

payable, due date, &c., and there is provision at foot to note the particulars and payments for five years. Once the master cards are made the machine will sort them into the order required; then when notices are to be issued the master cards are put through the machine, which will prepare the notice (typed and punched) for issue, and note on the master card that it has been issued, and the date. The notice is then posted to insured, who takes it to the nearest post-office when making payment. The postal clerk taking the payment detaches the punched part of the notice, receipts the typed part, which is returned to insured as his receipt. The punched part is sent to Washington as advice of payment. These advices as received are put through the machine along with the master cards. The machine sorts the advices into the same order as the master cards, notes the payment on the respective master cards, lists the outstandings in respect of which there is no payment, issuing at the same time a reminding notice, and marking in the appropriate place on the master card that such reminding notice has been issued, and the date. Necessarily a machine capable of doing what I have just described is complicated and costly. I do not think there is any work of such magnitude in New Zealand as would justify its adoption, and I merely mention it here to show the development of mechanical tabulation and accounting.

*United States Census Bureau Electric Tabulating-machine.*—The Mechanical Branch of the Census Bureau of the United States at Washington has produced an electric tabulating-machine of its own, which is used for compilation of census, vital, immigration, and emigration statistics. As in the case of both the Hollerith and Powers tabulating-machines, the work is handled on three machines—the punch, the sorter, and the tabulator. The machines of the Census Bureau are not on the commercial market, nor are they in use outside the Census Bureau except in the Canadian Statistical Bureau, which has a similar mechanical branch and has been allowed to copy and make the United States models. On these machines, as on the Hollerith and Powers, the method of work is to transfer the data dealt with to cards by punching a series of holes thereon symbolizing the various factors involved. The cards are then passed through the sorting and tabulating machines to obtain the tabulated results required. The cards are divided in the case of the United States machines into fields or zones, each corresponding to the respective details to be tabulated, while in the case of the Hollerith and Powers machines the card has forty-five columns with ten to twelve positions each, one or more columns, according to requirements, being allotted to each of the different factors being dealt with.

*United States Punch.*—The punch used is extremely simple, but not so good, in my opinion, as that of either the Hollerith or the Powers. The operators were not nearly so fast as on the other punches, 170 to 200 per hour being regarded as satisfactory work.

*United States Sorter.*—This machine seemed to be a fast and reliable sorter, working at the rate of 250 to 300 a minute.

*United States Tabulator.*—This is a really wonderful machine for the work on which it is used. It is adapted for unit analysis work, each card being counted only as one; it will not add, and cannot therefore be used where each card may represent more than one. It is an electric machine, and will print the totals in table form ready for the printer, extracting sixty different factors from the cards at one run. When I was in Washington the Department was at work on their 1920 census, and with inexperienced operators (two to each tabulator) each machine was averaging just on 100,000 cards per day. I was told that on vital statistics they had put through as many as 175,000 cards per day. One such machine would handle the New Zealand census in a few weeks.

I discussed the question of our obtaining some of their machines for New Zealand, and they were most cordial in their desire to assist in any way. They had no objection to our making the machines ourselves so long as we did not allow them to be used for commercial purposes. They also expected to be finished next year with some of the machines in use, and thought some of them might then be available for us on sale or otherwise. They suggested that the question should be raised by correspondence on my return if we wished to procure any. The Canadian Bureau of Statistics took advantage of the permission granted them to make and use these machines, and for this purpose they created a separate mechanical branch on the lines of the similar branch of the United States Census Bureau. I do not think, however, in the event of our obtaining permission from the United States and adopting their electric tabulating-machines, New Zealand should establish a mechanical branch on the same scale; rather the manufacture, application, and development of these machines could more economically and efficiently be carried out in the Electrical Engineering Branch of the Post and Telegraph Department, with which the Statistical Office could work in close co-operation and get the same benefits as if we had a branch of our own. I do not think the cost required to establish the mechanical plant or qualified staff necessary for the purpose in question as a branch of the Statistical Office would be justified. So far as the Hollerith or Powers machines are concerned, a very moderate mechanical equipment would suffice for attending to and keeping these machines in good running-order, and I have no doubt whatever as to the wisdom of New Zealand employing them; but as to whether any endeavour should be made to obtain the rights of the American census machine is a question in regard to which I have not been able to form a definite opinion. I see many advantages to be derived therefrom, but it would require an electrical engineer to determine the cost of manufacture and upkeep. I think to employ this machine for our New Zealand census would be like using a steam-hammer to crack a nut, and would not be economical. But if at any time the tabulator were made to add more than single units (and the mechanics are experimenting to this end), then its range of usefulness would be greatly increased, and it might be an opportunity for the New Zealand Government to obtain an excellent plant of its own. My impression is that at present for a country like New Zealand more efficient and economical service would be rendered by either a Hollerith or Powers plant.

*Hollerith and Powers Tabulating-machines.*—Both these machines operate very much in the same way, and use cards which are identical in form and marking. Although the agents in London would not agree that the same cards could be used on both machines, this was being done in the Post Office at Washington and in the Pennsylvania Railroad Office at Pittsburg. The main difference is that the Hollerith machines are electric, while the Powers are mechanical. Each plant consists of three machines—the punch, the sorter, and the tabulator. In addition