do well to seriously entertain. It was that they should endeavor to obtain a legal standing by means of a charter, something after the manner of the Architects Association, and themselves appoint a *Board of Examiners*, who would have power to issue diplomas or certificates of competency to the members. These would undoubtedly carry much weight with steam power owners desiring the services of the best and most skillful men. The association could then, by a guarded and careful use of the powers conferred upon it, raise the standard of qualification considered necessary for the position of a first-class engineer without doing injustice to a large class of men, perfectly practical and able to fill minor positions with acceptance, but who would be unable to pass an examination in the higher branches of the art. The Bill before the Legislature for the inspection of boilers and licensing of engineers is presumably introduced for the protection of the public, and in the public interest. This being the case, it is difficult to see why steam powers under fifteen horse power should be exempt. It is notoriously this class of boilers that cause the most trouble, and the reason is not far to seek. They are usually tended by men or boys with no special qualifications for the work, and who frequently have the most of their time and attention occupied by other matters. Large installations of steam power are usually in the hands of men who know enough not to risk their own lives or the lives of the public, whatever they may know about the economical management of the machinery under their charge. The opposition developed to the passage of the Bill in question was no doubt largely due to this appearance of class legislation, but if the Association had under their own control, in the manner suggested by Mr. Gibson, the examination and certificating of their own members, the difficulty would be obviated by a proper grading and classification according to competency and experience. An employer would then by application to the society be enabled to obtain a man who could be relied upon as competent to take charge of anything from one horse power to one thousand, as might be required. And now a word in the ear of our friends of the engineering society. Remember that no amount of legislative enactment will increase the value of the services of an incompetent or careless man, or raise the standard of the profession. You have in your own hands the means of attaining a higher position and increased emolument, but it will not be by an Act of Parliament or by assuming any position that savors in the slightest degree or has the most remote appearance of an attempt at coercion. Leave such things to those whose intelligence and abilities are not great enough to place them on a higher plane. You can do it by making for yourselves and your society a reputation that will *command* respect. Let your members be painstaking and conscientious in the discharge of their responsibilities. Waste no time in listening to the blatent harangue of the demagogue or in profitless hunting around for the few soft spots that may perchance be found amidst the hard and stern realities of life, but rather seek to improve the precious moments by an earnest endeavor to attain that knowledge and perfection of skill that shall compel the attention of those whose province it is to judge. Do this, and see that there is no favoritism in your recommendations, but that a high standard of merit and character is required, and your certificate will be more sought after and carry more weight than the best of government endorsement which any man, whatever his character may be, could probably purchase by the judicious expenditure of a five dollar bill.

PERSONAL.

Friends of Mr. J. A. Ferguson, the able chief engineer of the Toronto water works, will regret to learn that he is incapacitated by illness from performing his duties for a season.

Mr. O. P. St. John has resigned his position as steamboat inspector at Toronto, and has gone to British Columbia as the representative of the Doty Engine Co. of this city. Mr. St. John possesses the practical and scientific information, which added to a kind, gentlemanly demeanor, will undoubtedly secure for him and the company he represents a large measure of success.

The following comparison shows the great economy of electricity over water power for elevators: The duplex steam pump uses 8 pounds per hour for each h. p.; the engine which drives the dynamo to furnish electricity to the same extent uses, at most, 4 pounds. Only one-fifth of the power developed in the driving engine is used for operating the elevator. The safety appliances of one kind may be applied to all.

WHAT HAPPENS WHEN THE VALVE OPENS.

By A. N. Somerscales.

So long as a safety valve remains shut, the steam pressure acting on the underneath side of the valve is opposed by the weights of the load resting on the top, which may be either dead weight, a helical, spring, or an arrangement of one of these acting through the agency of a lever.

Now, either by calculation or by trial, it is possible to proportion the load to the area of the valve so that the valve shall be lifted off its seat when the steam has reached any particular pressure fixed upon as the blowing-off pressure.

Thus, if the area of the under side of the valve exposed to steam is exactly 12 square inches, and the steam is required to blow off at 100 pounds per square inch above the atmosphere, it will be necessary to provide a load $12 \times 100 = 1200$ pounds upon the valve, including the weight of the valve itself.

It is thus clear that the first condition, namely, that the valves shall open when the pressure reaches a certain determined amount, is not difficult to fulfil.

But now consider what happens when the valve opens.

The slightest amount of lift off the seat allows the steam to escape in all directions through the annular orifice between the edge of the valve and seat.

Its velocity is very great probably 800 feet per second.

The steam in the immediate neighborhood of the valve seat escapes first, and its place is necessarily taken by other steam from the boiler, which also escapes.

A current is thus set up, not only through the orifice furnished by the valve, but also through the pipe leading to the same.

Now, a fluid will not commence to flow unless there is less pressure in front than behind.

When we find, therefore, that the steam is rushing up the pipe leading to the valve seat, with any considerable velocity, we may be certain that there is less pressure at the top of the pipe near the valve than at the bottom of the pipe next the boiler.

In the case of a dead-weight valve, if it has to remain open and permit steam to escape, there must be as much pressure under the valve as balances the load on top.

And as we know that the pressure under the valve is less than the pressure in the boiler, the sole condition under which the valve can be kept open and allow steam to escape is that there must be some (however slight) accumulation of pressure in the boiler over and above the load on the valve.

For example, we may suppose the valve loaded to 100 pounds per square inch, and the difference in pressure between the top and bottom of the pipe to be 4 pounds when the steam is escaping.

Under these conditions the boiler pressure will become 104 pounds when blowing off.

To trace the action of the valve more closely, we may say that when the steam first begins to blow off, the valve will rise a very small distance off the face so little indeed that the velocity of the steam up the pipe will be small, and the reduction of pressure at the under side of the valve inappreciable.

The small orifice thus opened being insufficient to relieve the boiler, an accumulation of pressure will result.

The extra pressure acting on the valve will increase the lift until the reduction of pressure through the velocity of the steam in pipe is only just sufficient to balance the load on the valve as before.

If the boiler is still making steam faster than it is escaping, a further accumulation will occur, and a further adjustment take place.

But at any instant the pressure on the under side of the valve will always be 100 pounds above the atmosphere, even when the accumulation of pressure in the boiler is considerable.

Now, in order to prevent any considerable accumulation of pressure occurring when blowing off, it has always been the practice to make safety valves very much larger than the size of orifice actually required for the escape of all the steam which the boiler can make.

If an area of about one-thirtieth of a square inch is actually required for the steam to blow through, the board of trade requires an area of half a square inch in the safety valve.

Such being the practice, it follows that safety valves only need to lift a small fraction of an inch off their seats when blowing off, thus avoiding much accumulation of pressure due to the cause we have been considering.