

concrete or the columns and beams may be built of reinforced concrete throughout.

To do this wooden forms or centering is constructed and on these the concrete is laid. Steel rods are introduced in the concrete beams and columns by way of reinforcing them. Concrete structural work of this kind can be made just as strong as steel work of approximately the same sizes when protected. The floor slab should in my opinion be of concrete reinforced with expanded metal finished on the top surface with cement trowelled smooth or a hardwood surface flooring laid on the concrete.

The roof should be built on the same principle as the floors, but a weather-proof surfacing of metal, asphaltum or felt should be added, the skylight curbs and pent-houses should be constructed in concrete or porous brick.

To make this building completely typical, the stairs should be of concrete and completely enclosed at each floor, and there should be an automatic self-closing fire door at every entrance. The elevators should also be enclosed with brick walls or with expanded metal and cementine walls with a self-closing fire door at each opening.

The window frames and sash should be of sheet metal with rivetted or lapped joints and the glazing of all windows exposed to an adjoining building should be in wire glass or luxfer prisms in copper glazing.

Of course this is not the cheapest style of building you can erect, but it is not so very costly. I have found that compared with first-class heavy mill construction, all of wood, the cost is the same or approximately so. Compared with the cheaper forms of mill construction, there is an addition of from 5 to 10 per cent. to the total cost of the building. To offset this the insurance of the cheaper building is two or three or even five times as much as on the fireproof building I have described. On a valuable building and contents this becomes an immense economy, and would pay the interest on a much greater increase of outlay.

If it is better to have incombustible brick walls than wooden ones, it is equally advisable to have incombustible floors and partitions, rather than three by twelve joists and inch flooring. The law compels you to build safe walls, prudence should cause you to adopt equally safe construction for the floors and roof.

We are doing very well in Canada in building this modern type of factory building. In the recent developments of hydraulic and electric power almost all the power houses are fireproof after one or other of the types I have described. The great feature of the really modern factory building is immunity from destruction by fire. The sooner this is generally recognized and acted upon the sooner the business community will be relieved from the enormous drain on their resources from fire losses.

MACHINE SHOP NOTES FROM THE STATES.

By CHARLES S. GINGRICH, M.E.

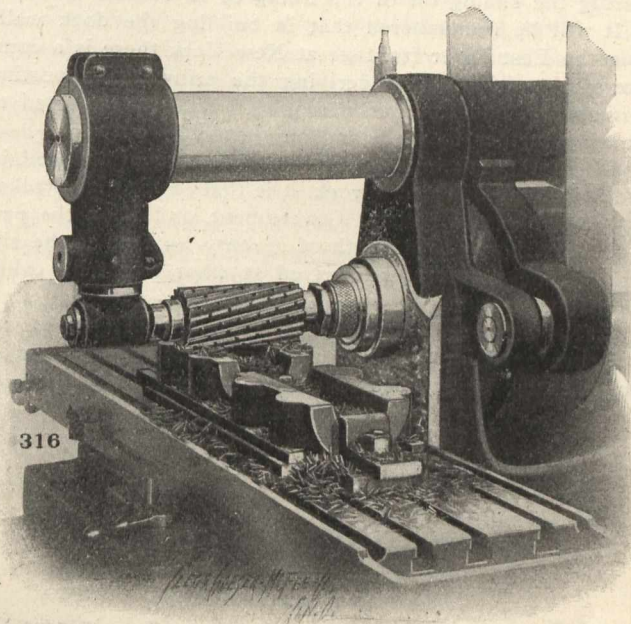
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Those of us who have at some time in our lives been connected with general machine shops, will remember having made special efforts to so arrange the design of machines that castings could be used without any machining; or, if this could not be easily accomplished, with as little machining as possible. The writer certainly recalls such cases in his own experience, and has a distinct recollection of instances of a vast amount of time having been spent to accomplish this result, beginning with the drafting-room and carrying the effort through the pattern shop, only to find that the foundry could spoil it all by careless moulding.

For the most ordinary work, as for instance, bearing caps such as are used on most wood-working machinery, laundry machinery, and in fact, all machinery of that class, even the best castings seldom come from the foundry with the under sides perfectly flat, these invariably requiring some chipping and filing to make them lie flat, and while this may

have been all right in the old days, it certainly is getting to be a very expensive process in the light of recent developments of machine tools.

As proof of this assertion, I submit an illustration of a milling machine facing off bearing caps which are 6" wide over all, at a table travel of more than 14" per minute. The milling cutter is of high speed steel, and this cut is taken across two caps as shown, in less than one minute's time.



The finished caps are perfectly flat, and a great deal better than a rough cast cap could possibly be. The miller is not a large one, either, it being a No. 2 Plain "Cincinnati." This certainly is a great deal cheaper than chipping and filing, gives very much better results, and also cuts down the expense in the foundry.

THE REVETMENT WALL AT THE QUEBEC DOCKS.

Editor Canadian Engineer:—

Sir,—Some few years ago I read before the Society of Civil Engineers of Canada, at Montreal, a paper on the "Instructiveness of Failure," the fact of a structure remaining secure or intact, being proof only that it is strong enough, while at the same time it may be 10 or 20 times as strong as it need be.

Here is another and glaring example of the "Instructiveness of Failure." It will have been noticed by engineers, and in fact by almost any one visiting the Quebec docks, that, from the moment of their termination, they began to lose their straightness of outline. The walls have not only lost their original batter, but have gone on leaning over towards the open until they have had to be tied in by iron rods at intervals, and have actually burst and fallen in great masses into the basins, and those which have not as yet parted company with the structure, are bound sooner or later to follow the same fate.

Hble. Mr. Laliberte, Chairman of the Harbor Commission, Que., is credited with the idea of immediately rebuilding the broken or fallen portions. I have, therefore, written him recommending that he do nothing of the kind, except temporarily, but on the contrary, remove the masonry, reinforce the foundation, and then rebuild the revetment wall. The reinforcement of foundation would consist in underpinning the present cribwork by a row of piling, which, as it cannot be so placed that the cribwork may rest directly upon it, must be driven outside the cribwork, with shouldering pieces thereto, and the whole thoroughly bolted. The piles should be driven to some 15 or 20 feet, or until stopped by the resistance of the soil.