

the investment, unless the engineering difficulties of the canal are greater than seems apparent. Looking at it in the light of present utility, as well as of safety in case of war, it seems strange that the Welland Canal was not cut to Hamilton or the Dundas valley in the first place.

CANADA does better than Great Britain, in point of a tool display, the tools shown being essentially American in design, modified somewhat, however, by British ideas. So the *American Machinist* says, speaking of World's Fair exhibits.

THE theory has just been advanced that natural gas results from salt water coming into contact with the molten carbides in the earth's interior. The author of this theory claims to have produced, by subjecting salt water to the conditions, a gas exactly similar to that found in nature.

THE joint report of Messrs. Vanier and Keefer on the Montreal waterworks recommends that an additional steam pump, of a capacity of 10,000,000 gallons per day, be bought. A comparison which these engineers make shows that proportionately Toronto has a better waterworks system. They estimate the cost of necessary improvements at \$100,000, for the low level station, and a new engine is advised for the high level service, which is now of increased importance. The report is now before the Council for discussion.

"A VERY common cause of vibration in steamships," says the *New York Engineer*, "is unbalanced screws. Very little attention is paid to this by engine builders. As a rule, not one screw in 100 is balanced in the shop; a running balance, not a static balance, is what we refer to. Centrifugal force increases as the square of the velocity, and a wheel that is only 100 pounds out of balance develops a tremendous centrifugal force at seventy-six revolutions per minute. Many instances have been known where vibration was cured by balancing."

THE velocity at which steam flows in pipes and through apertures is governed by the same law as the flow of liquids, if the gravity is considered. It is more convenient, however, to compute the flow from temperature, as follows: $V = 60 \sqrt{T + 460}$, or the velocity per second equals 60 times the square root of the degree of temperature with 460 added. The flow is nearly uniform at different pressures, and the following table will answer for nearly all cases without further calculation:

Pressure in lbs. per inch,	25	30	45	60	75	100	150
Velocity in ft. per second,	863	867	877	885	891	898	908

A NEW method for making steel with high carbon and low phosphorous economically in a basic furnace has been devised. It consists in melting scrap with carbonaceous materials. On the bottom and banks of the bath of a Siemens furnace, with a basic lining, is, evenly-placed, a layer of coarsely-broken limestone, and on this coke is laid; the scrap (which averages 0.07 of phosphorus and 0.03 of sulphur), is then charged on the top of the coke, and the charge melted down as quickly as possible. The scrap, as it melts, trickles down on to the coke, which reduces the oxide of iron formed in melting, and at the same time carbonizes the steel. When the charge is melted, additions of manganese ore and limestone are made as required. The amount of slag produced by this process is small, and it usually contains about 15 per cent. of ferrous oxide, and 25 per cent. of silica.

ONE of the best filters for removing the grease which often passes into the boiler with the feed water, consists of a metallic chamber or filter box, in which there are a series of gratings. Between the latter are placed layers of wire gauze, and flannel of a special texture, which forms the filtering medium. The feed water from the donkey-pump enters the filter box on one side, passes upward through the filter cloths, and thence out to the boiler, the scum passing away through another outlet. It is found that by this means, says the *Industrial World*, all the greasy matter and other impurities are arrested by the filter cloth, which can readily be taken out for cleansing or for renewal. The filter may be used either for land or for marine boilers.

So many of the earlier suspension bridges have failed through the corrosion or disintegration of their important members, that French engineers give the opinion that forty years is the limit of life for iron suspension bridges. Consequently, in making calculations for railways, provision should be made for replacing such bridges at the end of that time. Whether any similar limit should be set to the life of iron girder bridges is not so certain. Many such bridges have failed through decay, but whether decay in a girder bridge can be easily detected, and the weakened members economically replaced or repaired, is a problem as yet unsolved. The opinion is also now generally held that the tests ordinarily applied to old bridges suspected of serious corrosion, namely, that of running a train of locomotives over it, is far from being adequate. Bridges thus tested have failed soon afterward under moderate strains.

H. KENDRICK, secretary to the Chignecto Marine Transport Railway Company, has, says *Transport of London*, replied at greater length to the strictures of the *Financial News* with regard to the undertaking. It is pointed out that the directors have never ceased to endeavor to obtain funds sufficient to complete the undertaking, but in the present condition of the money-market it is difficult to raise money for any purpose whatever. The shareholders and bondholders, the persons chiefly interested in the completion of the line, are well acquainted with all the steps which have been taken towards the attainment of the object in view. The owners of the coasting craft fear the competition of the railway, and the hostility of Halifax to the enterprise is notorious. Credence should not, therefore, be too readily given to injurious statements as to the Company. Here is an extract from the Company's official at Halifax, taken from a letter dated 30th June:—"You will be glad to know that, in spite of the late severe winter and great amount of frost, very trifling damage has been done, either to the cuttings or embankments. I walked over the railway to Tidnish on Thursday, and found everything, both on the line and at Tidnish, in a satisfactory state."

WHEN testing a steam gauge to ascertain its correctness, says the *Stationary Engineer*, it is better to make the pressure at which steam is usually carried the important point for determination. A gauge may be true at low pressure and wrong at high pressure, or *vice versa*. By many it is not considered advisable to use a gauge for recording pressures as high as shown on the dial, for few springs will stand such an extension without becoming permanently set, to a certain extent, and especially is this the case with the cheaper gauges. It is not a difficult matter to devise means for compar-