proficient in either branch, marks just alike. I would go further—I would give every boy some manual training. It will do him good in more ways than many people think of.

I saw a short time ago that the Trades and Labor Council of Toronto, condemned manual training in public schools. Why they did so, or what their object in doing so was, I confess is an enigma to me. They usually uphold anything that will be a benefit to the working man, and by what manner of reasoning they conclude that manual training is against their interests, passes my understanding. They pay taxes to help make boys good lawyers, doctors or ministers, by special instruction, but their own sons who are determined to be mechanics, must not have any special chance in their school days. Why? Will these boys when they leave school, and are apprenticed to any mechanical business be any the worse for special study and manual training? If they are quick, and soon master their tools, will they not be worth more money to their employers, and consequently get more for themselves? When I learned my trade, if I could have shown my employer that I could take a hammer and cold chisel and chip a sprue off a casting without hitting my hand twice while I hit the chisel once, or if I could have shown him that I could grind a drill properly without spoiling a ½ inch of steel and a ½ hour's time, I know that I could have got enough money out of him to have paid my board the first year, instead of working for $2 a week and board myself. Nor would it have hurt me while I was at school to learn these things, neither would it have injured the business of the "jour" in the shop at that time.

I wondered when I read the resolution of the T. & L. Council condemning manual training, if the members were all old bachelors and had no children to educate and provide for. If the T. & L. Council and all labor organizations, would expend their energies in getting the employers to only take the proper number of boys, and give them a good chance to become first-class mechanics, paying them fair wages from the first and increasing as the boy becomes more proficient and useful, they would be helping to mend matters in the labor world. If they would also do what they can to help prepare good boys to learn trades, they would certainly be doing a good work in the labor world.

I have some boys in my family, and I hope they may be able to get manual training in our schools, and a technical training in a school of science. I am sure it will not injure them or their fellow workers, and if the employer does not substantially appreciate it, I have missed my guess.

BOILER INSPECTION.

THE following address delivered by the President at the Convention of Boiler Inspectors held at Pittsburgh, Pa., Nov. 20th, is worthy of the careful consideration of every steam-user :—

Gentlemen of the Convention : We have assembled for the purpose, as I understand it, of taking counsel one of another as to the best means of accomplishing the objects for which the office of boiler inspector was created. The number of lives annually lost by explosions of steam boilers is so great, that it appears almost incredible that a majority of our states and cities have done nothing towards securing a proper inspection of so necessary and yet so dangerous an adjunct of our manufacturing and mercantile industries. In all manufacturing establishments of any importance, steam power is a necessity ; and in hotels, mercantile establishments and other large buildings, it has come to be regarded as an essential requisite. Nothing that is so extremely dangerous, so liable to cause loss of life and valuable property, as steam boilers undoubtedly are, should be permitted to be controlled by men who are ignorant of their management and know nothing of their danger. One more source of trouble and serious accident, resulting from the use of steam boilers, is chargeable to the unwise policy of steam users employing inexperienced and incompetent men as engineers ; a position so responsible as that of engineer of a stationary engine is acknowledged to be, should not be occupied by a man who knows nothing of the management either of an engine or boiler. Why does any man incur such a risk to his own safety and that of his property? There is but one answer ; an incompetent man will work for less money than a competent man will. Should this be allowed, should any man, because thereby he may save a few dollars a month, be permitted to endanger the lives of his employes and of his neighbors?

Most men of middle age have a vivid remembrance of the frequent occurrences of boiler explosions on our waterways ; they were happening weekly. I once recollect of three explosions in one week on the Mississippi river, with a loss of one half million of dollars and sixty odd lives. There were hundreds of lives and thousands of dollars worth of property continually being killed or burned, or finding a final resting place at the bottom of some river or lake. It is not so, to-day, for we seldom hear of the boiler of a steamer exploding, although there is a larger number of marine boilers at the present time than there was before or during the war. What has wrought this wonderful change? Inspection of boilers and competent licensed engineers. The inspectors are competent men appointed by the general government to examine every steamer's boiler, and no one can assume the position of marine engineer unless he is armed with a certificate of the government that he has been examined and found to be qualified for the position. Why should not the applicant for the position of engineer of stationary engines and boilers be subjected to a similar test? Not in a few cities, states or countries, but the service should cover the entire country.

I have a list of explosions from March 1870 to March 1888 which I do not claim comprises all the explosions. It gives 2,267 explosions with 4,068 killed and 4,710 wounded. Of these, 801 explosions where 1,476 were killed and 1,122 wounded, were of threshing machines and saw mills. By carefully looking over the records of explosions, you will find in localities where there is an inspection service, there is not to exceed one third the explosions that occur where there is no inspection service ; you will also find in localities where an insurance company is doing inspecting there is quite a reduction in the number of explosions. It cannot be expected that the insurance inspection would be as effective as state or city, as it cannot be made compulsory. I find in the city of St. Louis that the insurance inspection is a great assistance to our service.

We have much to learn, and no one should hesitate to avail himself of all knowledge that presents itself, come whence it may. We should willingly learn all we can relating to our special duties and as willingly apply all we know to the accomplishment of the good work in which we are engaged ; we are endeavoring to protect life and property of the people and there is no service that is so great a protection to life and property. I also hope that before we separate we shall have effected a permanent organization. We should meet annually that each one may receive new encouragement and strength from the experience of the previous year.

The press can be of immense benefit to us and the service we represent, by disseminating facts bearing upon the subject of boiler inspection. As to what may be done here I have no doubt that the reporters will place us in a proper light before their readers. There is no aid so desirable, none so powerful as the support of a free, fearless and unrammeled press and its mission is to give its readers unvarnished facts and such comments as may be deemed necessary to a proper understanding of the subject.

BRASS AND ITS TREATMENT.

BRASS is perhaps the best known and most useful alloy, says the Boston *Journal of Commerce*. It is formed by fusing together copper and zinc. Different proportions of these metals produce brasses possessing very marked distinctive properties. The portions of the different ingredients are seldom precisely alike ; these depend upon the requirements of various uses for which the alloys are intended. Peculiar qualities of the constituent metals also exercise considerable influence on the results.

Brass is fabled to have been first accidentally formed at the burning of Corinth, 146 B. C., but articles of brass have been discovered in the Egyptian tombs, which prove it to have had a much greater antiquity. Brass was known to the ancients as a more valuable kind of copper. The yellow color was considered a natural quality, and was not supposed to indicate an alloy. Certain mines were much valued, as they yielded this gold-colored copper, but after a time it was found that by melting copper with certain earth (calamine) the copper was changed in color. The nature of the change was still unsuspected.

Alloys of copper and zinc retain their malleability and ductility when the zinc is not above 33 to 40 per cent. of the alloy. When the zinc is in excess of this a crystalline character begins to prevail. An alloy of one copper to two zinc may be crumbled in a mortar when cold.

Yellow brass that files and turns well, may consist of copper 4, zinc 1 to 2. A greater proportion of zinc makes it harder and less tractable ; with less zinc it is more tenacious, and hangs to the file like copper. Yellow brass (copper 2, zinc 1) is hardened by the addition of two to three per cent. of tin, or made more malleable by the same proportion of lead.

There would be less diversity in the results of brass castings if what was put into a crucible came out of it. The volatility of some metals, and the varied melting points of others in the same mix, greatly interfered with the uniformity in ordinary work. Zinc sublimes (burns away) at 773 to 800 degrees, while the melting heat of the copper with which it should be intimately mixed in making brass is nearly 1750 degrees. Copper, zinc, tin, and lead in varying proportions form alloys, always in definite quantity for a given alloy. The ease with which some of the metals are burned away at comparatively low temperatures, renders it a very easy matter to make several different kinds of metal with the same mix. This very thing occurs, and the great difficulty in getting bearing brasses uniform in quality causes some engineers to babbitt all bearings as the best way to insure uniformity. One lot of castings may be soft and tough, another hard, and so on.

Zinc is added the last thing as the crucible comes out of the furnace, and the mixing of the mass is a matter of uncertainty. If the metal is too hot for the zinc a large percentage goes off in the form of a greenish cloud of vapor, and the longer the stirring goes on the more escapes. The two metals which enter into the composition of brass have an affinity for each other, but they must be brought into intimate contact before they will combine. Some brass founders use precautions to prevent volatilization of the more fusible metals, introducing them under a cover of powdered charcoal on top of the copper.

"Brass finishes" is a term many understand as applied only to those who produce highly-furnished brass works ; but it is not so ; the brass finisher's work is not the superior class of work supposed, most of it being comprised in gas fittings, ormolu mounts, etc., but the highest class of brass finishings is a totally different process. Fittings for gas work, all finished well enough for their several purposes, and as well done as the price paid for them will allow, as well as the mountings for furniture, must obviously be produced at a low rate, in order to supply the demand for cheap work of this character, most of which is simply dipping, burnishing, and lacquering.

Let us follow the process of finishing the highest class of brass work, says the *Engineer*, of Glasgow. Before commencing to polish, all marks of the file must be removed, and this is done thus : Having used a superfine Lancashire file to smooth both the edges and surfaces, take a piece of moderately fine emery paper and wrap it tightly, once only, round the file. By having many folds round the file the work becomes rounded at the edges, and so made to look like second-rate things. Some use emery sticks, made of pieces of planed wood about ⅜ inch thick and ¾ inch wide, quite flat on the surfaces. They are covered with thin glue, and the emery powdered on to them, and then allowed to dry hard. Most common work is rubbed over, not to say finished, with emery cloth. This will not do for good work. The paper folded once round the file is used in a similar manner to the file, and when the file marks disappear, and the paper is worn, a little oil is used, which makes it cut smoother. The edges and surfaces being prepared to this extent, the edges must be finished. To effect this take a piece of flat, soft wood, and apply to its surface a little fine oil-stone powder ; be sure that it is quite clean, as it is very annoying to make a deep scratch in the work just as it is finished ; perhaps so deep that it will require filling out.

THE FLOUR INDUSTRY OF SOUTH AUSTRALIA.

THE manufacture of flour has made rapid strides during the past few years, and the introduction of the roller system has given it a great impetus. The quality of our wheat enables the miller to turn out an article which commands attention in any part of the world, and it is not so surprising, therefore, that a ready sale is obtainable in places where competition is not so keen as to cause too great a difference in prices. It is only of late years that China has been drawing supplies from South Australian flour, but during the present season a large quantity has found its way to Hong Kong. New South Wales has for many years purchased in this colony, and during the last twelve months close on 20,000 tons have been sent to Sydney and some 10,000 tons to Queensland, another old customer. Some 3,000 tons have gone to S. Africa, and Ceylon, New Caledonia and Cochin China have also drawn small lots. For the twelve months ending 30th September, 75,349 tons have been exported, representing a value of £647,463. Of this 60,000 tons is credited to Port Adelaide, Port Pirie coming next with 8,628 tons. For the manufacture of flour there are 85 mills in the colony, with a total horse-power of 2,951, and employing 614 hands.—*South Australian Register.*