1901.

NEW ZEALAND.

UNITED FIRE BRIGADES' ASSOCIATION

(REPORT BY THE DELEGATES TO THE PARIS FIRE CONGRESS).

SIRS,— 25th February, 1901.

At the last annual meeting of the United Fire Brigades' Association, held at Blenheim, in February, 1900, a resolution was adopted that if possible the firemen of New Zealand should be represented at the Paris Fire Congress. An application was made to the Government for assistance in the shape of a grant. This was acceded to, the sum of £250 being placed at the disposal of the Association. A condition was attached to the effect that the report of the delegates sent to Paris should be placed at the disposal of the Government, for distribution to the various bodies interested in preventing the destruction of life and property by fire. It was also set out that the report should deal with the improvement of the fire brigades of the colony by the adoption, if desirable, of methods and appliances in use in other parts of the world, and suitable to the conditions obtaining in New Zealand. On the question being placed before the associated brigades, Messrs. Gilberd and Smith were selected as delegates. The selection was approved by the Government, and the delegates left New Zealand on the 16th June, 1900, to carry out the duties assigned to them, and they hereby present the following report:—

In connection with the object of our journey, we inspected the fire-prevention services of the following cities: Sydney, Melbourne, Colombo, Paris, London, Birmingham, Glasgow, Dundee, Brighton, New York, Charleston, Niagara, Chicago, Kansas City, Salt Lake City, San Francisco, and Honolulu.

The principal object of our trip, however, was to attend the International Fire Brigades' Congress at Paris, held from the 12th to the 20th August. This we attended as part of the British contingent, numbering about a hundred and fifty, and organized by the National Fire Brigades' Union of England. At this Congress there were present large bodies of firemen from all the European countries and from the United States, the total reaching about six thousand men.

The first business transacted took the form of a meeting of officers, but as the papers read and the discussions which followed were in French, we were unable to follow the proceedings. As subsequently we were unable to obtain any official report of them, and, as none of the British fire brigade journals published any of the papers, or the discussions resulting from them, we conclude that they were of little general interest.

An exhibition of appliances was held at Vincennes, but although very interesting and complete, was almost exclusively confined to Continental manufacturers. The fire-engines on exhibition were all on the lines of those of English make. The fire-escapes shown by German firms were very complete and useful.

One noticeable exhibit was a pneumatic telescopic tube escape, actuated and controlled by compressed air, and manufactured by Fries and Sohn, Frankfort-on-Maine. The first section being raised to a vertical position, a man ascends with the hose and branch, and stands on the top section, and by turning on the pressure from the cylinders the ladders shoot up to their full extent, about 70 ft. On a trial made at the exhibition, in forty-five seconds from the carriage stopping, a fireman was elevated to the top of the frame-building used for the displays. The air-cylinder can be charged by ordinary hand-compressor, or liquified carbonic-acid may be used. One charge is sufficient to raise and lower the ladder five times. The inclining or revolving of the ladder is performed by hand. The ladders rotate on ball bearings. Two men are required for raising them, but only one is required for directing. The apparatus is carried on a low, four-wheeled wagon, and does not require a level site.

A very ingeniously fixed fire-escape for use in factories, schools, &c., was exhibited on a specially constructed building. It is called "Scherrer's Fire-escape," and has the merit of providing an easy and safe outlet from the threatened floors, and a useful means of entrance for the firemen in their work. The principle is that all the windows situated one above the other are connected to a bar fixed in the buildings alongside the sash-frames, and set on roller bearings on the ground-

floor. On this bar are levers, one for each floor, and by pulling any one of these every window may be opened at right angles to the building. By this action a ladder, placed on the inside of each window, detaches itself and slides downwards until it reaches the window beneath, there connecting with a similar ladder fixed on the inside of every sash, thus forming a continuous ladder from the top window to the ground. This appliance can be operated in a few seconds from any floor, and the apparatus is so constructed that the windows furnished with it cannot be distinguished from the other windows of the building. This escape has the merit that it cannot be actuated from the outside, nor does it interfere with the architectural design. We feel certain that for factories and similar buildings it would be of great benefit in case of fire. The mechanism and construction are simple, and it forms a ready and safe exit in case of necessity.

The other escapes, engines, and appliances shown were of the stamp usual in the colony, and were in great variety.

On a later date, on the Vincennes Racecourse, an exhibition of methods of fire-extinction and life-saving by the firemen of the different nations was given. To assist in this demonstration a large frame building about 60 ft. high had been erected opposite the grandstand. Representative teams had to start from a point about 500 yards distant, and rescue persons and extinguish imaginary fires on the different floors. It was a very interesting competition, and showed to advantage the different styles of those competing, especially of the Portuguese and American teams. In the life-saving portion of the display the former used the ordinary section scaling-ladder, but instead of the usual method of lifting the ladders, and shipping the additional lengths from the bottom, they were attached at the top. The men quickly reached the building, and with the life-lines drew up the canvas shoot-escape, and with this and their lines soon had those to be rescued safely on the ground. They were a wonderfully well-disciplined and agile body of men. Their climbing exercises and smart work caused great enthusiasm among the large concourse present. The American team from Kansas City, under Chief Hale, gave a splendid exhibition with their steam fire-engine and pompier ladders. In the suppression of an imaginary fire they were easily first, their work being wonderfully smart throughout. Their engine, with steam up, preceded by a light hose-cart which laid out the hose at a gallop, was quickly got into position, and in a very short space of time had jets playing over the building. The hitch-up was made in under five seconds. The British representatives gave a very creditable display, the Leyton Brigade working their steamer quickly, and getting strong jets from front and rear of building. The Worthing Brigade worked their escape, but through a slight error in placing it had to shift its position, and this in the loose soil caused a little delay. When once in position, by the aid of the canvas shoot attached, they soon had the necessary number of persons on the ground. Altogether, it was a very interesting and creditable display. The American team being ruled out as a professional team, the first prize was awarded to the Portuguese, and the second to the British. The members of the Paris Brigade also gave a very interesting gymnastic display, and an exhibition of drill with their motor engine. While coming along the track it was stopped for a few seconds to extinguish small fires about one hundred yards apart. The speed with which these fires were put out and the engine got under way again showed their power and utility in a very favourable manner. At the conclusion of the above there were an inspection and march past of the firemen by President Loubet, who then presented the prizes won, and also decorations to representatives of the different nations present.

At one of the Paris fire stations we had the pleasure of attending a turn-out of the brigade. With the men on the upper floor, and coming down the sliding-pole, the automobiles were out in slightly over 11 seconds, and the horsed escape in 30 seconds. The ease and rapidity with which the former style of plant is worked is surprising. The Paris Brigade has a number of these motors in use, the power being storage electricity. They have a large trussed telescope escape which weighs over 4 tons, and this is quickly and successfully used in their work. The turning of corners and the getting into position are easily manœuvred. The electrically-propelled engine carries a tank of about 100 gallons capacity. As soon as the engine arrives at the scene of a fire the motor-power is instantly transferred to the pumps. The hose, which is provided with an internal spiral wire, is already connected and full of water, thus insuring a pressure immediately. The fireman, by opening the shut-off nozzle, has a jet at his command at once, and in this respect is the equal of the chemical engine. This engine has also a suction-pipe by which it can supply itself, or the tank can be filled from the mains. From the accumulator can also be drawn power for illuminating purposes, through arc or incandescent lamps. The electric hose-cart is capable of carrying six men with a full supply of hose, pompier ladders, &c. The accumulators for supplying the necessary energy are enclosed in cases and carried underneath the apparatus. They are calculated to allow for thirty-six miles of travelling before being exhausted. The automobiles give great satisfaction, and it is expected that, with certain improvements that have been found necessary, they will be universally adopted by the Paris Fire Department for transporting its fire-fighting appliances. There can be no question that, if the automobile can be made to stand the rough usage that may be expected in this style of work, it will be generally adopted, as it seems to be the perfection of usefulness in the matter of fire-brigade appliances. Another appliance is the smoke-exhauster. The pressure from the main is used to drive a fan, which is connected with a very light cambric rubber hose about 6 in. in diameter. This can be used to draw the smoke out of a cellar, &c., or to force in air. After this exhibition we attended their drill-ground, where squads of men were put through a number of life-saving and gymnastic exercises. These were wonderfully well done. For six months each recruit is kept in this training-school, the physical portion being a special feature. The men are also trained in the use of the fire-brigade appliances, and lectures are given on a variety of subjects, such as building construction, hydrostatics, &c., which must tend to make them better able to follow their dangerous calling.

As a whole, we consider the Congress was not the success it should have been. It was a great opportunity for exhibiting improvements in the science of fire-fighting missed. The manage-

ment also left much to be desired. No proper regulations or conditions were available. The idea of a meeting of experts in fire matters from all parts of the world is a proper one, and will no doubt lead in the future to others, where the experience gained will result in arrangements being made whereby the fire service will be materially benefited.

Our next visit was paid to the London Metropolitan Fire Brigade. In the absence of Commander Wells on his annual holiday, the second officer, Mr. S. G. Gamble, very kindly showed us over several of the stations and fire-floats. We also attended the Central Station, Southwark Road, and were present at several of the weekly exhibition practices. At this station all the recruits are instructed and tested preparatory to their being entered for active duty. On the public day the recruits go through all their ordinary drill with the manual and steam fire-engines, and also practise with life-saving appliances, scaling-ladders, life-lines, and the large-wheeled escape. A turn-out drill by the regular firemen also takes place. An alarm is rung by the officer, and all the plant is horsed and turns out as if to a real alarm. Considering that the horses are stalled across the yard from the engine-room, the times (about 24 seconds) were very creditable. At this station are very complete establishments for the manufacture and repair of most of the appliances in use by the department. Very large store-rooms are also filled with the general requisites of such an institution, and the organization seems almost perfect. The plant of the Metropolitan Brigade is horsed by contract at so much per head. The contractor supplies all horses required, arranges their feeding, and takes all responsibility.

The London County Council, under the representations of the brigade authorities, are making every effort to improve the fire-protection service in this great city. New stations are being built in several parts, and equipped according to modern ideas. The buildings are of a fine character, and are as near perfect for the purpose as possible, adequate accommodation for men, horses, and plant being provided, and every provision made for rapid response to calls. The fire-alarm system is pretty complete, but great improvements are contemplated.

Most of the other fire-stations visited in the United Kingdom are almost repetitions of the London Brigade, but it is surprising to find in use in some of the smaller cities plant and appliances of a very superior character, showing that the authorities recognise the importance of adequate protection from fire. One thing noticeable outside London is the predilection shown for chemical fire-engines. Quite a number of these are in use throughout the Kingdom, and the number is increasing as they become better known. The Glasgow Station, quite recently furnished at a cost of £70,000, is very complete, and is acknowledged to be one of the finest in the world. The buildings, plant, and alarm system seem as near perfection as possible.

While in London we visited the office of the British Fire Prevention Committee. This institution was formed in 1897, and has for its principal object the direction of public attention to the need for increased protection of life and property from loss by fire by the adoption of preventive measures. The fire protection referred to is more in the direction of proper building regulations than in the generally accepted terms referring to fire brigades. The institution is composed of a number of gentlemen professionally interested in the subject of fire prevention, and among its members are found the principal scientists of Great Britain, including the leading experts in the engineering, architectural, and allied professions. It has a very complete testing station, at which tests and reliable research on the question of fire-resistance are conducted. The committee's reports, giving the results of these tests on materials, methods of construction, &c., are published, with complete diagrams, illustrations, &c., and are supplied to members. In time the results of the experiments and the data obtained will be of great service to all concerned in this important work.

We inspected a very useful invention at the Charing Cross Hospital, where some rooms were being fitted with partitions and ceilings manufactured by the Fireproof Partition Company. The framework consists of a channel-iron, fixed on floor and ceiling; into this is fitted studs of H iron, 1½ in. by 1¼ in., about 2 ft. 6 in. apart. Inserted in the grooves are sheets of corrugated steel, about 28 in. gauge. The corrugations are of dove-tail shape, ⅞ in. square, which forms a key for the plaster. The partition is then plastered on both sides, and forms a strong fireproof wall; it can also be used for ceilings.

Another invention which we had the pleasure of inspecting were the fire-proof lights, known as "Luxfer Prisms." These are constructed of glass about ¼ in. thick, on one side of which are corrugations or prisms, for the purpose of refracting the light. These prisms are about 4 in. square, and it is the method of glazing that renders them proof against great heat. The squares of glass are fixed into plates of any size by thin copper strips, laid on edge between the squares. The whole frame is then placed in a bath and a copper bead is deposited on the strips by electricity, thus binding all the squares in a solid metallic frame. Although the glass may be completely shattered by fire and water, the frame until actually melted holds the glass in position. While being a wonderful diffuser of light, it is at the same time a perfect check to the passage of flame. This feature makes it specially suitable for use in lifts and light-wells.

For the same use is Pilkinton's "wired glass." This consists of thick glass in the centre of which is embedded ordinary galvanised-wire netting. This also resists extreme heat before collapsing.

Another material in considerable use is non-flammable wood. A chemical preparation, after the wood has been properly prepared, is forced into all the pores by great pressure, and the effect is therefore permanent. The wood can only be burned by extreme heat, and as the chemicals used have a tendency to fuse under a high temperature they add to its protection. The wood having been under treatment over a month under all conditions of temperature, the possibility of warping or shrinking is prevented. Also, because of the volatile and fermentable constituents having been driven off, the liability to rot is removed.

We inspected the automatic fire-alarm system installed by the Pearson Company in the Cripplegate district of London, the scene of the great fire some three years ago. In this vicinity

the buildings are of immense proportions, occupied by merchants, and so carry very heavy stocks. A number of these erections have been fitted out with this alarm system. The principle of it is that all the floors are fitted with very sensitive thermostats, and are connected by wire with a central office. If the temperature in any portion of the circuit increases above a certain point, the alarm is immediately transmitted to the central office, and information is at once conveyed to the neighbouring fire-station, a few yards away. On buildings supplied with this appliance a liberal rebate is allowed by the insurance companies, and out of this saving the cost of installation is provided. The proprietors of the May-Oatway Automatic Alarm, invented by Mr. May, of Dunedin, have also an office in the city. A number of improvements have been made in this device since it was exhibited in New Zealand, and it now provides a very sensitive and perfect system.

While in London we visited the factories of Messrs. Shand, Mason, and Co., and Merryweather and Sons, and were very kindly shown everything connected with the manufacture of fire-engines and appliances. Several improvements in the design of steam fire-engines were noted, one of the principal being the ease with which the valve-chambers may be inspected. By the loosening of a few bolts the cover may be removed, the valve got at, and the cover replaced, all within the space of two or three minutes.

After spending about six weeks in England we left for the United States, and immediately took train from New York to Charleston, South Carolina. A meeting of the International Fire Chiefs was being held, at which we attended. During the session we were much interested in the papers that were read, and the discussions that took place on matters connected with the fire service. A discussion on the question of the utility of the automatic sprinkler and nozzle showed what a great assistance they are to firemen in the extinction of large fires. The sprinkler is arranged so that on any increase in the temperature above a certain point (about 160 degrees) the solder controlling the valve melts, and allows the water to issue in a spray in all directions. If the fire spreads, the heat opens more sprinklers, and it is found in most cases that this contrivance effectually holds a fire in check. The system can be so arranged that immediately the sprinkler comes into action an automatic alarm can be rung at the fire-station. In large factories and stores a nozzle placed in the most suitable position can be utilised by the firemen connecting their hose to the water-main supplying the nozzle. This is so arranged that on the pressure being applied the nozzle rotates, and throws the jet in all directions. From photographs shown, and experiences related, we judged that this has proved of great service in many instances.

After the close of the convention, an exhibition of appliances was held, and trials were made of various styles of apparatus, some of which were quite new, and will no doubt prove of service. One great feature was the variety of nozzles exhibited. In some cases it seemed hardly possible that, with two steamers forcing water through four lines of hose, a fireman could, with one hand, control a nozzle throwing a $2\frac{1}{4}$ in. jet; yet such is the case. Controlling-nozzles seem to be in general use, which, of course, necessitates the use of relief-valves on all fire engines. The use of these is based on the idea of reducing the loss of water to as great an extent as possible, the branchman being able to reduce the size of his jet to exactly what is required, or even to shut it off altogether. In some of the departments lengths of small hose are carried in case they may be wanted. These are fitted so as to attach to the ordinary hose, and are used at small fires. Cellar-pipes, fire-alarm systems, swinging harness, and all requisites used by firemen were exhibited in great profusion, and we regret that we were unable to arrange for such an exhibition at this, the New Zealand Conference. We hope that the Association will be able at some future date to make arrangements whereby an exhibition on similar lines may be held at our annual meeting, so as to give New Zealand firemen an opportunity of seeing the class of apparatus used in the outside world.

One of the points that struck us in visiting the American fire departments was the very complete arrangements in use. When an alarm comes in, the lights are turned up all through the station; gongs give the alarm, and, striking the number of the box-alarm involved, show the district and position whence the alarm comes. The men get to the engine-room floor by means of sliding-poles. The horses are released, and rush into position under the swinging harness. The men on the floor pull down the collars, which fasten automatically, and all that is left for the men to do is to snap the rein-hooks and everything is ready. In a moment the men are in their positions, and the driver by pulling a cord opens the doors, and they are away. With an alarm given when the men are in their rooms it is considered they should be away in fifteen seconds. There can be no question that in the majority of cities in the United States those responsible for providing protection from fire quite realise the dangerous enemy they have to fight against. The appliances placed at the disposal of the firemen are of the best and most complete description, and the expense seems a question of no consideration. This gives the manufacturers of appliances encouragement to design apparatus in accordance with the most modern ideas, knowing that if a suitable article can be produced a demand is certain. In the face of increasing risks of large fires, the firemen require plant of the most improved description. The stations, as a rule, are fine buildings, in good positions, and well equipped. The officers are able, and, with a fine stamp of men to support them, we can quite understand the reason why the American fire-service is placed first.

One noticeable feature in the American apparatus is the almost universal adoption of the chemical fire-engine, the general opinion being that fully 50 per cent. of fires are extinguished by this class of engine. As a rule, the combination hose-truck and chemical engine seems to be the favourite design. This carries two cylinders, and is despatched to arrive first at a fire, so that if unable to extinguish the flames it holds them in check until the steamer gets to work. As the combination carries hose and ladders, these can, if necessary, be made use of. For small fires these engines have great advantages. They can be taken close up to the seat of the fire, and as soon as the branchman arrives he has a jet at his command, which, being controlled by a shut-off nozzle, only the right amount of water need be used. The lead of hose is small, and can be

quickly handled and got into position, a few men being able to take it up to the top floors with ease. The steam fire-engines in use are of very solid construction, very elaborately and beautifully finished, and of a much greater capacity than those in general use elsewhere. The hose-wagon has nearly superseded the hose-reel, the advantage being that the hose comes off much easier. Especially is this noticed when corners have to be turned, as there is no side-pull, or chance of fouling with the reel revolving. Again, when the truck stops, the hose ceases paying out, but with the reel there is a chance of the hose getting foul through the drum continuing its revolutions. When extra lengths of hose are required it is much easier and quicker to get them out than to drag off the reel, and when time is of importance this advantage cannot be overlooked.

On most of the lofty buildings it is compulsory to have fire-escape platforms at each floor, with iron railings, and a ladder connecting each. These are for the safety of the occupants, but are also a great convenience to the firemen in their work. On a number of these buildings, alongside the fire-escapes, are fixed rising mains which reach on to the roofs. These mains have a two-way or three-way Siamese connection at the bottom, and the steamer's hose can be connected to the main. At each floor there are hose-connections, to which the firemen attach their hose, the connections being reached by the fire-escape ladders. This saves handling a large quantity of hose for each jet, which would otherwise have to be brought from the steamer. Leads of hose can also be taken from the connections on the roof, if the fire is in the building adjacent.

The fire-escapes and water-towers in use are very heavy pieces of apparatus, and are generally run with three horses. The water-towers are useful adjuncts to the fire-extinction plant, as it is possible with them to pour into a burning building volumes of water which would be quite impossible from ordinary ladders. These can be elevated and directed through windows or other openings where the heat would be too great for a fireman to work.

The San Francisco Fire Department have what is called a battery. It has a very large nozzle, up to 2½ in., mounted on a two-wheeled truck. To supply this jet six lines of hose can be connected, and a very powerful stream can be thrown. This is easily controlled by one man.

While in Chicago we inspected the latest built fire-boat, the "Illinois," which is the most powerful in the world. On her bow is fixed a large nozzle, up to 5 in., through which can be discharged nearly 10,000 gallons per minute to a distance of 400 ft. She is available for fires all along the river-frontage, and can deliver great quantities of water through very large hose; and can also pump water through the mains right up into the city.

Summing up the results of our investigations and inspections, with regard to the improvement of the fire-protection service of the colony, we may state them as follows: The principal point to be kept in mind in considering the question is, that any loss by fire means that property (representing expenditure of capital and labour) has been destroyed, and as such is a direct loss to the community. Each individual, as a member of the community, should in some decided manner have the fact brought prominently under his notice that he is a loser by every fire, inasmuch as he has to bear his portion of the loss. The opinion is often expressed that destruction of property by fire is not always a loss, and that in some cases it is a profit, by sale to a "cash customer"—namely, the insurance companies. Can it be supposed that the money handed over is self-created? The insurance companies collect the amount from other policy-holders, and hand it over to the insurer. Thus, if he is no loser, all the policy-holders have been taxed to provide this amount, and also the amount necessary to provide for a profit on the capital of the companies and the cost of premium collection. When it is considered that the loss by fire in New Zealand for the past twelve months will reach a total of fully £300,000, surely the time has arrived when some stringent efforts should be made to reduce this terrible waste. The community should have it strongly impressed on them what a heavy tax it means, amounting, as it does, to 8s. per head on the whole population. This is the actual value consumed, but does not represent the only loss, as to it has to be added the cost and profits of insurance companies, fire brigades, &c. There is also the loss of wages to employés through fires in premises used in connection with industrial pursuits. If all this loss could be brought home to the colonists in the shape of a direct tax, no doubt very urgent steps would be taken to reduce this increasing waste. If this could be done, we would soon feel the benefit, as at present every merchant and retailer in fixing the price of his goods has to take into consideration the amount of premiums paid to insurance companies—and the premiums are based on the fire-loss. At present the false sense of security, founded upon insurance against an actual monetary loss, perhaps has something to do with the careless manner in which the matter is considered.

At the Charleston Convention of Fire Chiefs, one speaker, in discussing this question, advocated "that the State should prohibit any full indemnity being paid to any one responsible for a fire-loss, or to any one on whose premises a fire originates, unless such occupant can show affirmatively that it originated through the carelessness or design of another party. When the exact location of the origin of the fire remains in doubt, none of the immediately adjoining parties should receive full indemnity. The possibility of any party profiting by a fire happening on his premises would be so remote that fires from this source would cease as if by magic." This view of the matter is a sound one, and well worth considering by our legislators, who should, we think, take up this question and have it thoroughly discussed. They would have the opportunity and power to obtain information that would be available to no one else.

Up to the present no reliable statistics are available to discover the actual loss by fire in New Zealand. Surely it is within the duties of the State that steps should be taken by them to secure such information as would show approximately the value of property annually destroyed by fire. The United Fire Brigades' Association has made an effort to get this done, but the result is anything but satisfactory. As is well known, the reports utilised are derived from the newspapers, and although every effort is made to get correct information the figures are often wide of the mark. Then again, the amounts quoted are often the total amounts of the insurance, and do not represent the actual loss. In many cases owners of property, when applied to, refuse

to give any information, especially so where there may be a prospect of the property being considered over-insured. In these cases the insurance companies prefer to pay the full amount of their liability rather than chance the ill-favour engendered by taking such cases before the law-courts. In the face of these reasons, therefore, we consider that the Government should organize a department whose duty it should be to collect statistics as to the fire-loss in the colony. In connection with this department might also be placed the duty of holding an inquiry on all fires, which we feel certain would tend to reduce the number. The condition of buildings with reference to fire-risks, in the matter of design, amount of insurances, &c., by being made public would, no doubt, often lead to the discovery of the origin of the fire, or a probable reason for it. This, based on the experience gained, would also direct public opinion in favour of proper regulations being adopted, with the idea of preventive measures being taken. Owners of property would soon discover that it would be to their advantage to provide suitable fire-extinguishing appliances, and not trust all to the compensation derived from insurance. This matter not only interests business-people, but also the wage-earner.

One of the most important factors entering into the fire-hazard is that of building construction. During last session of Parliament a law was enacted making it compulsory that every building should be provided with suitable means of escape for the occupants in case of fire. Should not the same principle be arranged in the matter of fire-protection? By this term is meant, not only provision for fire extinguishing, but the construction of buildings on the fire-resisting principle, or, to use a better term, "slow combustion." Proper regulations drawn up by experts would provide that the design of buildings should be directed to make them, if attacked by fire, as much as possible fire-resisting, instead of as at present in numbers of cases as if built to insure rapid destruction. Provision should be made for the division of the risk of fire spreading, by carrying partition walls right up to the roof; the casing by heat-resisting material of iron columns supporting floors; and in the laying of floors at a slight grade, to allow water to get away through openings at the lower side. In lighting-wells the sashes should be glazed with fire-resisting glass, and non-flammable wood should be used in the fittings. This would all assist in staying the rapid spread of fire. Skylights should be properly protected from falling flakes of fire, as they are often used to give light to packing-rooms, and are commonly placed where inflammable goods are stored. The openings for hoists should be properly protected, as they are a great help to fire spreading, by causing a strong draught to all floors. Provision should also be made for facilitating the work of firemen by ladders fixed on the outside of buildings, with adjacent water-mains going right on to the roof.

If regulations such as these were based on the experience gained in other countries, and revised to suit the conditions obtaining in this country, we feel certain the loss now accruing would be considerably reduced. In New Zealand the climatic conditions, assisted by the general use of light inflammable timber, bring about a result favourable to the rapid spread of fire. It follows, then, that special precautions should be taken against this risk, and it should be the special duty of fire inspectors to examine and report on all buildings where the possibility of large fires exist. There can be no question that a large number of fires are the result of carelessness, and may be classed as preventable. Want of care in the fitting of steam, gas, and heating pipes, in allowing accumulation of rubbish, &c., are responsible for much loss by fire, which with proper inspection and supervision might be prevented.

The fire-brigades of New Zealand are in the large majority of cases composed of volunteer firemen, banded together for the protection of the lives and property of their fellow-citizens. In many instances these bodies do not receive the consideration they deserve. Even the local governing bodies shirk their duties in regard to providing appliances for the use of the firemen. Speaking from an intimate knowledge of nearly every brigade in the colony, we are satisfied that, with the exception of a few instances, the appliances provided for the use of the fire brigades are of a most inadequate nature. It is, as a rule, only after the most severe lessons that the public, and through them the local authorities, are forced to acknowledge this position. It is only by the greatest amount of good fortune that in a number of the towns their closely built portions have not been completely destroyed. Within the last few years some pointed instances have occurred showing the unpreparedness to meet and fight large outbreaks of fire. The value of property that has been lost to the State from fire would have been better spent if the amount had been expended in the direction of providing more complete prevention appliances. We are convinced that in the near future these towns will have to expend large sums in the reorganization and equipment of their fire brigades. It will be recognised that the area of the closely built portions is extending, and that the classes of buildings subjected to risk are of a more dangerous nature. To meet this how few towns have provided additional plant? In most cases they are the same as used years ago, and quite below the standard now required.

One of the most important points in the successful working of a fire brigade is without doubt the possession of suitable and adequate appliances. Without these the efforts of the most skilled officer, and of the men under his command, are to a certain extent useless. In a number of instances, with the idea of economy, towns have supplied the firemen with antiquated plant. As additions have been made to this, they have of necessity been of the same style to fit in with that in use, the result being that the brigade is saddled with a plant illustrating anything but modern ideas. The cost of replacing this gradually increases, but has eventually to be faced. This should be a lesson to the authorities that, in the selection of fire-extinguishing plant, matters should be so arranged as to allow of extension to meet the requirements of the future.

All authorities acknowledge that the base upon which successful fire-fighting rests is that of "the quick receipt of information of an outbreak of fire, and getting extinguishing appliances promptly to where they are required." Every moment's delay may mean the difference between a small fire and a conflagration. It is an old saying that "a fire that is killed early dies easy." It should be the duty of all officers to urge on the authorities the necessity for a reliable alarm

system. In the larger centres, of course, the electric alarm, with the adequate number of street alarm-boxes, is the only one to be thought of. The telephone system is a useful adjunct, but there is not reliability, as there is often delay in getting connected with the fire-station. We are confident that an independent electric system will always prove a profitable investment by causing increased efficiency of the brigades through the prompt transmission of alarms. In the smaller towns the alarm, as a rule, is given by a single bell. A great improvement would be effected by increasing the number of points where the alarm could be given from.

Then, there is the question of conveying the apparatus speedily to the scene of the fire. In some places in the colony, in which are included some of the most dangerous risks, men are to be seen dragging their appliances by hand—this, too, in localities where hills abound, and roads are none too good. The result is that the firemen arrive in a thoroughly exhausted state. We believe that the automobile will in time be found in general use in the fire departments, till then horses should be utilised. With these, and the adoption of the swinging-harness system, the appliances are quickly on the spot, and the men arrive fresh and ready for their arduous work. There is also the advantage of being able to send back to the station for extra plant if required.

While on this question of appliances, we are convinced that the advantages to be gained by the use of the chemical engine have not been recognised as they should be. Christchurch is the only city in New Zealand in which chemical engines are in use. In connection with a proper alarm system, we are sure that in time one or more of these useful contrivances will be considered a necessary part of a brigade's outfit. They excel in connection with incipient fires, as they are so quickly brought into action, and they have the advantage that the branchman has the water-supply so well under his control that little damage is done by water. The damage usually caused by water is a matter that should occupy the attention of all firemen, and the use of the shut-off nozzle, as is the case in America, should be encouraged. This, however, necessitates (where fire-engines are used) the adoption of the relief-valve. In some departments lengths of small hose which can be connected to the nozzle are carried. Thus small jets are utilised and controlled. Of course, discretion must be used as to the amount of water needed, bnt more or less damage by water must always be accepted as an alternative to greater loss by fire.

While on this subject, the question arises whether the street fire-plug and portable hydrant in general use in the colony might not be greatly improved upon. If the design of the fire-plug is examined, it will be found that the opening of the ball-valve rarely allows a water-way of more than $2\frac{1}{8}$ in. in diameter. The volume of water passing through the barrel of the hydrant is also reduced and divided by the bridge carrying the valve-spindle. This means a great contraction in the amount of water passing through the hose, resulting in a considerable reduction in the number and size of the jets that can be drawn from the fire-plugs in proximity to the fire. In the neighbourhood of large blocks of buildings, where risks of big fires are to be found, we consider the adoption of the fixed stand-pipe would be found to be of great advantage. When it is remembered that in long leads of hose there is considerable loss of pressure by friction, it is of great importance that as many jets as possible should be obtained from the nearest supply. A stand-pipe such as we suggest, with a diameter of 5 in., would have a capacity of nearly four times that of the ordinary fire-plug, an advantage easily estimated.

Another fault common in this colony is the great distance between the fire-plugs. It should be recognised that this is false economy. It necessitates the use of long leads of hose, and this being a perishable part of the fire-brigade plant involves great cost in keeping in serviceable order. Therefore the closer the fire-plugs (which after the first cost are permanent) the less the wear-and-tear of hose. The fire-plugs, too, would be of more advantage if placed on the kerb or footpath. They are more easily found there, and not likely to be covered up by mud, as is often the case when situated in the roadway.

We noticed during our visits to the different departments a great variety of new and improved appliances of the smaller kind in use by firemen. It would be impossible to describe all in this report, but samples will be submitted for the inspection of delegates at the close of the Conference, and we feel sure they will prove of great interest.

Another feature of fire-prevention work in the older countries that could be adopted here with profit is the regular inspection of big risks by members of the fire brigades. The men have a great advantage in case of fire, in knowing the construction and design of the building they visit, by the confidence they have in getting about while engaged in their duties. Not only this, but they are often able to draw attention to risks and defects not noticeable by the ordinary citizen.

To show that the cost of the fire-brigade service in New Zealand is carried on in a very economical and cheeseparing manner, we would call attention to the very small contribution required of the residents in the more closely built districts of the colony. The heaviest expenditure for maintenance in any town in the colony for the support of fire brigades does not exceed 1s. per head per annum, while in a number of cases the cost is much below 6d. From information gained in the United States, where the conditions more closely resemble those in New Zealand, the cost in the smaller towns is about 2s. per head. In New York it ranges from 3s. 6d. to 5s. 9d. The question then arises, would not the greater expenditure necessary to properly equip the brigades be the more economical in the end?

In the countries we have visited great stress is laid on the proper training and instruction of candidates for the positions in the fire departments before being enrolled for active service as firemen. This, in a small population such as ours, is impossible, but in the Fire Brigades' Association there is an organization which could be used to greater extent than it is at present to diffuse information to the firemen of New Zealand. Arrangements should be made by which, at intervals of a few years, exhibitions of fire brigade apparatus should be held. In these the latest ideas in appliances and methods should be shown. This, with lessons to be gained by visits to the more modern stations in the large centres, must prove of exceeding benefit to the younger firemen.

In concluding our report we have to thank all officials and members of the different fire-service organizations for their extreme kindness shown to us during our visits to the different countries. Everything of interest was explained, and all information asked for was placed at our disposal instantly. We therefore, in the most sincere and unreserved manner, hereby place on record our grateful sense of the courtesy and attention shown to us in every country through which we travelled. We desire to do this not less on our own account than on behalf of the colonial brigades we represented. Trusting that our report may draw public attention to the great fire waste, and by so doing secure improvements in the maintenance and equipments of the fire-brigades. We have, &c.,

JAMES G. GILBERD,
Superintendent, Napier V.F.B.
E. SMITH,
Superintendent, Christchurch F.B.

The President, Officers, and Delegates of the United Fire Brigades' Association.

Approximate Cost of Paper.—Preparation, not given; printing (1,625 copies), £4 15s.

By Authority: JOHN MACKAY, Government Printer, Wellington.—1901.

Price, 6d.