



Fig. 1. Flow of Data into and of Reports out of the Statistical Division.

work finished, orders, shipments, etc. Under a specially qualified executive and with a specially trained personnel, it can turn out its main products—sales reports, material reports, expense reports, cost reports, etc.—more regularly, more frequently and more accurately than we could obtain them in any other way. And the material used in the production of those main products is sorted and classified in such a way as to make it available for the production of by-products—periodic and special reports of all kinds, regular and special analysis of orders, of expenditures, of processes, many of which would be otherwise out of the question because of the prohibitive expense, both in time and money, involved in getting out the data as an independent undertaking.

its principal activities, display a few slides to show some of the results, and conclude with a somewhat more complete exposition of one of the chief products of the division which I believe will be of interest to all of you—the expense distribution sheet and the steps necessary to obtain it, together with some of the incidental results or by-products that we obtain while getting it.

Figure 1 gives a general view of the flow of figures into the statistical division and of the nature of the reports, both periodical and occasional, that flow out of it.

From the Employment and Service Department comes all information concerning new employees, and changes in the status of old employees. This information is transferred to punched cards (Figure 2), one for each employee, and these cards are sorted and filed in numerical order. When any employee leaves or is discharged, the date of quitting and the reason (furnished also by the Employment and Service Department) are punched on the card, and the card is transferred to a file of "quitters." These cards contain, in addition to the name, which is printed on the back, columns for employee's payroll number, car line used, sex, year and month of birth, nationality of applicant and of his parents, status of citizenship (citizen, alien, etc.), marital condition, number of children, previous employment, education, standing in psychological and clerical tests, date of employment, class of employment (whether piece work, hour work or week work) wage rate, insurance record, date of leaving and length of service. After the files are once established the labor of maintaining them is practically negligible, and the information to be obtained from them by mechanical sort-

PERSONAL DATA																				
Payroll No.	Car Line	BORN	NATIONALITY	CITIZENSHIP	RELIGION	EDUCATION	PSYCH. TEST	CLER. TEST	EMP. DATE	WAGE	INSURANCE	QUIT	REASON	LEAVES SERVICE						
		Year Mo	A F M						Year Mo	Class	No. Amount	Year Mo		Year Mo						

Fig. 2. Sketch of Top of Hollerith Personal Data Card.

It is not proposed in this paper to put forth any argument as to the necessity for any of these reports or as to the merits of any particular form of presenting them. All this paper will attempt to show is that they can and should be obtained in the ordinary course of well-conducted scientific management and that their compilation and presentation is a distinct function of such management. It would be impossible to attempt to go into detail concerning all phases of the work of this division. The object of this paper is to give a brief summary of

ing and tabulation is almost without limit. Labor turnover records, of course, are the first product of this phase of the division's work, but, by means of the data on the punched cards the turnover can be dissected and analyzed and becomes the source of very valuable information. Similar analyses are made from the cards of the employed personnel, and these analyses are of tremendous assistance to the Employment Division in determining what applicants to accept, or rather, what applicants to reject. The expense of instructing new

employees is a very considerable item in most plants where a certain amount of skill must be attained, and a great part of this expense can be saved if we can intelligently eliminate those applicants whose qualifications would indicate a probable short duration of employment. For instance, if the records show that out of twenty-five new employees, single, alien, of foreign parentage, and with only common-school education, only one remained after three months, it would seem the part of wisdom to reject the next employee having those same qualifications. Such rejections are as much to the advantage of the employee as to that of the employer.

Detailed reports of this kind should be furnished periodically. Other reports can be had when desired. This service is especially useful in filling out the numerous questionnaires requested by labor bureaus and the various other agencies that are always asking for information. These are usually a source of great annoyance, consume considerable time, and are frequently filled out without too much regard for accuracy. By means of the cards referred to above this work can be done quickly, accurately, and without interfering with the routine of any department.

The special uses for this personnel data are innumerable. Take as an example the column in which is punched, in code of course, the car line used. In case of a breakdown in the service on any car line, we are able to determine, at a moment's notice, the number and names of all employees who will be delayed or prevented from reporting for work. In case of a street car strike, where it is necessary to provide motor transportation, it is easy to determine just how many persons to provide for in each section of the city.

Now let us look at the Statistical Division's work in connection with the receiving and handling of orders. When any order is received and approved it is delivered immediately to the statistical division where all data are transferred to another set of punched cards. These cards form the basis of over twenty-five different reports, some seasonal, weekly or even daily, some only occasional, and others only when requested by the department or official requiring the information. For an experienced punch operator, much less time is needed to punch the card than would be required to post the information on a card or ledger sheet, and, once the cards are punched, it is a mere matter of mechanical sorting and tabulating to obtain any of the many reports needed.

One of the more important periodical reports furnished from the above data is the lot or material report,

which is merely a tabulated recapitulation of all orders by materials, giving the number of items ordered in each material. This report made out twice a week during the selling season, is used by the merchandising department as a guide in the purchase of materials. A somewhat similar report, also made out twice a week, is the model report, in which orders are tabulated by models. This report is of especial value to the planning department in determining the personnel and equipment required to manufacture the various kinds of product in the proportion in which they have been ordered. Both of these reports are used by the sales department as a record of the season's result to date, as a basis of estimating the probable totals, and as a guide in issuing directions to its salesmen—withdrawing certain materials when the supply is exhausted, or directing the pushing of certain models or materials when in the judgment of the department such action seems advisable.

The next step in the use of these data (and please bear in mind that these are still the same cards punched upon the original receipt of the order) is to furnish information on which to base the starting of work in process. At this point it might be well to explain that our product is a seasonal one, and that with the exception of certain staple materials it is impossible to have on hand in advance any great part of a season's requirements. It is frequently necessary to put material into work almost immediately after receipt. In order to manufacture most economically we do not use this material to fill any specific customers' orders but rather to complete our schedule in certain models. This being the case, as soon as material is received, or at any other time when material is to be put into work, it is essential to know at once, the number of items ordered in this material, the number of items in each model in which the material is used, and the number of items in each size in each model.

For the coming season we are handling over 500 materials in over sixty models, and each model is made in a large range of sizes, so that to maintain a ledger by materials and models involves the possibility of more than 30,000 ledger sheets, each of which is provided with at least sixteen columns for sizes. When hundreds of orders are being received each week it can readily be seen that the labor of posting to such a ledger from individual orders, either by hand or machine, would be stupendous. By means of our punched cards, this laborious process is very greatly simplified. The cards representing all orders received since the pre-