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PROGRESS OF MODERN MANUFACTURES.

M. Michel Chevalier, the distinguished French political economist, has published an interesting disquisition on the progress of the manufacturing system, forming an introduction to the "French Juror's Report" on the International Exhibition in London last year. He considers that international exhibitions of industry promise to become permanent institutions, exercising a vast influence for good by enabling nations to take reckonings of their manufacturing progress. From a comparison of the results of the previous exhibitions of England and France, M. Chevalier concludes that the producing powers of mankind are continually on the increase. What is meant by manufacturing power is the work that one man can perform in a given time. This result is attributed to improvements and the more extended use of machinery driven by water and steam power. In the manufacture of iron the productive powers has increased thirty-fold in six centuries. Thus, if a man could manufacture one tun per day six hundred years ago, he can now produce at the rate of thirty tuns.

In the production of cotton yarn, dating from 1769, when Arkwright took out his first patent, one man can now spin 400 times more yarn than the best spinner of that period. In grinding grain and making flour one man can do 150 times more work than he could perform one century ago; and in the manufacture of lace one woman can produce as much work in a day as one hundred women could execute a hundred years ago. In the refining of sugar, the whole of the operations last only as many days as it required months about thirty years since. The manufacture of looking-glasses with an amalgam of mercury and tin, once occupied six weeks in fixing the amalgam on a large glass; the present process occupies only forty minutes. The engines of a first-class iron-clad frigate perform as much work in twenty-four hours as 42,000 horses.

In the production of large steel forgings there has been great progress made. In the Exhibition of 1851 Krupp exhibited a small steel cannon; to the French Exhibition of 1855 he sent a steel ingot that weighed five and a half tuns; while to the one held last year in London he sent a crank axle that weighed no less than twenty tuns. In all branches of the mechanic arts M. Chevalier confesses to the progress made in the productive power of man by the aid of improved mechanism. Such improvements are chiefly due to ingenious inventors and enterprising manufacturers.

FRictional GEARING.

We have had a number of applications lately from persons who desired to make use of frictional wheels as a means of transmitting power. Wheels of this character have not been very generally employed in this country; the only instance where they are used, that we can call to mind at present, is upon the shafts of blowers, made in Philadelphia, for creating an artificial draft. Some solitary cases are familiar to us, but our experience and knowledge of their capacity is limited. We once saw a long line of shafting, in the Eastern States, driven by a pair of beveled frictional gears. They were made of hard wood. We also remember that there was a brick machine which had these frictional gears in use,

driving a kneading cylinder. There seems to be no good reason why they should not be generally employed, and we hope to see them experimented upon and introduced. The objections to toothed wheels are many; if these smooth-faced gears can do the work which it is claimed for them, they will certainly inaugurate a new era in imparting power and motion. The philosophical principles embraced in the peculiar action of metal or wooden bodies in rolling contact with each other are here appended. First: The friction is in proportion to the pressure; it is independent of the velocity or the diameter of the cylinder. Second: It is greater when the substances are the same, than when they are of different natures. Third: It is not diminished by slight coatings of grease, but is impaired by the polish of the surfaces. The second principle may perhaps be rendered more intelligible by saying that the metals which have the greatest affinity or attraction for each other are obviously the most suitable for the purpose in question. Wheels intended to run together should be cast from the same pouring, so that their natures may be alike as near as possible. Friction may be defined as the interlacing of the fibers of substances in contact with each other; and in proportion as these fibers are reduced, are smoothed off by attrition or any other means, the friction is lessened. It is not necessary that friction wheels should be made roughly; but it is requisite that any approach to burrishing should be avoided, as by this process the minute particles or atoms of matter, upon which the wheels depend for their action are glazed over, and the adhesion or friction consequently reduced. If we examine surfaces which have been in rolling contact with other surfaces, we shall find a peculiar appearance and feeling upon them; as for example a T-rail, or the wheel which runs upon it. This appearance is the result of the work done by it, and a microscopic examination would reveal a series of minute points and laminae in the iron upon which the wheels depend for their adhesion or bite. We shall be glad to record any progress in the manufacture and employment of frictional gearing.

THE PREPARATION OF FOOD.

It has been asserted by politico-domestic writers that the foundations of society rest upon the human stomach. We do not suppose that these essayists mean to declare literally that the whole social structure rests like a night-mare upon the gastric regions, but merely to convey the idea that our mental tranquillity and harmony depends in a great measure upon the proper fulfillment of the digestive functions. Food improperly prepared causes the greatest uneasiness to the stomach; this organ either rejects it utterly or else is so enfeebled by the effort to overcome the evil tendencies superinduced by it as to lose much of its natural vigor. So important is the influence of the stomach upon the brain and its moral workings, that the great occurrences of modern times are said to have been originated by various diseases. Thus, if Napoleon declared war against combined Europe, it was not so much induced by love of conquest as by a fit of spleen engendered by dyspepsia. Or, if through some apparently inexplicable reason, solemn treaties and compacts have been violated and set at naught by nations, the primary cause may be found in a truffle or a *paté de foi gras*, which disagreed with the imperial stomach, and so made royalty utterly blind and oblivious to all its moral obligations. These are fine-spun and far-fetched theories unquestionably, and are only valuable as showing the results which might arise from violating the natural laws of the human body. Let us, then, have our food prepared in such a manner that it will be both wholesome to the body and pleasing to the palate.

This must not be interpreted into a license to make a god of the belly, by any means. Food to be wholesome must be palatable, and this latter point is only gained when tested by the popular standard in such cases—the taste. It is an old and a trite saying that "what is one man's meat is another man's poison," and this is true in a literal sense. The outdoor worker, whose indigestion is unimpaired, can assimilate food that is in reality rank poison to a person of more sedentary habits. The proverb is also true in another sense, and this one is more particularly

applicable to our quotation, and that is, that from the want of sympathy with the nourishment which any individual takes into his stomach, the sustenance revolts against the latter and creates distress, utterly nullifying the object for which it was designed. What we desire therefore, to impress upon our readers is to see that their meals are properly prepared before they are eaten. The office of nourishment is a divine one, renewing those wondrous organizations, the heart, the brain and the whole physical system. To feed the body is to sustain it, and to sustain it is to perpetuate all the usefulness and all the glory which its combined functions are capable of conferring upon the world. If we recognize this view of the case we must see in the humblest vegetable or in a pound of animal fiber that is to be cooked, a weight which, if it be thrown into the right scale, will exert a vast influence upon society. Let us then be discriminating in the quantity as well as the quality of the sustenance we consume. This does not imply daintiness, although, if there is any one condition of life in which fastidiousness is excusable, it is certainly in selecting and rejecting that aliment which the palate or nostril forewarns us is unwholesome.

Americans have long been called a nation of dyspeptics, and not unreasonably. Our energetic way of getting a living or amassing wealth leaves little leisure for the cultivation of those social amenities which not only adorn life but are actually necessary to a healthy enjoyment of it. The laughter and chat at table after dinner exert their influence most beneficially upon the digestion, and the mild and soothing influence and quiet modulation of the voice at the tea-table are a fitting exposition of the state of mind demanded at that time alike by the body and all its organs, mental and physical. If therefore, we are dyspeptics it is as much due to the absence of good cooks as to other causes; for who can laugh when a weight presses upon his stomach which makes life a burden? or who can be tranquil when his last meal urges him to frenzy, almost? There are a great many persons, who taking a superficial view of the subject would be disposed to deny our point *in toto*. It should be borne in mind however that long before our day gifted men of all sciences and professions have deemed it no small distinction to confer upon the world any details, relating to the absorption of nourishment by the body, which they may have developed during their researches. So also cooks abroad (who, by the way, are recognized as artists when they have attained great celebrity) have received decorations and honors from royalty almost without stint. Here, however, with us, the case is different; we might quote yet another saying bearing upon this subject, which is that "heaven sends meats but the devil sends cooks." It is only necessary to bear in mind, both when cooking and eating, that the human stomach is an extremely valuable and delicate organ, and he who offends it not only inflicts present discomfort, but also a lasting injury to his constitution.

THE IRON-CLAD STEAM BATTERY, "ROANOKE."

As we possess facilities for gaining access to the iron-clads now building, we availed ourselves of them recently to inspect the progress of the work going forward on the *Roanoke*. We betray no confidence when we publish the following particulars:—The *Roanoke* is at present entirely covered from stem to stern with a canvas awning, so that the men employed are sheltered from the weather. There are to be three turrets, which are being put in position as fast as possible; two of them (one forward and the other amidships) have their first courses well on. The deck plates are all laid, they are three-fourths of an inch thick, placed one upon the other, so as to break joint where the edges meet. The joints come very neatly together, a small space being purposely left for expansion and the natural working of the ship; the plates are secured by counter-sunk bolts to the deck beneath. The armor plates are all on, and a very intelligent workman assured us that he would soon have the outside of the *Roanoke* completed. The boiler makers are busy in putting up the smoke-pipe breeching on the steam chimney of the boilers, one being common to all. There will be a heavy grating over the hatch which surrounds the smoke pipe where it issues from the deck, made of