of the mill? Further, does "Argus," or any man of the world, mean to tell us that the manufacturer of the tomahawk or the homespun is necessarily less civilized than the man who tends a machine? If it is true, then, that the hunter or the housewife may be as civilized as the factory operative, how, it may be asked, are our great factories essential factors in our civilization? Just in the same way as modern agriculture, commerce, banking, &c., are the necessary outcomes of civilization, without which it could not be maintained, but to which we do not owe its existence. And further, all these and many more of the products of our civilization are so inter-dependent that no one could exist without at least some of the others. For instance, modern agriculture would be impossible without modern science and manufactures. The same may be said of commerce and manufactures; or, more correctly, the conditions of modern manufactures could not exist without science, commerce and finance having reached their present stage. Nor could any of them have attained their present stage unless tolerable security to life and freedom for thought had not been previously gained.

Let me furnish "Argus" with one or two illustrations to show this. The Egyptians and Hindoos now refine sugar and manufacture cotton with the latest machinery, and there is no reason why they should not at any moment build locomotives. Are they then a highly civilized people, or even much more civilized than they were before they acquired these arts? If they are not, which is, I believe, the case, then it is a proof that the establishment of modern factories is not even evidence of the existence, much less is it the cause, of a high order of civilization. "Argus" may reply, however, that, though the Hindoos and Egyptians may use modern factories, they did not, and could not originate them, but merely borrowed them from civilized people. Have we, then, originated, or can we prove that we could have originated those methods of manufacturing which we wish to establish? No, we did not, nor could we have originated them, therefore there is no necessary inference that our possession of them will either be the evidence of, or cause of an advance in civilization. If it were so, then the great seats of modern manufactures would be the points where we should go to seek the highest civilization. For instance, Birmingham and Paisley should be more highly civilized than London and Edinburgh, Pittsburg and Lowell than New York and Boston, and so on. If, however, the modern conditions of manufacture are not the sources of higher civilization and progress, in what way are they essential to our condition? Simply in cheapening the necessaries and luxuries of life. For instance, a pair of boots, made by hand, will, probably, be at least as well made as those turned out by machinery, and the old fashioned boot-maker is notoriously much more likely to be a civilized member of society than the operative in a boot and shoe factory. Therefore it is not the superiority of the object made or of the maker which constitutes boot and shoe factories an advance upon the old methods, but, the greater cheapness of the boots and shoes which are thus produced. The cheapness, however, of boots or any other articles made by the latest machinery, does not depend on the factory being situated within the boundaries of every society which uses them, but on the contrary, is only fully reached, when the particular article desired is made in the place, which, owing to circumstances, possesses *naturally* the greatest facilities for its production. Protection, however, here steps in and asserts that people should not buy their goods from the place where they are most cheaply produced, unless that happens to be within their own limits, and therefore strikes a blow at progress, in the only sense in which it can be said that material commodities are essential to civilization. I have thus dwelt at some length in showing that factories are not themselves either a proof of the civilization of the community in which they exist, nor are they themselves necessarily conducive to the civilization, either of that community as a whole, or in that portion of it engaged in operating them; because, as I before said, the idea that such is the case, is one of the commonest and most pernicious delusions.

Hence it is not sufficient for "Argus" to contend, that because France, Germany and the United States, continue to adopt protection, it is therefore beneficial to those countries, for we have no reason to suppose that the great mass of the people of these countries know what is for the advantage of their country as a whole, or of themselves individually. Do, however, the majority of those who, in those countries, are at once educated and disinterested, advocate Free Trade or Protection? I think I can safely assert that the vast majority of the economists, in all countries, are in favour of Free Trade, and I must respectfully urge that no one who has not thoroughly studied political economy, has any more right to hold an opinion on the question than has the ordinary layman, on an abstruse point of law. Nor would most people have pretended to an opinion, if it were not that protection requires legislative action for its ally, and therefore the subject has come within the circle of politics, and consequently every man who has a vote, jumps to the natural, but very erroneous conclusion that he is competent to decide the question. I have now endeavoured to explain to "Argus" and others the real position of Free Traders, and also to show that the present condition of manufactures is an outcome, not necessarily the latest or the highest, and by no means the cause of our civilization. I am, however, afraid that for the present I must not trespass upon your space at greater length. With your permission I shall, at a future date, try and explain, why ambitious peoples, like the Americans and some of the English colonists, are in favour of Protection. In conclusion, I would say, that "Argus'" assertion that the modern forces, such as the steam-engine, are on the side of Protection, hardly deserves discussion, for it is not supported by argument or illustration. In point of fact, though all progress indirectly tends to ultimate freedom of all kinds, its factors are just as much at the service of its enemies as its friends. In other words, those who would curb the free interchange of commodities are perfectly willing, and even eager to use the forces which are the outcome of the freedom they condemn. *Roswell Fisher.*

VENTILATION OF SEWERS,

WITH SPECIAL REFERENCE TO THE CITY OF MONTREAL.

(Read before the Special Committee on Ventilation of Sewers.)

The subject of ventilation has been both written and experimented upon so exhaustively, that it is proposed to consider the subject principally with reference to our climate and the existing and future state of the sewers of this city.

To define the composition of sewer-air and its effects upon animal life are the province of the chemist and physician, and on both these questions, the leading authorities being mutually agreed, it is proposed to accept as a fact that the composition of sewer-gas is as described by Doctors Letheby and Russell, who made an extensive analysis of the air in the London sewers. The difference of opinion as to its specific gravity arises from the fact that the proportions of the gases which compose it vary at different times and places. As an example of this: in June, 1877, complaints were received by the City Surveyor of the foul state of St. Catherine Street sewer, between McGill College Avenue and Metcalfe Street. On removing the man-hole cover from the sewer the smell of coal-gas (carburetted hydrogen) was so strong that the sewer was left open some two or three hours before it was deemed safe to enter it with a light; it was then found clean, and that the smell proceeded from a leak in an adjoining gas-pipe, which admitted the gas into the sewer.

Accidents of this nature, and the ebb of the sewage, appear to demonstrate, that independent of any natural tendency of the gas in the sewer to rise, mechanical actions are at work which render ventilation absolutely necessary.

Ventilation of sewers may be divided into two kinds,—*artificial* and *natural;* the former to comprise those modes which cause a current of air to move in the sewer by means of special appliances, such as furnaces, pneumatic pumps, fans, lamp-posts, and chemical agents. All of these methods have been more or less experimented with, and are now universally condemned.—(See Henry Austin's Report of 1849 to the Commissioners of Sewers, London; Baldwin Latham's Sanitary Engineering, 1873; and the still later Report on the Sewerage Systems of European Cities, by Gustavus Warwiese.)

Natural ventilation of sewers may be defined as drawing the sewer-gas into the atmospheric air, unaided by special heat or mechanical appliances. This is the system now universally recommended both by Chemists and Engineers, so that we have to consider the best means of permitting the escape of sewer-gas and the free admission of air into sewers.

Although your committee are doubtless aware of the means usually recommended for this purpose, a brief description of them is necessary—and their respective merits and the objections against them alluded to—before considering their application to our sewers.

1st. Ventilation by special pipes up the exterior walls of buildings, and connected with the house-drains or by tile-pipes into the crown of the sewer. These pipes, generally 4 or 6 inches in diameter, and of galvanized iron, have been much recommended and successfully applied. Those connected with the crown of the sewer are preferable, as they would permit the escape of the sewer-air more readily, and their junction with the sewer would never be obstructed by the ebb of the sewage; but a great saving of cost would result from connecting them with the house-drains, which as a rule connect above the ebb line of the sewers in this city.

Some few of these ventilators are in use in this city, and have proved very successful. The objections generally urged against them are: That the warm aqueous vapour from the sewers ascending through a long metallic tube might congeal during the winter months of a severe climate. This would probably be the case if they were extensively used in this city.

2nd. Ventilation by rain-water pipes, connected with the sewer in the same manner as No. 1. This has been extensively recommended and tried by eminent sanitary engineers. As early as 1849, Henry Austin, in his report before alluded to, strongly recommended them, and as late as 1860 the Town Council of Croydon passed by-laws to this effect; but the system is now universally condemned.

3rd. Ventilation by soil-pipe. Although the carrying up of the soil-pipe through the roof is now admitted to be necessary to ventilate the house-drains, its merits as a mode of ventilating the sewers has been little discussed. Baldwin Latham, in his "Sanitary Engineering," 1873, and Waring, in his "Sanitary Drainage," 1876, both allude to its use for this purpose. Latham states: