the Hollerith make a special counter for census work (with one, two, or three banks of counters), while the Powers make their sorter count as it sorts. Both plants have been proved out and now give every satisfaction in operation. I found the users of each, both in London and America, emphatic in asserting the superiority of their own plant. My own conclusions, after seeing a number of separate plants of each kind at work, is that they are complementary rather than competitive, each having certain advantages over the other on certain work. The fact that the Hollerith tabulator does not automatically print the results gives it an advantage in speed of operation over the Powers, which does print the results automatically; so that on work where a full record of the details is not required it is advantageous to use the Hollerith for part of the work (punching summary cards) for the totals of the partial results obtained from it, and passing these through the Powers tabulating, getting therefrom the printed results required. Where I saw both plants in operation together they were used in this way. Comparing the respective machines of each plant I make the following remarks:—

Punch.—The Hollerith punch is a small, simple machine, easily carried about from place to place. This is a very great advantage, as the operator can pick up the machine under her arm and go to wherever the data originates to punch the cards. The cards are hand-fed and removed by hand. The punch is not so accurate in registration, nor are the holes so clean-cut, as in the case of the Powers punch. Accuracy of registration is an essential feature of the Powers, but not so important with the Hollerith, as the electric brushes can establish contact over portion of the hole. On the Hollerith machine the cards are punched one column at a time, with the disadvantage that every mistake of the operator means a spoilt card. The wastage of cards in this way with poor or inferior operators is considerable, but in the case of good operators remarkably small. On this punch a wonderfully high speed is attained by operators with a natural talent for the work. In nearly all the plants visited an accurate record was kept of the work of each operator; in some a bonus was paid for good work, and in others the results were merely posted in the workroom and taken into consideration for pay and promotion. In a London office visited the operators were expected to do 400 per hour, and were averaging over that, while in the New York Central Railroad Office one operator punching thirty-six holes to a card was averaging just on 500 per hour (499, 501, 502, &c.). These averages were not for mere trial spins, but the actual weekly records.

In addition to this punch the Hollerith also uses another punch for the identification-holes which are common to each card, such as date, district, &c., usually covering the first five to seven columns of the card. This is called the "gang punch" because it punches eight to twelve cards at one time. It is not necessary to use this punch, as, of course, the whole card can be punched in the one operation, but it is found economical in time to do the work in two operations when the first series of holes applies to whole batches of cards. Ordinarily this gang punch is also a small punch operated and fed by hand, but in the Pennsylvania Railroad Office at Pittsburg they used a power-driven automatic feed and ejectment gang punch working at a very high speed; the cards were gang-punched first and supplies handed out to each operator. One machine kept the whole of the operators supplied. Both Hollerith punches can be purchased outright.

Powers Punch.—There are two punches made by the Powers—the key punch and the slide punch—and both are electrically driven with automatic feed and ejectment. They are both large and unwieldy in comparison with the Hollerith, and cannot so readily be moved about from place to place; they are usually fixed in one place and operated there. There is, however, no difficulty in having them moved to any place where current is available.

Unlike the Hollerith, the cards are not punched column by column, but in one operation, by the machine when the release-key for the ejectment of the card is touched. This has the advantage of allowing the operator to correct any mistake made before the card is punched, with the result that the wastage on account of spoilt cards is small. An operator is nearly always conscious when she has touched the wrong key, and here she is enabled to make the correction immediately. In the case of the slide punch the matter set up for punching is visible, and can be read off and verified by a glance; it can be operated by both hands, several columns being set at the same time.

Both punches combine the gang features of the Hollerith with the individual. Any column can be readily set and remain fixed as long as desired, thus cutting out the second operation of gang punching required on the Hollerith, which must mean a considerable saving in time. The slide punch particularly has some fine features of great advantage for certain classes of work—its visibility, and the rapidity with which its columns can be fixed and released. The Powers key punch is, I think, capable of being more rapidly operated than the slide by the expert operator, and should, I think, more than equal the Hollerith in speed. The United States Customs statistics were compiled on a Powers plant, and only the slide punch was used, which is specially suitable for that class of work. According to the record kept there the operators were averaging just on 3,000 per day, which must be regarded as excellent work. On New Zealand census work, in transferring the data from the schedules to cards by hand, 500 cards per day was considered satisfactory.

As a machine the Powers punch is, of course, more complicated and costly than the Hollerith. Comparing the two makes of punches, I consider the Powers punch superior to the Hollerith.

Sorter.—Both sorters are excellent machines, and there is really very little to choose between the two. Each will sort to twelve classes at from 250 to 300 cards per minute. The Powers sorter is fitted with counters, which count the number of cards sorted in each class, and also the total put through the machine, which is perhaps a slight advantage where such a count is required.

Tabulator.—The Hollerith tabulator is made with five counters, each running up to nine figures, with device to make any of them merely list or add; each counter can be further split if desired, and the connecting cords are very simple to operate. Several results can be taken off the cards at one run, and some of the counters can be made to cumulate the totals. An operator must always be in attendance on each machine, and the results are read off and taken down by hand. This is a great disadvantage as compared with the Powers tabulator, which automatically records its own results, clears, and goes on again; but, on the other hand, the