The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, to whom was referred for examination the Hollerith Electric Tabulating System Report.

That:

The Hollerith Electric Tabulating System is a device by which electricity is applied to the computation and tabulation of census and other returns of a similar nature which require summation and classification under various heads and in different groups.

The methods consist essentially in first recording the data relating to each person by punching holes in sheets or strips of electrically non-conducting material (paper) and then counting or tallying these data either separately or in combination by means of mechanical counters operated by electric magnets, the circuits through which are controlled by the perforated cards or strips.
Thus the returns containing the record of each person have been received from the enumerators of the census, each record is transcribed by punching, to a Manila card, 6 7/8 by 3 inches. These cards have one corner cut off diagonally to ensure proper arrangement of the cards when piled together. The number of the corresponding record having previously been written on the card for the purpose of identification, the state, enumerators district etc. are recorded on the cards by a certain combination of four or five holes at one end of the card reserved for that purpose. As this combination of holes will be the same for all the records from a given district, a special machine is arranged which punches all these holes through four or five cards at one operation, thus reducing the labor involved to a minimum. These holes serve positively to locate a card in its proper district. A card misplaced among a thousand, can be readily detected by the fact that one or more of these holes would not correspond with the balance of the
cards. The importance of this consideration is manifest.

In order to punch the individual records upon the cards, they are placed one by one in a suitable punching machine. This machine is arranged with a plate of metal pierced with numerous holes, each hole or combination of holes corresponding to some fact to be recorded; and the given record is transferred to the card by punching from it holes corresponding to the proper holes in the plate. The order in which the facts to be recorded are punched, is in general conformity with that in the records, so that beginning at the left of card is punched for race, sex, age, relation to head of family, conjugal condition, occupation, education, physical condition, and birthplace of father, birthplace of mother. In this manner is obtained a complete record which will answer mechanically all questions which can be put to it. If desired, these punched record cards can easily be read and verified, by
simply placing them over printed forms prepared for the purpose.

The tabulation of the facts thus recorded on the cards is accomplished as described below. The press shown in the diagram consists of a hard rubber bed plate provided with suitable stops or guides against which the cards are successively placed. The bed plate is formed with a number of holes or cups, corresponding in number and arrangement with the holes that may be punched on the card. Each cup is partly filled with mercury and connected with a binding post on the back of the frame. Above the hard rubber plate is a reciprocating box provided with a number of projecting, spring-actuated, contact points corresponding in position with the centres of the mercury cups. When a card is placed in the press, and the handle brought down, these pins will form circuits corresponding with the punched record.

Arranged in a suitable frame are a number of counters, each capable of
registering to 10,000. These counters are actuated by electro-magnets terminating in binding posts on the back of the counter frame. To tabulate any of the facts recorded on the cards, it is only necessary to connect the corresponding binding posts with the binding post of the counters and then pass the cards through the press, when the results will be shown directly on the counters. The number of facts thus recorded at one operation is only limited by the number of counters which are used. Certain facts being, if all are thus tabulated, certain facts being, it is desirable at the same time to sort or arrange the cards according to any desired data, as for example, nationality, a sorting box is employed. This box is suitably divided into twenty compartments, each of which is closed by a lid, held against the tension of a spring, by a catch which forms the armature of a suitably arranged electro-magnet. The magnets are connected with the binding posts of the press according to the data by which the cards are to be assorted. When a card is put in the press the
Armature, corresponding with the given record is attracted, thus selecting the corresponding lid, which remains open until the card is deposited in that division and the lid again closed by hand. This is done with the right hand while, with the left hand another card is being put in position in the press. The sides of the sorting box are hinged to permit the easy removal of the cards when sorted. The sorting of the cards can be done while at the same time and desired groups or groups of facts. A series of checks upon the accuracy of the machine's record can easily be applied.

(a) In recording a given series of facts upon a number of cards one dial is always so connected that it will record every card that passes. The reading of this dial must therefore equal the sum of the readings of all the others. (b) Every time the circuit is closed in the act of registering the facts upon a card a bell strikes. The failure of this bell to sound is therefore a warning to the operator that for some reason the card has not been registered.
By accident a card is placed under the press upon which is recorded none of the facts at that time being enumerated; the machine will refuse to register. (b) All the cards that rightfully belong in any one of the sorting boxes will have at least one hole in common (besides those denoting the district) and a piece of wire may be thrust through this hole if the cards are piled together in order. It is likely to do this shows that one card has been placed in the wrong box and the interlocutor can be at once thrown out.

A commission appointed by the Superintendent of the Census instituted a comparison between three methods of compiling census returns; Mr. Chas. F. Ridgway's method, called the "Chief System," Mr. Wm. C. Hunt's method by means of "f cards" and tally sheets; and the method of Mr. Hollerich. The test selected was the tabulation of certain returns from the Census of 1880 from four districts containing 104,911 inhabitants.

The following results are quoted from the commission's report.

Junior Assistant in Transcribing
By punching, Hollerith's method — 72 h. 27 min.

On slips, Hunt's method — 144 h. 25 min.

On chips, Pidgin's method — 110 h. 36 min.

This occupied in tabulating.

By electrical machine, Hollerith's method — 8 h. 28 min.

By sorting slips, Hunt's method — 35 h. 22 min.

By sorting chips, Pidgin's method — 44 h. 41 min.

The committee further report that Hollerith's method of tabulating is superior to both the others in accuracy. They estimate that it is six in compiling the 34 returns of the eleventh census will result in a saving of $57,912.85.00, about 20% of the total cost of taking the tenth census.

Your subcommittee made an examination of the Hollerith system in Washington, where they saw it in operation, and they are of the opinion that it deserves the following description: it is invaluable to large numbers of individual facts are to be summed and tabulated. They consider the inventor is deserving of the greatest credit for his useful and novel application of electricity, and strongly recommend that he be rewarded for his invention, the highest award in the gift of the Franklin Institute.

L. D. Irving, Chairman
Francis LeLure
L. F. Rodinella
Elihu P. Crandall.