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OVER-DENSITY OF POPULATION IN CITIES.

The great and growing question as to the dangers, both to life and health, that result from an overcrowding of the population in large cities, has lately received a new treatment at the hands of the learned Dr. Parr, by the labors of whom the subject has been reduced to a science of almost mathematical exactness.

That man by his very nature is gregarious in his habits, and that, following the dictates of his nature, it is his wont to congregate in dense communities, is a fact so well known, and one that has been so often commented upon, as to appear trite in its repetition.

In round numbers, where we stand on an average 400 feet off from each other, we live on an average 50 years; where we are 300 feet off, we live 40 years; where we come within 60 feet of each other, we live but 30 years; and where we are but 20 feet off, we live but 25 years.

Again, from Dr. Parr's actual figures we learn that "during the decennial period from 1861 to 1870 inclusive, the death-rate of certain of the most favorably situated districts of England, taken at per 1,000 of the population, proved to be 17 per annum, 16, and even so low as 15; whereas in certain other places it stood at 31, 33, and even 39 per 1,000 per annum.

Such are some of the more important of the interesting facts given us by Dr. Parr in his valuable paper. The Architect, to which we are indebted for an abstract of these conclusions, remarks very truly that "no doubt the local circumstances of any particular community must always exercise a considerable influence on the death rate.

Without pretending to state the cause, we may call attention, in connection with this subject, to the following fact: From the figures lately published by the German Imperial Statistic Office, giving the mortality per 1,000 inhabitants in the chief cities of the world, we learn that the death rate in the city of New York is about one third greater than that of London, and a fraction greater than that of Liverpool, which, as Dr. Parr has shown, is the most unfavorable district in England.

PATENTS IN NEW SOUTH WALES.

A bill to amend the laws relating to patents has been introduced in the Parliament of New South Wales. It pro-

vides for the establishment of a patent office, the appointment of a "Patents Officer," and the issuing of patents for inventions, and the publication of the patent specifications. Any person may obtain a patent for his invention, giving him an exclusive property therein, provided the invention has not been in public use in New South Wales for more than one year, or has not been patented in any other country more than one year.

SUN SPOTS AND COMMERCIAL CRISES.

To the numerous explanations that have hitherto been given by various writers on commercial topics, to account for the present depressed state of trade, there has recently been added another—this time from the pen of Prof. W. Stanley Jevons, who, in a late number of Nature, treats the matter at some length from a scientific standpoint.

The fact has long attracted attention that commercial crises, like the one through which we are passing, are marked by a certain periodicity in their occurrence, and they have been associated, not unreasonably, to a certain extent with a deficiency of crops, and such deficiencies again have in recent years been supposed to be in some way connected with the "sun spot period."

Professor Jevons, in his present paper, endeavors to establish a direct relation between the latter periods and times of trade depression; and, although his studies have not as yet allowed him to fix the exact nature of the connection, the data that he furnishes exhibit at least some curious coincidences. After some preliminary accounts of what has been done in this field of research, both by himself and others, in former years, Professor Jevons says: "It is impossible in this place to state properly the facts which I possess; I can only briefly mention what I hope to establish by future more thorough inquiry.

Hyde, Clarke, Wilson, and Danson all argued, 30 or 40 years ago, that commercial fluctuations must be governed by physical causes; but the difficulty that has beset the theory is that hitherto no one has been able to detect a clear periodic variation in the price of corn. Sir William Herschel endeavored to do this at the beginning of the present century in his inquiry as to the economic effects of the sun spots: but his facts are too meager to justify any certain inference. Professor Jevons confesses that as yet his own inquiries have been equally without result on this point.

seldom, if ever, have the intensity, profundity, and wide extension of the true decennial crises.

The conclusion which the author draws from his speculation is that "if there is any truth in all these sun spot speculations, there must be a periodic variation in the sun's rays, of which the sun spots are a mere sign, and perhaps an unsatisfactory one. It is possible that the real variations are more regular than the sun spot variations, and thus may perhaps be explained the curious fact that the decennial crises recur more regularly on the whole than the maxima and minima of sun spots."

To determine this mooted question, then, he suggests the importance of at once undertaking direct observations upon the varying power and character of the sun's rays; and to this end solar observatories should be established in every country where the sun can be observed most free from atmospheric opacity. If from such observations it be found, as will probably be the case, that the sun does vary, "the time will come when the most important news for the commercial world contained in the *Times* will be cablegrams concerning the solar power." And he adds that certainly an empire upon which the sun never sets cannot wisely neglect to keep a watch on that great fountain of energy, since "from it we derive our strength and our weakness, our success and our failures, our elation in commercial mania, and our despondency and ruin in commercial collapse."

PROGRESS OF THE SWEDISH ARCTIC EXPEDITION.

There is a strong probability that the Swedish Exploring Expedition, under Professor Nordenskjöld, has by this time proved the existence of an available northern passage from the Atlantic to the Pacific. In 1876 and 1877, Professor Nordenskjöld succeeded in reaching the mouths of the Siberian rivers Obi and Yenisei by way of the Kara Sea, a feat never before accomplished, thus establishing a new commercial road to the regions which those streams water. During the past summer, the expedition which sailed from Hammerfest, Norway, in July, successfully traversed the Kara Sea in the forepart of August, and arrived at Dickson's port, at the mouth of the Yenisei, on the 6th. Four days later the expedition, comprising two small but strong steamers, the *Lena* and the *Vega*, began the exploration of the hitherto untried sea to the north and east. By August 20, the northernmost point of Asia was passed, and in a week more the mouth of the *Lena* was safely reached. Here the steamers parted company, the *Lena* to ascend the river to Yakutsk, the *Vega* to continue the exploration of the Siberian coast, hoping within a few months to reach Japan by the way of Behring Strait. The greater part of the coast from the *Lena* to Behring Strait has already been explored by sailing vessels, so that the probability of the successful passage of the *Vega* is very great. Should it prove feasible to navigate those seas even during a few months of each summer, the commercial advantage of the new route between Europe and Eastern Asia and Western America will be considerable. Besides, it would open up to trade the northern half of the vast continent of Asia, by way of the great rivers Obi, Yenisei, and *Lena*.

Professor Nordenskjöld has already shown that trading vessels carrying profitable cargoes can reach the north of the Yenisei in August and September, and return with marketable freight before the Kara Sea is closed by ice. Should the entire route by way of the Arctic Sea prove practicable, the summer voyage from Europe to the East would be shortened about one fourth; but that advantage would be offset by the disadvantage of being closed by ice ten months in the year.

In any case the new Siberian regions opened up are likely to prove of great benefit to Europe, both in furnishing large supplies of food stuffs and raw materials, and in offering a market for manufactures. Siberia has made enormous progress in material development during recent years, and improved trade connections would give a great impetus to the new settlements. Fortunately American manufactures are highly esteemed in Siberia; and if a proper effort is made a large share of the new trade may fall to us. On the other hand Siberia is likely to become a serious rival to us as a producer of breadstuffs. Vast regions there are admirably suited for the cultivation of grain; and they will make themselves felt in the markets of the world as soon as means are provided for transporting the crops cheaply.

THE TRADEMARKS QUANDARY.

The attempts to better the law of trademarks by statutes have evidently muddled the subject. A Maryland judge has pronounced the law of Congress unquestionably constitutional; and jurists will generally agree that, if it is so, it has superseded State laws. But a Wisconsin judge is just as clear that the National law is a nullity; and one consequence of this decision, if sustained, would be that State laws are revived. Meanwhile the manufacturer cannot know under which law to act.

Before either law was passed courts of equity had built up a somewhat vague yet efficient system for perfecting the peculiar labels, unique designs, characteristic names, and fancy catchwords adopted by various manufacturers and dealers. Every producer of an article generally known to be good sets a value on the trademark with which it has become associated in the public mind, and will resist the employment of it by his competitors. The courts have sustained these claims; not so much, however, in the view that a trademark is property, as upon the ground of protecting the public from imposition. Any man may make and sell

cologne or cocoa oil, pencils or piano-fortes, shawls or shirts; but if he sells them under the names and characteristic labels of old and distinguished dealers, the public are liable to be deceived. For the sake of the public the courts will stop such imitations by injunction, and if doing so also protects a meritorious manufacturer in the slowly-acquired reputation of his wares, so much the better. This was the old equity doctrine of trademarks. But it was a long and difficult inquiry, in many of these cases, which of the rivals was first in the use of the disputed name or emblem. To relieve this difficulty, to supply proof of the original ownership and use, is a leading object of the trademark statutes. Such statutes have been passed in England, by the Legislature of New York, and by Congress. They enable a dealer when he first adopts a trademark to register it as his own; and having done this, he can at any time appeal to the public record to establish his priority of design. Conversely, any one proposing to adopt a trademark can ascertain from the record whether the same design has been appropriated.

Our people have little concern with the English law; it is the confusion between State and National laws which needs remedy. The first National law appeared in 1870, as one chapter in a newly enacted revision of all the laws pertaining to patents and copyrights. This juxtaposition of subjects gave the impression that the law rests upon the power of Congress to secure to authors and inventors the exclusive right to their respective writings and discoveries. And now the objection is made that a trademark is not a writing or a discovery, and its designer is neither an author nor an inventor. Therefore the law is unconstitutional.

The objection is forcible, but an answer is offered that trademarks pertain to commerce, and that Congress has power to regulate commerce. Opponents of the law reply that it is commerce among the States which Congress may regulate, while trademarks belong primarily to domestic commerce, which Congress cannot control. Friends of the law contend that the National Government may make treaties, and treaties may properly stipulate for mutual protection of trademarks of subjects of one government within the dominions of another, and therefore Congress may pass a general trademark law as incidental to enforcement of treaties. And so the discussion slowly proceeds, with the effect of creating the dilemma that claims founded on either law may, at any moment, be adjudged invalid. For the power of Congress, if it exists, is exclusive; if it is disproved, then and then only are State laws operative. The *New York Tribune*, from which we select the above, concludes with everybody else interested in the matter, that the subject deserves early and final determination.

HOW TO UTILIZE OLD FRUIT CANS.

Perhaps one of the most appropriate uses of an old fruit can that can be devised is to make it contribute to the growth of new fruit to fill new cans. This is done in the following manner: The can is pierced with one or more pin holes, and then sunk in the earth near the roots of the strawberry or tomato or other plants. The pin holes are to be of such size that when the can is filled with water the fluid can only escape into the ground very slowly. Thus a quart can, properly arranged, will extend its irrigation to the plant through a period of several days; the can is then refilled. Practical trials of this method of irrigation leave no doubt of its success. Plants thus watered flourish and yield the most bounteous returns throughout the longest droughts. In all warm localities, where water is scarce, the planting of old fruit cans, as here indicated, will be found profitable as a regular gardening operation.

SENATE BILL 300.—SECTION 2.

In all discussions of patent rights with reference to Mr. Wadleigh's bill for the amendment of the patent law, it is needful to bear in mind the broad principle that Congress is empowered by the Constitution to grant to inventors the "exclusive" right to the manufacture and sale of the article or process patented. The right is limited in time, but it cannot be limited in scope. In other words Congress has no power to come between the patentee and his invention, to say what he shall do with it. Whether this provision of the Constitution is wise or not is beside the question. In our opinion it is eminently wise; but wise or foolish, there it stands, and can be got rid of only by an amendment of the Constitution, not by any change in the wording of the patent law.

The fatal objection to Section 2 of Mr. Wadleigh's bill is that it undertakes to limit the scope of the patentee's right. It provides that if the patentee chooses for any reason to share his right with A and B, giving them a license to use his invention or discovery, C, D, and all the rest of the alphabet may come in and enjoy the privilege on the same terms. Still worse, if the patentee elects to retain the entire control of his invention, his purpose may be thwarted, the penalty for the infringement being a license fee "determined from all the evidence in the case."

The purpose of the American patent law is to encourage the advancement of the useful arts through invention and discovery. Its object is to induce men to study and experiment and invent; and it seeks to accomplish that object by the hope held out to the inventor that by the enjoyment of the exclusive right to the manufacture and sale of a patented invention he will stand a better chance of gaining a fortune than would be otherwise possible. Once secured a patented invention is property, to be respected as other property is. The Constitution provides that during the life of

the patent the owner of it shall be free from dictation or interference; so long, of course, as he uses it without direct injury to himself or others. In other words, his right is as exclusive as his right to a horse or a gun, or a house that he has reared or bought or made.

What would be thought of the wisdom of a legislative body which should enact a law to the effect that in case A lends his horse to B, for friendship or hire, any other man might use the horse on the same terms? Or in case A should decline to lend his horse, B's unauthorized use of the animal would be punishable only by the payment of the customary license fee of the livery stable? Similarly if A allows B to plant a potato patch in the corner of his farm, the whole farm shall be laid open to invasion on the same terms? Or if C wants to occupy a room in D's house he shall be allowed to do so on payment of such rental as some one else shall decide to be sufficient?

Is there any less absurdity or injustice in making parallel provisions with respect to invasions of patent rights?

As a rule it may be said that the work of inventing a novel and useful device is less arduous and costly than the work of introducing it. As a rule, too, the inventor is very apt to be without the means needful to develop and introduce an invention so as to make it pecuniarily profitable. Accordingly very favorable terms may well be offered to the first to take hold of and work up a new invention. The risks are great, and the promise of ultimate profit should be correspondingly great. Would any cautious business man be willing to assume such risk if he knew that when the profitableness of the invention came to be successfully demonstrated, any one else could step in and use the perfected invention at no greater risk than the payment of a license fee?

The great trouble with the framers of devices for facilitating the invasion of patent rights, like this second section of Mr. Wadleigh's bill, arises from their proneness to forget the grand purpose of the American patent system—the advancement of the useful arts by the encouragement of invention—and the not less vital point that the only means for the attainment of that end contemplated by the framers of the Constitution was the recognition of the inventor's exclusive right to the control of his invention or discovery during the period for which the patent should be granted.

It would no doubt be very pleasing to such as are or desire to be infringers upon patent rights, to have the inventor's exclusive right laid open to invasion. But the patent law was not framed to meet the wants of infringers, and Congress has no constitutional power to alter it in their favor.

BOILER FEEDERS FOR LOCOMOTIVES, ETC.

Among the improved appliances in this line proven by practical tests to possess superior merit, the Hancock Inspirator may be especially mentioned. The company's business announcement will be found in our advertising columns. The performances of this apparatus are in some respects remarkable. E. Howard & Co., the well known watch and clock makers, have one in use which they say draws the water from a driven well, some 75 feet distant, and a perpendicular lift of 20 feet, and also forces the water, when needed, 70 feet up into a tank at the top of the building.

For locomotives they are especially useful. Mr. James K. Taylor, master mechanic of the Old Colony Railway, states that every one of twenty-three of these feeders, now in use on the locomotives of the above company, is giving great satisfaction. Not one has had to be taken off for repairs. They supply all the water required by the engines, are found more reliable and economical than any pumps, which latter they do not hesitate to remove. They are more positive in working, less liable to clog, have greater range than any other device, and require less attention from the engineer in working them. Practical indorsements of this sort are worthy of the highest consideration.

An Economical Engine.

A compound condensing pumping engine, erected for the Buffalo (N. Y.) High Service Water Works, by the Holly Manufacturing Company, of Lockport, N. Y., recently tested under the supervision of Professor Greene, President of the Troy Polytechnic Institute, developed a duty of 80,489,638 foot pounds per 100 lbs. of coal. Following are the elements of the test:

High pressure cylinder, 1, diameter, inches.....	25
Low pressure cylinders, 3, diameter, inches.....	25
Double-acting pump cylinders, 4, diameter, in....	15.5
Length of stroke of each cylinder, inches.....	33
Total number of revolutions.....	25,650
Duration of test.....	20h. 15m.
Revolutions per minute.....	21.12
Piston speed per minute, in feet.....	106.16
Pressure on water gauge, in pounds.....	46.76
Pressure from reservoir supply, to be deducted in pounds.....	5.58
Actual water pressure, or load on the pump, in lbs.	41.18
Coal consumed, no deductions, pounds.....	5,400
Steam pressure, pounds.....	61.5
Vacuum, inches.....	26.5
Temperature of injection water to air pumps, degrees, Fah.....	48
Temperature of water in hot well, degrees, Fah..	92
Temperature of feed water to boilers, deg., Fah.	170
Air pumps, two single acting, diameter, 24 in. stroke, 30 in.	
Suction and discharge pipes, diameter, 24 in.	
Fly wheel, diameter, 12 ft. 4 in.; weight, 7 tons.	
Duty in foot pounds, per 100 pounds of coal....	80,489,638

This engine is similar to that described in the *SCIENTIFIC AMERICAN*, vol. xxxix., p. 95, and in *SUPPLEMENT* No. 140.