystals of smoky and limpid quartz occur. Such crystals are plentiful at Long Branch, but I found there no other varieties worthy of note, and though many of these are beautifully clear while wet, they lose their limpidity when dry, owing to forcible impact one with another in the strong surf, which, as microscopic inspection shows, covers their surfaces with minute fractures.

At Pescadero, however, the silicious gem materials occurred in extraordinary variety and profusion. The sea floor and beach contour favored accumulation and a gentler attrition, and we have there in the fine lapidary finish of these lustrous stones the ultimate product of patient nature and the tireless sea toiling through untold lapses of time.

Pebble gatherers are enthusiastic in their pursuit, and return again and again to the charmed precincts of the beach for new varieties, more perfect specimens, or to complete "sets."

And surely no hobby could be more innocent, more full of restful enjoyment and physical good than the gathering of these pleasing and imperishable mementoes in the exhilarant sea air and climate of the Pacific coast, and in so delightful a locality.

But beyond its distinguishing feature, the Pescadero beach is otherwise interesting and picturesque. The receding tide leaves wide stretches of kelp-covered reefs, where fine sea mosses and the beautiful abalone univalves may be obtained by the more adventurous visitor. Here, also, are things of interest to geologist and naturalist in the lithology of the shore, the fantastic carving and surf sculpture of the rocks, the pebble-paved pools and basins in the uncovered sea floor, hollowed as if by art, fit baths for the sea nymphs or fabled Amphitrite, and natural aquaria rife with varied sea life, lined with mosaics of purple-spined sea urchins, limpets, and many-tinted sea anemones.

The botanist, too, especially one unfamiliar with the California flora, will find much of special interest in the wild flowers, grasses and shrubs of the immediate coast line, if he times his visit rightly, say in the period between March 1 and the close of July.

A mile in lineal extent north and south will embrace nearly all of the Pescadero beach deposit; and "Pebble Beach" proper is but a part of this, a crescent-shaped sweep of sea marge sheltered between rocky promontories and backed by arenaceous bluffs.—*Min. and Sci. Press.*

The Largest Artesian Well in the World.

A recent number of the Melbourne *Times*, Australia, contained an account of the opening of an artesian well at Barcaldine, in the interior of Queensland. The locality where the well has been sunk is far removed from any watercourse, and has frequently suffered severely from drought. The boring operations were commenced some time ago by Mr. J. Longhead, managing director of the Federal Boring Association, and no sign of water was met with till the 16th of December last, when the drill suddenly dropped 7 feet. Within a few minutes the water ascended the bore, rose several feet into the air, and then fell away into the form of a large glass dome. Its temperature then was 120° Fah., but soon afterward receded to 102°, and Mr. Longhead anticipates that it will go down to about 90°. Before the rods were removed, the bore was continued to a total depth of 691 feet 9 inches, so as to form a receptacle for any sediment, and prevent its interference with the course of supply. The rods were then lifted, and some additional casing was put in to preserve the sides of the bore where any weakness had been revealed. A pipe 17 feet long was inserted into the bore, and carried up to the top of the derrick, which had been used in connection with the boring plant, and over the top of this the stream of water, 12 inches in diameter, has seemingly been allowed to run to waste. The pressure indicated that had the piping been carried a much greater distance into the air, the stream would not have reached its natural level. It is supposed that the water is issuing at the rate of 400 gallons per minute, or 576,000 gallons per day. Mr. Longhead is of opinion that the supply is inexhaustible, and that its soft nature clearly indicates that it originally came from some snowy ranges.

New York Technical School for Girls.

We imagine that it will surprise most people to learn that there is a technical school in New York, exclusively for girls, which has been in existence fourteen years, and graduated this year a class of nine hundred and twenty-four members, or more than the united members of the graduating classes of boys in all the technical schools in the western hemisphere. It is true that the sciences taught in the school are not of a very abstruse character, but they are of the sort best adapted at present to help girls to earn an honest living, and many a woman must bless the thoughtful charity by which she was put in the way of independence. There is still something strange to an American in the modern movement by which women have entered into nearly all the departments of industry and trade which were once monopolized by men. It is not many years since a young girl's face was a rather rare sight on Wall or State Street, and those that were seen generally belonged to persons who were shyly hurrying by on their way to a ferry or railway station. Now nearly every broker's or lawyer's office and merchant's counting room has its gentle, industrious bookkeepers and typewriters, and in many cases these modest and faithful assistants are intrusted with very great responsibility. All the girls who wish to be employed, however, cannot find places as typewriters or bookkeepers, and it is a matter of much importance to the welfare of the sex to increase the number of occupations in which it can be of service. This sort of work is just what a technical school can do, and those who would like to see the weaker class of their fellow citizens placed in a position where they need not be dependent for support upon the uncertain mercies of their male relatives will do well to keep the New York example in mind.

Among the subjects taught in the school are stenography and bookkeeping, mechanical and free hand drawing, sewing both by hand and machine, cutting and fitting, music, designing, as applied to textile fabrics, wall papers, and tiles, and modeling. All the instruction given is free, and the salaries of the twelve teachers employed, as well as rent and other expenses, are paid by subscription, under the care of the Young Women's Christian Association. So far as the public is concerned, the education of women in all these, as well as other kindred subjects, is an unmixed advantage. Not only are thousands of intelligent persons changed from idle and often very poor consumers to industrious and comparatively affluent producers, but the introduction of so much trained skill into the practice of the domestic arts must before long show itself in the development of those arts. The manufacture of wall paper in this country certainly owes to a few clever women a great part of the extraordinary artistic success which it has achieved; and to take another example, the decorative embroidery of the Associated Artists, and of Mrs. Holmes before them, give a promise for the future of American art which is hardly to be found in the painting or sculpture of the country.

If we could suggest anything which might, with advantage, be added to the curriculum of this or similar schools, it would certainly be the development of the actual practice of artistic industry in other ways besides embroidery. There is no reason, for instance, why women here should not be as successful in decorative painting as the Misses Garrett and their rivals are in England. Most women are somewhat sensitive to color, but are so persuaded of their natural gift in this direction that they scorn to learn anything about the subject, and make, in consequence, laborious attempts at decoration which, to everybody except themselves, appear painfully ignorant and bald. If the same women would get rid of the notion that heaven has already taught them a business which their brothers spend years in learning, and would, like men, make themselves acquainted with the observations of such masters as Owen Jones, Dr. Dresser, and William Morris, and study and compare the work of different ages and countries, the beautiful forms of the antique and the Renaissance, the brilliancy of the Japanese, and the ineffable coloring of the Chinese, they could, more easily than most men, acquire a resource and certainty which would make them the best and most rapid of decorators. The same sort of training would fit them for other artistic professions. We cannot say that we think the system of making designs for tiles and similar things, for indifferent workmen to carry out, is calculated to develop the highest artistic capacity or produce the most beautiful art. The highest beauty can only be added by the artist's own hands, without the intervention of mechanics, and there is just now a wide field for the use of works of decoration which shall be as much autographs of the designer as an easel picture could be. To take a single example, a great deal of mosaic for the adornment of buildings is now made in Venice by an association of girls of good family, who draw and color the designs, pick out the bits of glass or stone, and send them to be put in position. Although mosaic is now a rare luxury with us, it might be popularized in this way to the general advantage. There is a sort of mosaic, useful either for floors or walls, which is made by gluing the bits of marble or glass on brown paper. The paper is then sent in sheets to the place where it is to be used, and laid with the bits of marble downward, on a bed of fresh Portland cement. When the cement has set hard the paper is washed off, and the mosaic finished by polishing with a stone. For the ornamentation of our vestibules and hearths very effective use might be made of this means. The broken bits of tile from the tile layers answer an admirable purpose for mosaic, and give far more richness of color than can be got with marble. These might be glued on sheets by a skillful hand in such a way as to form designs of a value infinitely superior to anything yet attempted in floor or permanent wall decoration, and at a price by no means extravagantly high.—*Amer. Architect.*

Heights of Clouds.

The cloud illumination caused by the electric lights of Detroit and Ypsilanti is occasionally so well defined in outline, as seen from this observatory, that it occurred to the director to inaugurate a series of altitude measurements for the purpose of determining the heights of all forms of clouds visible at Ann Arbor after twilight.

The central portion of Detroit is about 35 miles from the observatory, while Ypsilanti is only 5·8 miles distant. The azimuths of the two cities differ about 30 degrees, so that the conditions for determining the heights of the upper and lower clouds can always be made favorable when the atmosphere is sufficiently transparent. When the clouds are very high, the Detroit illumination is so well defined that the probable error of a single measurement of an altitude is only a few minutes of arc. When the clouds are low, the nearer illumination is well defined and the farther one either invisible or coincident with the apparent horizon. The greatest and least heights recorded up to the present time are respectively 17,580 and 770 feet.—*Amer. Meteo. Jour.*

Electrical Patents.

The number of applications for patents on electrical appliances is phenomenal. During the week ending May 29, seventy-three patents were issued from the Patent Office. A general subdivision into various recognized departments is interesting, as showing those in which inventors are most busily engaged: There are 14 patents relating to instruments and devices of measurement and testing, 2 to telegraphy, 2 to the telephone, 3 directly to the motor, 4 directly to the galvanic battery, 4 directly to the secondary battery, 1 to a thermo-electric generator, 26 to dynamos and electric light apparatus and the transmission and distribution of electricity for purposes of light and power, 17 to miscellaneous applications. Among those relating to electric light apparatus are quite a number covering a whole alternating current system.