

Mr. STEPHENSON addressed the Meeting in the following terms, on taking the chair for the first time, after his election as President:—

GENTLEMEN,

My first duty is to thank you for the high honour that you have conferred on me by electing me to be your President. At the same time I very earnestly ask you to continue the valuable aid which has for so many years maintained the prestige of this Institution, and will, I hope, enable me to carry on the work with the success which has distinguished the Presidency of my able friend and predecessor, Mr. Harrison. I am fully sensible of the responsibilities belonging to a position of which any member of our great profession might well be proud. In accepting the onerous duties that are inseparable from it I look to you,—I will not say for indulgence in any shortcomings of my own,—but for that ready co-operation, which my predecessors have never asked for in vain, and without which I cannot hope to fulfil the claims of the office.

I am sure you all share with me a feeling of deep regret, that the continued indisposition of your late senior Vice-President, Mr. Hemans, has prevented him from taking the place which I now occupy. We all know how well he was entitled to it by many years of faithful service in your councils, and by those personal and professional qualifications which rendered him so worthy a representative of this Institution.

It has been customary for your Presidents, in their addresses, not only to pass before you, as it were, in a general review, the engineering works of the period immediately preceding their accession to office, but to recall, often in a picturesque, and always in an interesting manner, the earlier and more remote achievements of the founders of our profession. I can propose no such task to myself, not only because those who have been before me have already carefully traced the history of various branches of engineering science, but because I cannot expect to make any useful addition to the series of interesting sketches which have been presented to you from this chair. I shall therefore confine my remarks to a very slight reference to some important works, and to a consideration of subjects which, in my opinion, demand earnest thought and study on the part of engineers, and require intelligent appreciation by the public.

SEPARATION OF GOODS AND MINERAL TRAINS FROM PASSENGER
TRAFFIC ON RAILWAYS.

Your late President stated, in his address, that,

“Although in England the employment arising from the construction of railways is not so great as it has been, there is still a large amount of work to be done, to meet the increased requirements of the traffic of the country; and in foreign countries this branch of practice will for a long time demand the attention of the rising generation of civil engineers.”¹ This is doubtless a correct statement in general terms, and for some time past we have been reminded that extensive railway works in this country are drawing to a close and will necessarily be fewer and fewer. I am strongly of opinion, however, that,—though the works which have yet to be completed, will not afford employment for all who may make railway engineering their special study,—the time is not far distant when very considerable extensions of existing works will be required, to provide for the increased mineral and coal traffic of the country. I refer to the necessity—which is more and more pressing—for increasing the means of transit for heavy “goods trains,” and for separating them (and especially the “coal trains”) from the passenger traffic on our crowded main lines. Up to the present time various plans for effecting these objects have been brought before the public. Since the latest of these schemes was proposed there has been an enormous increase of traffic on railways in connection with coal and mineral districts. A great accumulation both of passenger and “goods” service finds the provision of our lines still seriously inadequate, though railway companies have endeavoured to meet the growing difficulty either by forming some new lines or by widening those already at work. Not only public convenience, but public safety demands a very much greater extension still, and I believe that the best, and the most probable remedy, for a condition that may soon become insupportable, is the separation of goods and minerals from the passenger traffic on our main lines. That means must be adopted to simplify the present system is inevitable, and I cannot doubt that those companies whose traffic with the mineral districts is largest, will find it to their advantage to push on the duplication of their lines, in order to meet the exigencies caused by the enormous development of their business, and to effect the division that must soon be imperatively required. The separation, judiciously carried out, will, I think, be an economical advantage.

¹ *Vide* Minutes of Proceedings Inst. C.E., vol. xxxvii., p. 227.

The greater portion of the stock is already in existence; the cost of management would be little increased, and the gathering lines in the coal fields, the coal depôts, and the lines in London for distribution to the consumers, are already in the hands of the companies. A still greater consideration is, that heavy freights would be conducted at less than half the speed at which they are now conveyed; so that engines would take a largely increased load, and the frequent "shunting," which is so destructive to wagons and causes such loss of time on the road, would be reduced to a minimum. The ordinary wear and tear of running stock would be considerably diminished, while coal would arrive in London in better condition, and would eventually be delivered to the public at a lower price in accordance with decreased cost of transit.

As each year passes new works add their traffic to the already crowded lines, and every year increases the difficulty of carrying on this traffic between frequent passenger trains. At the same time the reduction of the cost of transit by sea is greatly enlarging facilities for carriage by ships.

The erection of extensive docks in the coal rivers, the provision of effective staithes and cranes for rapidly loading and unloading, and better means of communication with the collieries, are advantages which have accompanied the building of a class of larger carrying vessels. To these may yet be added ships of a still larger size, the propelling cost of which will be further reduced, so that there is an absolute certainty of the freights by sea being diminished.

On the other hand, as the increased mineral and passenger traffic on railways are not separated, the existing difficulty of running fast coal trains between passenger trains will continue to add to the cost and danger of transit. Thus, while the cost of the sea route is being reduced, carriage by railway is becoming dearer and dearer. The consequence will be that the shipping trade will command the bulk of the Newcastle and Durham coal freights to London, and when we remember that coal and mineral lines have usually filled the pockets of shareholders to a greater degree than passenger lines, it becomes a matter of great importance to the railway interest that this carrying trade should be secured to it. I think, then, it is obvious that in any case a very large amount of work remains to be done in the shape of additions to the present means of conveyance on railways,—and if the views which I have expressed be correct, a great increase of construction in the shape of new or duplicate lines, together with the public demand for improvements of rivers, drainage of towns, new docks, harbours,

land reclamation, and gas and water supply will afford much future employment for engineers in this country.

HARBOURS OF REFUGE.

During a recent visit to several places on the Mediterranean I was equally surprised and interested by the extent and variety of the great works which, during the last few years, have been constructed for the protection and secure accommodation of shipping, along the whole extent of coast from Marseilles to Naples.

The attention of the English traveller is arrested—even if his national pride be not disconcerted—both by the provision of excellent harbours of refuge, and by the admirable and complete methods which have been adopted for lighting the entire coast.

The magnificent works at Marseilles; the fine harbour at Genoa; the formation of the Bay of Spezzia into a harbour of refuge by means of a breakwater; the grandly conceived half-moon breakwater at Leghorn, and the extensive constructions in progress at Naples, compel the admiration of the English visitor, and cause him to reflect how few and inadequate are the provisions made in his own country for the safety of ships and the protection of life and property at sea.

On parts of our coast, which may be said to be crowded with shipping, the need for maritime works and places of security is painfully obvious, and I was gratified to find on my return from abroad last year, that Sir John Coode had, in an able lecture delivered at the Royal United Service Institution, taken up the subject of providing harbours of refuge, along with those strategic harbours which came more immediately within the scope of his address.

As long ago as 1845 or 1846 it was proposed to construct a harbour of refuge near Margate, and it became my duty to accompany Mr. Rendel and Mr. Robert Stephenson to make an examination of the coast. Shortly afterwards an inspection of the east coast was made with a similar object; but though even at that time the traffic was so great as to arouse serious apprehensions, because of the want of maritime works, for securing the safety of the vessels engaged on that coast, the whole subject was permitted to lapse, and, so far as the east coast is concerned, to fall into oblivion.

It is only those who are actually acquainted with the perils that threaten shipping on the British coast, and who have some practical knowledge of the need for greater security, as well

as the means by which it may be attained, that can bring the subject of providing harbours of refuge prominently before the Government and the general public.

Several years ago, in the course of my duties as one of the Engineers-in-chief to the Danish railways, and to canal and reclamation works in Holland, I had frequently to cross the North Sea in all its varied and usually boisterous conditions. I have always been proof against the common enemy of most landsmen, so that I had many opportunities of estimating the extreme difficulties, and of observing the constant dangers, which beset brave and trustworthy men, held responsible for the lives and property of those committed to their charge.

Need I say that the necessity for providing harbours of refuge has vastly increased since that time, and, according to the best information obtainable, continues to increase, because the traffic conducted by the mercantile marine will always be in proportion to the growing commercial activity of the country. Of this commercial activity, the eastern coasts of England represent a very considerable portion; and when we remember that the proportion of wrecks and casualties at sea is also increasing to a terrible extent, it should surely be our duty, on every proper occasion, earnestly to demand that the remedy should be provided efficiently and at once.

From the North Foreland to the Frith of Forth, the east coast has no harbour in which a ship can seek shelter, with anything like safety, in heavy gales.

It is true that at several of the large coal ports a great deal has been done by private enterprise. I may instance those improvements in the Tyne, where a very large expenditure has been incurred in building piers, conducting dredging operations, &c. By these means a much greater depth of water has been obtained; but such works cannot be classed with proper harbours of refuge. They have not even diminished the anxiety or the actual dread which the sailor feels when he is compelled to run for a harbour where the danger to which he is exposed becomes greater after his ship is inside the pier heads.

This painful need of maritime works on our coast is the more remarkable when we observe what has really been effected in those places where some of our foremost engineers have had the opportunities of carrying out their designs.

The magnificent harbour at Holyhead, begun by the late Mr. Rendel and completed under the able management of Sir John Hawkshaw, is regarded by the whole nation, if not by every trading nation in the world, as an inestimable boon to the per-

petually increasing fleet of merchant vessels which come from all countries to Liverpool.

The Plymouth breakwater and the Portland breakwater, the latter begun by Mr. Rendel and completed by Sir John Coode, have fulfilled the most sanguine expectations, and are achievements of which the country and the profession are justly proud. The skill with which they were projected, the ability with which they were carried out, and the grand result attained by the saving of life and the preservation of property, have raised them to the rank of some of our greatest national possessions.

From whatever point of view we regard the neglect of the Government to provide harbours of refuge on the east coast, our wonder increases.

Large sums are spent (and doubtless they are well spent) in maintaining training ships, and in instructing lads for becoming sailors in the Royal Navy. At the same time, it is proverbial that "the coasting trade breeds sailors for the service of the country." It surely follows, then, that if it be desirable to spend money in educating a youth to be a sailor, it is no more than the plainest economy to protect and encourage the sailors who are ready-made, and are not only maintained without cost, but contribute, by the enterprises in which they are engaged, to the material prosperity and commercial success of the country.

I cannot quit this topic without expressing my belief, or at any rate my hope, that the time must shortly arrive when there will be a demand that some portion of the heavy revenue derived by the Government from the east coast maritime trade shall be devoted to the purpose of extending to shipping navigating the North Sea, the security of places of refuge such as will give it advantages already enjoyed at other parts of the English coast.

OCEAN STEAM NAVIGATION.

For several years past, the attention of engineers has been earnestly directed to the great question of improvements in ocean steam navigation; but the general public has very little notion of the difficulties which marine engineers have had to contend with in their endeavours to produce engines capable of affording a maximum speed with a minimum consumption of fuel.

It is remarkable, however, that recent improvements have mostly been founded on an invention which, though admitted to be correct in principle, and admirable as the design of a highly scientific mind, required many subsequent adaptations to secure

the success which it has since achieved. The engines which were in use at a period within the memory of some who are here present were incapable of accomplishing distant voyages without visiting numerous stations for the purpose of coaling, a necessity which caused a great increase in the cost of ocean traffic.

Thirty-six years ago Mr. Hall designed, patented, and constructed a marine engine of a new type, which, though it failed at the time to accomplish all that he hoped from it, was destined to overcome the serious difficulties that then beset steam navigation, because of the able experiments and additions which it suggested, and which were afterwards applied to his invention.

Indeed, it is not too much to say that marine engines, even of the most recent construction, are identical in principle with those projected by Mr. Hall, as regards the means adopted for the economy of fuel. This is a very significant fact, worthy of grave attention on the part of some of the younger members of the profession, since it shows the extreme importance of that close attention to practical details without which even the most admirable contrivances may for a long time fail to produce beneficial results. Unhappily, the man who, by his own great ability, presented to the world a plan which, when it was fully understood and wrought out, saved hundreds of thousands of pounds every year, not only died without recompense, but without that recognition of his talents which he had so worthily earned.

Following up his system, however, our marine engineers have succeeded in producing machinery which enables us not only to uphold our position as carriers for the world, but to traverse ocean routes which were formerly beyond the reach of steam navigation. Working with 50 or 60 per cent. less of coal, we can make voyages that were once regarded as extremely difficult, if not impossible, and at the same time are enabled to carry a much larger cargo, inasmuch as less space is required whether for stowage of fuel, or for the engines and boilers.

Before leaving this subject I should mention my conviction that much may yet be done to produce steam power at a still cheaper rate, and I would call the attention of the younger members of our Institution to the immense benefits which must accrue to them and to the country by new and successful research in this direction.

Not very long ago experiments were made on a moderately large scale by injecting the common atmosphere into the boilers of a steam ship, and though the results were not altogether satisfactory, I am strongly impressed with a belief that further investigation may ultimately lead to success.

I may also mention that experiments which have been made on the Clyde, in order to expel the water and air which are formed in the condenser, may eventually enable us to save some of the power now absorbed by the air-pump, and as these improvements are directed to the vital portions of a condensing engine, they are well worth the serious attention of those who are interested in steam navigation.

LOSS OF STEAM VESSELS AT SEA.

The ship itself being so closely allied to the engine, it may not be out of place to offer here a few remarks upon the loss of vessels, and to endeavour to account for the frequency of such calamities.

Every engineer must have noted comparatively recent records of the number of steam ships bound for the Baltic and the Mediterranean, and foundering during their passage of the North Sea and the Bay of Biscay. These accidents have frequently been attributed to overloading, but though I am a decided advocate for keeping a sharp look out in order to prevent this practice, I am obliged to confess that in a great number of instances overloading does not to my mind satisfactorily account for all such disasters.

It should be remembered that in gales of wind, steam ships of the present type are handled differently from sailing ships. So long as canvas will stand the pressure, the sailing vessel in a gale is placed under small sail and hove to, with her hatches closely battened down. This position, with careful attention to the helm and sails, enables the crew to ease the vessel up to any sea which may appear more than usually threatening. Thus she may be kept in comparative safety, even though her head may fall off occasionally by an unlucky or cross sea.

On the other hand, the mercantile steamer of the present day is built long and narrow, with large openings in the deck for engine-room skylights and stokehole. Her great length in proportion to her breadth, prevents her from being hove to, so closely as a sailing ship, unless she is helped with enough steam to keep her head up to the sea. Therefore any accident occurring to the engine is followed by the long steam ship falling off the wind, which has the effect of bringing her broadside to the sea. She is then exposed to the full force of the waves, and, before any repairs of the engine can be effected, the sea often breaks into the engine room, rises to the furnaces, puts out the fires, and leaves her helpless, or, at all events, only dependent on canvas which will not enable her to face the heavy seas. I am at a loss to understand how it is that such an obvious evil should have remained so long without a

remedy being provided to protect the vessel should the engines break down, especially as the cost would be inconsiderable. The engine and boiler rooms, containing what may be called the vital parts of steam vessels, should at least be as secure from an inrush of water as any other part of the ship; but the practice is to cover the skylights with glass protected by iron rods and canvas, so that the first heavy sea that comes on board breaks through.

If steam ships are to be protected from overloading—and it is very proper that this care should be exercised—why should not similar supervision lead us to considerably raise the engine-room combings—protect the skylights with a base formed of iron Venetian shutters for the canvas coverings to rest upon, and materially increase the size and height of ventilators, which might be made telescopic, so that in bad weather, when the skylights are closed—a good supply of air for the combustion in the furnaces may be easily and safely obtained. If these things be done, and at the same time care be taken that all the sea-cocks shall be absolutely in view, and accessible at a moment's notice, we shall assuredly hear of fewer steam ships foundering at sea.

CAPITAL AND LABOUR.

There is a subject to which I must allude, though the serious difficulties that present themselves whenever it is fully discussed prevent my entering upon it at any length on the present occasion. I refer to the mutual relations of Capital and Labour, and to the disturbed condition of what is called "The Labour Market."

This topic has been constantly before the public for the last few years, and may be said to be of vital importance to the whole community. It necessarily affects the estimates of all those who are engaged in the construction of public works, or who have invested capital in large manufacturing enterprises; it also affects, as directly, the vast number of workmen employed, but the results of a disturbed state of the labour market do not stop there.

They extend to dealers in commodities and to consumers of articles of daily necessity, the prices of which are ultimately regulated by profits or wages, so that the present uncertainty of market prices, and the consequent suffering of a large part of the population, is to a great extent caused by the equally injurious uncertainty of the price of labour and the profits on capital. I cannot, of course, presume to attempt any complete solution of difficulties that vary according to the special conditions of each particular industry, but I may be permitted to offer a few remarks on the

effects of the unsettled state of labour on mining and mechanical works such as those which I am called upon to direct.

Let me at once admit, that, in my opinion, the workman has a just right to sell his individual labour for its highest value. It is only by acknowledging this right that we can assert the equally obvious claim of the employer to regard that labour as one of the necessary commodities which he has to buy, and to obtain it as cheaply as may be possible. I am not discarding the notion that there may and should be another element in the relation of employers and employed. Doubtless there should exist a mutuality of sentiment, which, where it is present, has a very powerful influence in uniting masters and men. But it must not be forgotten, that in order to do this the sentiment must be really mutual, so that the result will be an intelligent regard for each other's interests. Such sentiments of reciprocal regard and good-will may follow when each party concerned allows the just claims of the other;—when employers are willing patiently to listen to reasonable requests, and are not too ready to refuse all concessions, even though they may be warranted by circumstances;—when workmen are both willing and able, fairly to estimate the position of employers, at times of keen competition or of slack demand, and to abate pretensions to increased pay or diminished hours of labour, if either one or the other involve immediate serious loss and the depression of an entire industry.

At present, however, we have to deal, not with the possible sentiments, but with the hard facts of the case. The effect of recent combinations of workmen has been to deny the just right of employers to regard either wages or labour as a commodity. At the same time, it is constantly affirmed that those who have labour to sell are entitled so to regard it, and to insist on selling it dearly, or even at a factitious price. This distorted view of the question leads workmen to regard with extreme jealousy and dislike any appearance among employers of that combination to which they themselves constantly resort. Let us suppose, however, that all the employers engaged in a particular industry were to combine for the purpose of obtaining high prices, just as workmen do for obtaining high wages.

Let us suppose they were to do so at a time when large contracts for important works had to be given out. If they were to follow the line of those whom they employ they would agree absolutely in fixing the amount of their tenders for those contracts, and the Company issuing them would be entirely in their hands. But let us go a step further, and imagine masters, not only adopt-

ing the principle of combination, but actually combining with the workmen who had already fixed the amount of wages throughout an entire district. The result would be that masters and men together could, theoretically, fix any price that they chose to demand for works of every description.

Such an illustration appears so extreme as to amount to absurdity; but it at least shows what would be the result of combination carried to a complete issue. I ought to apologize for stating so obvious a proposition, but I desired to arrive at the equally obvious fact that competition is the real antidote for combination. In manufacturing and mercantile affairs competition is inseparable from progress and general improvement.

In many cases tenders must be sent in some months before the period for commencing the work. Should that work be such as the manufacturer is in the habit of supplying, the usual method of estimating prices is simple enough. He adds to, or deducts from, the amount of outlay, as calculated from the last transaction of the same kind, the sum which represents the difference in the present cost of material and wages, and to the amount thus obtained adds the proposed profit on the transaction. It is easy, therefore, to see how a subsequent demand for increased wages may turn into loss profits calculated on contracts that will possibly be twelve months or more in course of completion.

It is this continued insecurity which is now seriously affecting some of our great manufacturing industries. A master who ventures to demur to a demand for higher wages is likely to be the victim of a strike which will entail still heavier losses; and this consideration may cause him to yield, notwithstanding that competition, and the already enhanced cost, and restricted hours of labour, may, at the best, have left him only a trivial return on capital, plant, and machinery.

It can scarcely be wondered at that this state of things should perpetuate bitterness of feeling. It is not surprising either, that the master who yields to exorbitant demands in order to save his contracts, and finds that he has for months to brood over his losses, is apt to remember his enforced concessions when he is more free to refuse what may be juster claims.

The constant recurrence of strikes, and the uncertainty of the labour market, have, in fact, changed the course of business, and undermined all systems on which contracts were formerly entered into, without leaving room for any settled plan to take their place.

Forward contracts for materials can no longer be readily secured; the cost of wages, which is one of the most important calculations in estimating profits, cannot be determined, and within a few days, or at a fortnight's notice, a master may find his capital lying idle, his machinery unemployed, and his whole factory an unremunerative investment.

This, then, is the present position of employers and employed towards each other; but I am bound to confess that it would be unfair to cast all the blame upon the men. In this, as in almost every conflict between persons who have learned to regard each other with suspicion, there are faults on both sides. It cannot be denied that "temper" has been a very potent element in causing and prolonging some of the larger strikes with which the country has been afflicted. In such disputes the main points of discussion are too often lost sight of, because of the desire of each party to "gain the day." So long as this feeling exists, so long will strikes continue. While masters and men have no confidence in each other, the men will periodically abandon work and fall into poverty and want, while masters will have to look at silent workshops.

This subject has occasioned me much painful thought in relation to several works over which I have control, and where I find that the endeavour to sustain satisfactory relations with a large number of workmen is by no means the least of the responsibilities. That mutual confidence, which is, in my opinion, essential to truly successful work in manufacturing enterprises, seems to be further and further from realisation; for some of the rules laid down by Trades Unions are incompatible with justice—not only to the masters, but to the men themselves. How can it be otherwise when the ingenious, skilled mechanic can only demand the same rate of pay which is the wage of the unskilful workman? The union rate of wages is fixed without regard to the ability of the worker to produce, either in quantity or in quality, labour that shall be of higher value to his employer. There is no need to point out how inconsistent this system is, with the constant (and true) assertion, that labour is a commodity. What should we say—what would the workmen say—if any combination of dealers ordained a level and unyielding value for commodities—for food, drink, and clothing—without regard to their true worth, or the conditions of supply? The result of this arbitrary control of wages is, that good workmen, who are compelled to receive less than they are worth, naturally regard their position as being unsatisfactory, and their advantages as valueless.

The denial of the right of masters to pay, and of men to

receive, higher wages for a better class of work, or for a larger quantity of labour performed by those who would rather remain at their business than waste their time—is a great evil for workmen in manufactories. A scarcely less miserable effect of the demand that labour shall be paid for without regard to quality, is the tendency to deterioration in the work itself. A good workman must have a very decided sense of responsibility to induce him to take as much pains with the work he turns out as he would do if he knew that he would obtain a reward in proportion to his display of ability; especially when he knows that the man next him is (through incapacity) turning out inferior work, and yet can demand as high wages as he is himself receiving.

And we must remember that the uncertainty of the demand for wages, and the consequent necessity of adding a sum of money to contract prices in order to meet possible contingencies, in case of strike, give a premium to foreign competition; while any deterioration in British workmanship removes the only advantage which we are able to claim in comparing our own and foreign productions.

To this point I directed special attention in a letter which was read to the workmen at Newcastle in 1871, and the statement I then made has, I regret to say, been more rapidly verified than I predicted; by the experience of manufacturers in their competition with foreigners, and by my own observation while I have been abroad, of the great increase of foreign engineering and ship-building works in places which recently depended on this country for their supplies.

With reference to that other vexed question—the reduction of the hours of labour, I can speak only in relation to my own experience. I believe, however, that I shall be supported by the experience of others engaged in large manufactures, when I express the opinion that in the long struggle which took place in the North, in the early part of 1871, the opposition of the masters was directed less to the shortening of working hours per day, than to the loss of time which they foresaw would ensue; for they knew by experience that the ability to earn the same amount of wages in shorter hours would increase the tendency to make “idle time.” It is as they feared, for the effect of diminishing the hours of daily labour has been also to diminish, in a greater proportion, the quantity of work produced, so that machinery and floating capital have suffered loss, by frequently lying unproductive, even during those hours when the men are supposed to be at work. Thus it is frequently the case that a rise in wages produces

no real increase of earnings, and is of no actual benefit either to the men or to their families.

It is for the want of knowing what are the true effects of some of the changes demanded and conceded that the general public cannot duly estimate the relative position of employers and workmen during the conflict which precedes, and the crisis which follows a strike. For instance, at the time that the so-called "nine hours movement" was the assumed basis of the men's demand, it was generally supposed by the public that mechanics and labourers in engineers' shops were actually working fifty-nine hours a week. It is true that these were the hours fixed by the masters and agreed to by the men, but, as a matter of fact, they were seldom really worked, and in many large establishments it is well known that the average of working hours per week were actually fewer than would have been represented by nine hours a day, or the fifty-four hours per week, which the men demanded.

These disturbed relations of labour and capital are among the most difficult, and, at the same time, the most important questions to which those who are engaged in engineering work have to address themselves. Important, because they stand related, not only to the material of our national wealth and enterprise, but to the well-being of hundreds of thousands of our fellow-countrymen. Difficult, because they have to do,—not with mechanical operations, nor with inventions for directing and adapting vast physical forces; but with the sentiments, the duties, the prejudices, and the responsibilities of working men.

I wish that it was in my power to offer a solution even of the least of these difficulties. I am convinced that none can be found in the combination of class against class, or in the "defensive" policy which always ends in aggression.

While the representatives of each side are combining and encouraging each other to resist encroachments, or to do battle for supposed advantages, which may after all be disastrous alike to capital and to industry, there is a great and persistent invasion by foreign competitors, who, knowing more of economic science, or being less under the dominion of "Unions," are thus enabled to carry off the spoil.

Doubtless the spread of better and truer education may help to remove errors which keep up a ruinous antagonism between those who are mutually dependent; but it will be only after many years, and in another generation, that this irresistible force will achieve its results. We must endeavour in the meantime, while

we are promoting the spread of knowledge, to lessen evils which lie at the root of the mischief that we deplore.

It would be useless to conceal the fact that the unsatisfactory condition of the labouring classes, their social position, and their failure to profit by the claims which they have combined to secure, is to be attributed to the abuse of a luxury to which, in moderation, every working man is entitled. This is why no shortening of working hours, no increased rate of pay, obtains for them and for their families the advantages that should be derived from the greater leisure for self-culture and the improved means of making comfortable homes.

Till this great evil be mitigated, there is no hope for that improved condition of the working classes for which our legislators are looking. The mischief must be dealt with at its root. Increased means of instruction, better houses (provisions I strongly advocate), do not touch the question for the present generation. The men themselves have the cure in their own hands, and it can only be effected by their own strong determination to stamp out the cause of so much unhappiness.

If this should be effected, we shall have genuine sympathy and mutual confidence between masters and workmen, instead of continued ill-feeling. The settled working hours will be more regularly observed. Plant, capital, and machinery, which can only pay whilst employed, will be better utilised. By moderation in living, the physique of the men will be improved, they will be able to earn more wages "by time," and the masters will be able to afford higher pay. They will have the means of providing healthier and happier homes, and, by the increased and regular economy of time and capital, will enable manufacturers to produce their commodities at a rate which will put this country in a position to meet foreign competition.

I do not speak bitterly, but in sorrowful earnest; and I know that there are a large number of good men to whom these remarks will not apply. Let me say, therefore, that it behoves us, who have had superior opportunities, better culture, more immediate means of surrounding ourselves with refining influences, to prove that we are, at least, learning to overcome prejudices, and patiently to take every reasonable method of proving to the men whom we have to employ that we entertain no animosity against them.

These results, however, can only be attained by forbearance. Let those who think themselves most aggrieved be the first to practise patient hearing and temperate acting; for these will be

the best claims for being listened to when the time comes either for asking reasonable concessions or for refusing inordinate demands.

Imperfectly as I have touched some of the most important topics which at present engage the attention of our profession, I am compelled to omit many others, perhaps equally important.

Unless I were to extend my remarks to such a length that I could scarcely hope for your kind attention, it would be impossible for me to enter upon such subjects as those of the enormous advances of telegraphic engineering and electric science, both of which are still making such vast strides that they form a distinct, though not an altogether separate, branch of our profession.

Amidst the number and variety of the great works yet to be effected for the benefit of mankind, every member of the profession has "verge and scope enough;" and if I have succeeded in bringing before you a few important subjects which may claim your earnest after-thought, I shall have increased reason to be glad that you have honoured me by placing me in the position which I now occupy, and that your courtesy has enabled you to hear me with an attention for which I heartily thank you.

Being duly moved and seconded, it was

RESOLVED—That the President be requested to permit his Address to be printed and circulated with the Minutes of Proceedings.
