and papers have been discussed by the branches to which they specially belonged. The decision to broaden our methods so as to draw closer together members of each of the divisions of engineering, into which modern conditions have tended to specialize the profession, has met with success. It is obviously preferable to have our electrical, mechanical and mining brethren members of one large society with common interests and federated strength, than to have separate and independent organizations. Another reason favoring this joint work is the difficulty of drawing distinctly the lines between the several classes of work; the mechanical engineer must to-day be an electrician, and the mining engineer needs the experience of the general civil practitioner. It would be a mistake to encourage the foundation of separate societies for the several branches. If any objections exist to the general policy of our society, the proper course is to bring them up in our own body and be governed by the decision of the majority, rather than to form new organizations. Our council has abundantly shown its readiness to discuss reforms in the direction of extending our usefulness. That this policy has been successful is attested by our balance-sheet and by the fact that the very creditable home which we occupy has been acquired without any difficulty in meeting the extra expense. Much credit is due to the successive councils of the society, and particularly to the members resident at headquarters, for the broad-minded and progressive policy they have pursued with such beneficial results, and the indefatigable work of the secretary and other officers also merits the highest consideration of all members, and has been of the utmost assistance to your president.

"The society should look forward to increasing, at no distant day, the number of its working rooms, and, without usurping the functions of a social club, offer members further accommodation."

The president, in the course of his address, suggested the establishment of a central bureau for the registration of plans of all surveys made in Canada, also a systematic graditic survey for the whole country, as the surveys made in the older provinces are all compass work and many of them glaringly inaccurate. The growth of the country renders this work urgent. Whether it should be done under the Department of the Interior, or, as in Great Britain, under the military authorities, or by a special organization, he would leave the Government to determine. He also again urged the importance of fixing and recording triangulation stations and bench marks so that they can be used by engineers and surveyors at any time.

As it might be of interest, and in keeping with the practice of previous presidents, to refer to works with which he was personally connected, he alluded to the progress of engineering work relating to the Department of Marine and Fisheries, sketching the work of past years. At the time of the Confederation there were in Canada 227 lighthouses at 198 stations, and only two of these were equipped with steam fog whistles. Since 1867 there have been established in the Dominion, 769 new lighthouses at 598 different stations, 71 power fog alarms, 15 fog bells, 10 explosive fog signals, 89 signal buoys, and 106 gas lighted buoys, numbers far exceeding the total establishment of any country in the world except the United States of America, and very little inferior to the aggregate in that country of great wealth and magnificent distances. A majority of these appliances were designed and put in operation under the superintendence of himself, who for a long time enjoyed the distinction of being the only lighthouse engineer in Canada. Of late years attention has been turned to improving aids rather than to rapidly increasing their numbers. In lighthouse illumination catadioptric lenses are rapidly being substituted for the older-fashioned, simpler, and less expensive paraboloidal reflectors, and petroleum vapor burnt under incandescent mantles is taking the place of the ordinary oil light. These petroleum vapor lights are very efficient and economical. Photometric tests show that ten times as much light can be got from the vapor burnt under mantles as from the same oil burnt through wicks. The possibility of increasing the power of our Canadian lights is unfortunately limited by the capacity of our lightkeepers. As long as these officials are put in charge of stations without any previous instruction in their duties, so long will it be necessary to limit the size of the lamps to such as can be managed by ordinarily intelligent men. To place lamps with large, intensely hot flames in the hands of uninstructed keepers is to invite destruction of the buildings and apparatus. Until the appointment of lightkeepers can be restricted to young men nominated to go through a course of preliminary training under competent instructors, with the power of instant dismissal for breaches of duty in the hands of the inspectors, it will be impossible to much further improve our lighthouse installations. Most of our gas buoys and some of our small fixed lights are now using acetylene in compressed form as an illuminant, but there are difficulties, not the least of these being its cost, that will militate against its general adoption, especially in the face of a rival so formidable as petroleum vapor. Electricity has never been used to any great extent in our lighthouses for many reasons, one being the liability of the machinery to break down, another the untrained lightkeepers we are obliged to employ. In the vicinity of towns having municipal or private electric plants, electric lights have in a few instances been installed, and operated by the municipal power station. An important advantage of electricity, where it is available, is the facility with which occultations can be produced. With the increase in the size and draught of modern steamships has come the necessity for widened and deepened channels, as well as for the better demarcation of those channels. In the River St. Lawrence, between Quebec and the sea, the 30-foot ship channel is now marked, not only by splendid range lights in the axes of all the deepened cuts, but also by gas buoys replacing the old unlighted buoys at all salient points, so that it should be possible to bring a large ship up to Montreal by night almost as readily as by day. The wonderfully ingenious Pintsch gas buoy, with its equally ingenious automatic occulting attachment, has done more to render night navigation safe than any previous invention, and Canada now has these buoys established at all critical points between the Saguenay River and the head of lake navigation, marking the 14-foot channel in the canalized stretches of the St. Lawrence, as well as the sea-going ship channel. In exposed positions on the sea coasts whistling buoys on the Courtenay principle, another clever invention, and the old-fashioned bell buoys, are used more extensively than gas buoys, being better adapted to stand the shock of the waves, and requiring no special attention beyond periodical lifting to remove sea growths and renew the moorings. The work of placing and renewing the 89 signal buoys now in commission, and the thousands of smaller buoys, studding all our harbors and rivers, employs quite a fleet of steam tenders.

A modern lightship, such as those lately moored off Anticosti, and off Lurcher shoal, in the Bay of Fundy, is a perfect battery of ingenious mechanisms. From the electric lights at her mast heads, automatically occulted by clockwork making and breaking the current produced by a dynamo in the engine room, to her moorings, connected with powerful automatic buffers and steam windlasses to relieve the strain on her bows, she is full of interesting machinery. She is self-propelling, provided with a powerful fog alarm, a submarine bell, and a Marconi telegraph instrument. For the design of these latest vessels we are indebted to the United States Lighthouse Board, whose plans were adopted under the conviction that its long experience with lightships in the open Atlantic was too valuable to be ignored.

The first Canadian fog alarms were steam whistles. About 1873 reed horns were substituted, from motives of economy, a very simple and fairly effective arrangement, patented in Canada, being adopted. In these machines the lifting of a piston in a steam cylinder compressed air in a larger cylinder immediately above, and forced it through the horn, so that the length of blast was regulated by the stroke of the steam piston. One of these horns has been heard 26 miles under favorable conditions. They were not, however, considered first rate fog alarms, and when larger grants became available, syrens of the Scotch and English types were adopted as the most powerful sound producers obtainable. A first-class English syren at Belleisle is operated by air compressed half a mile from the syren house, the power being obtained from a Pelton wheel run by water led from the lakes on the hills of the island. This installa-