

aration often becomes almost gelatinous, efficient filtration is impossible, and the average yield on a manufacturing scale is 25% of the theory.

Various experimental lots were made in accordance with specifications with like results. Trials were then made using in turn, as extracting menstruums, cold water, chloroform water, water at 40° C., at 60° C., at 80° C., at 90° C., and finally boiling water, eliminating the ammonia water entirely. Chloroform water, aside from its preservative action, showed no advantage over distilled water at the same temperature. As the temperature of the extracting menstruum was raised, there was noticeable a marked decrease in the amount of the albuminous material present and filtration at the end of the process was observed to be increasingly rapid. With boiling water this substance gave practically no trouble.

Several large batches of this fluidextract have been made without difficulty and, after the lapse of more than a year, the condition, flavor and odor of the record samples are entirely satisfactory.

The working formula is as follows:

FLUIDEXTRACT OF GLYCYRRHIZA.

Glycyrrhiza No. 20 powder	1000 Gm.
Alcohol	250 cc
Boiling Water q. s.	
Cold Water q. s.	

Moisten 1000 Gm. of Glycyrrhiza with sufficient boiling water, pack in percolator, cover with boiling water and macerate, keeping hot over night. Percolate to exhaustion with boiling water, reserving first 500 cc collected. Evaporate weak liquor to a soft extract, dissolve in reserve and, if necessary, make up to 750 cc with water. Gradually add 250 cc of alcohol with constant stirring, let stand one week, siphon off clear fluid and filter remainder, wash residue on filter with q. s. of a mixture of one volume of alcohol and 3 volumes of water to make 1000 cc.

Precautions must, of course, be taken during warm weather to keep the reserve percolate sweet.

This formula has been submitted to the U. S. P. Revision Committee with the recommendation that it receive consideration.

LABORATORY OF WILLIAM R. WARNER & CO., INC.,
NEW YORK, N. Y.

VOLUME PRODUCTION PHARMACY.*

BY WILLIAM H. GESELL.

The phrase, *Volume Production Pharmacy*, applied in this way, may be new to you, and it is really an entirely different type of pharmacy than you and I were taught in college.

Volume Production Pharmacy is the result of the present trend of pharmacy. Formerly, when a person went into a drug store and purchased pharmaceutical preparations, he patronized that drug store because he knew the proprietor, knew of his training, knew that his preparations were made by him in a careful, scientific and honest manner—he depended on his honesty for their reliability. Perhaps this condition would have continued indefinitely as it has in other countries where there are laws that the pharmacist must be the individual owner. But in the

* Parts of an address before New York Branch, A. Ph. A.

United States, the "Merchandising Drug Store" has changed the pharmacist from a scientific plodder to a scientific super-salesman. I know of cases where in certain stores clerks make as high as eighty sales an hour.

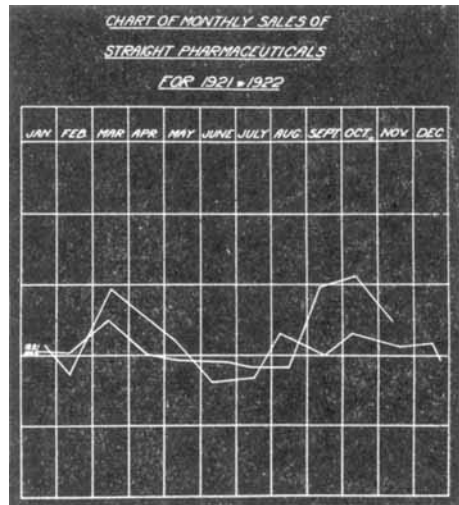
The laws of most States demand—and rightly demand—that a pharmacist should have a scientific training and certain experience before he is licensed. But because he has become a super-salesman, with scientific training, and because his time as a salesman is more valuable as such, he buys most of his pharmaceuticals. This places the burden of the responsibility of the large production of pharmaceutical preparations on the wholesale manufacturer, and a serious responsibility it certainly is.

A passing tribute must be paid to the old-time druggist—he worked unlimited hours, waited on his customers spasmodically as they came in, passed the time of the day with them, filled prescriptions, manufactured his own preparations, general pharmaceuticals and sometimes chemicals in a small way, and in the evenings, in that room back of the store (I am sure some of you remember these rooms), he rolled pills of Blaud's Mass, etc., and read of the newest achievements in pharmacy in the many trade papers to which he subscribed.

Volume Production Pharmacy carries with it grave responsibilities. Preparations which the wholesaler prepares must be of a quality acceptable not only as Pharmacopœial preparations but must also pass the various State requirements, which are sometimes impossible. They must please the eye of the purchaser and, very peculiarly, quite a few pharmacists are not of the same opinion as to just how a preparation should look. *Volume Production Pharmacy* demands of the manufacturer that he must produce superb, correctly labelled, properly analyzed, compatible preparations, and he must compete with many small manufacturing concerns whose stock in trade is a cellar and a few crocks; the preparations are mixed by the owner, peddled by the son, packed by the children, and the preparations are often of nondescript quality.

The selling curve of pharmacy is approximately as given in the chart, but, of course, the graphic curve only shows more or less the seasonal trend. It has even a greater disadvantage because there are many more fluctuations than actually given here. The significance of this curve shows that *Volume Production Pharmacy*, therefore, has to have for its aim an intelligent plan of work so as to give the best quality and prompt service to its customers.

It is easy to say, "Well, simply manufacture preparations during dull times that are going to be in demand during the succeeding busy period." To a great extent this course is followed but the problem is really not so easy.



Selling Curve.

An epidemic in any season will completely upset well-arranged plans and, therefore, such emergencies must be prepared for. Many preparations require special attention—some age, others decompose from aging, some discolor—all of these difficulties have to be overcome so that permanent, quality preparations can be delivered at all times.

In a concern where only a few standard preparations are manufactured, and economists say that this is the best way, the problem is not a serious one. But in our business—where we manufacture five thousand different pharmaceutical preparations, and where we have, besides our regular production, dedicated a full department to those out-of-the-ordinary preparations which a druggist might want in a hurry—these factors create a very complicated problem.

You may say that this is stretching the point of giving service. Service has been defined by its component letters—"S" is for *Service*, "E" is for *Education*, "R" is for *Resourcefulness*, "V" is for *Vision*, "I" is for *Intellect*, "C" is for *Courage*, and "E" is for *Enthusiasm*—all of these ingredients of Service enter in *Volume Production Pharmacy*.

The factors which influence *Volume Production Pharmacy* are as follows:

1. Unstability of the markets on raw materials.
2. Control of stocks of finished and unfinished goods.
3. Over-production and under-production.
4. Experienced operators.

Formerly, in the drug store, the unstability of the market never worried the pharmacist. In *Volume Production Pharmacy* the complexity of this situation is a terrific one. Prices go up and down in a very short period; the keeping of large stock is a financial impossibility, and, therefore, careful buying is of paramount importance. Coupled with this is the control of stock, both of the finished and unfinished goods. In order to be able to cope with the many difficulties that arise in *Volume Production Pharmacy* it became necessary in our case some years ago to develop a general control system. To be able to follow any order from the time it arrives to the time it is delivered, watch the orders to find out how often an order repeats itself in a given period and thereby predict unexpected rushes, etc., and to do this without overburdening oneself with unproductive help is a serious problem. For after all the pharmaceutical super-salesman is still a pharmacist and, if the prices rise above what he thinks they should be, he can and will manufacture such items.

Therefore to produce economically, it means to "Taylorize Pharmacy." It is a very simple plan to apply the principles of Frederick W. Taylor to a machine shop where a limited number of items are made with a given number of operations and where the constants seldom vary, but *Volume Production Pharmacy* depends so much on the type of merchandise received at a particular time that it is very difficult to adapt positive and given rules for every situation.

The principles of Mr. Taylor consist of the following:

Firstly.—The development of a science for each element of a man's work, thereby replacing the old rule-of-thumb methods.

Secondly.—The selection of the best worker for each particular task and then training, teaching and developing the workman, in place of the former practice of allowing the worker to select his own task and train himself as best he could.

Thirdly.—The development of a spirit of hearty coöperation between the management and the men in the carrying on of the activities in accordance with the principles of the developed science.

Fourthly.—The division of the work in almost equal shares between the management and the workers, each department taking over the work for which it is the better fitted; instead of the former condition, in which almost all of the work and the greater part of the responsibility were thrown on the man.

As to the second principle—the selection of the best worker—I need hardly discuss that because it would fill many a paper.

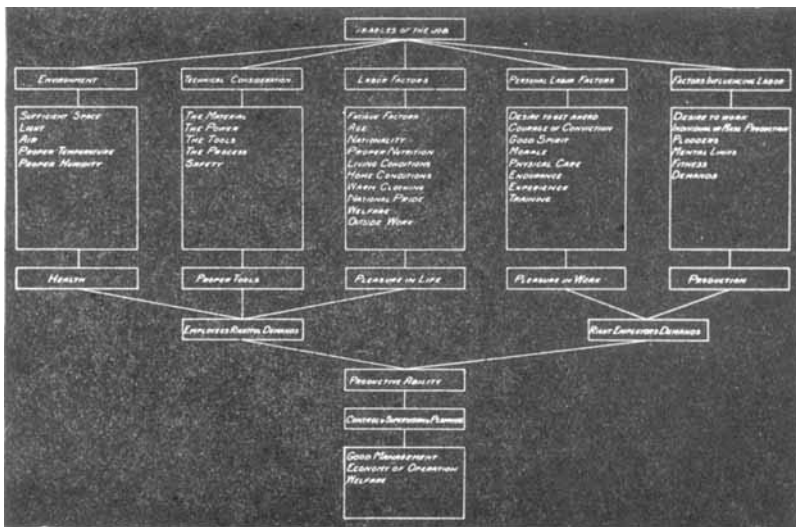
Principle No. 3—the development of a spirit of hearty coöperation—is also a lengthy subject and of no import in this discussion.

Principle No. 4—the division of the work between the management and the workers—is also not directly applicable here.

It is the first principle—the development of a science for each element of a man's work—which I am trying to tell you something about.

I will not go into the details of classifications and standardization of products, methods, materials, etc., but will endeavor to tell you about the science of manufacturing, about the centralization of individual efforts, and the connection of all parts of the shop so that the work is carried on rapidly and reliably in a large volume.

The following chart shows the variables affecting the job and the employee.



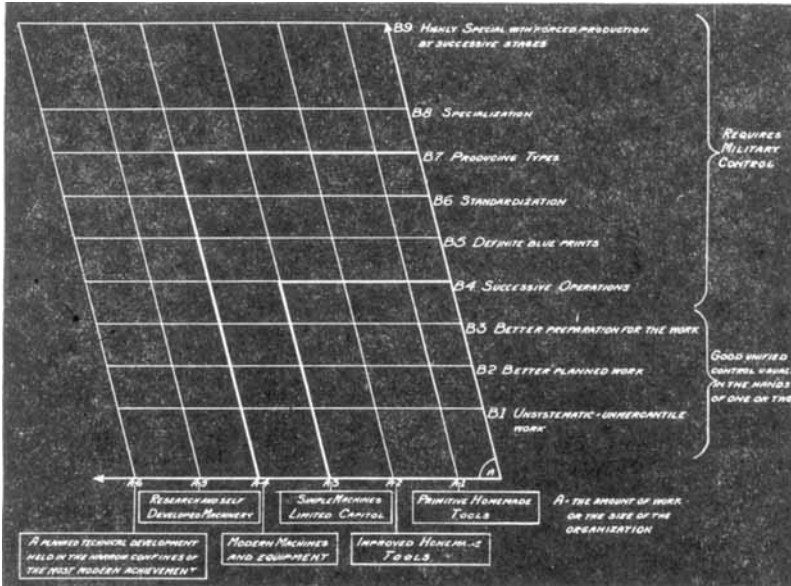
Sollheim

Variables of the Job.

The other graph shows the progress in organization of a plant. It is the function of good management to simplify and improve—that is, to lower the cost of production and to make the work easier for everyone. This graph shows the various steps of organization in a growing enterprise.

Management is leadership. Effective leadership, of course, means the ability to deliver the goods. The trouble, however, is in getting men who are willing to be leaders and who will never “pass the buck.” Inherently, we are all lazy. Work was forced on us. It is the invention of civilization, city living, etc. But work can be made pleasant. Some men can make it pleasant for themselves for others

it must be made pleasant, but only the men who find their work a pleasure become leaders—"passing the buck" is not known to them. Leadership is the faculty of finding happiness in one's work, and because of civilization and modern development of industry good leadership is destined to depend more and more upon



Sollheim

Organization of the Plant.

education and specialized training—a good management is not accidental; it is created by intelligent, broadminded leadership, founded on experience and specialized knowledge.

In *Volume Production Pharmacy* specialized knowledge is very necessary. The pharmaceutical business requires a thorough knowledge of pharmacy, chemistry, physics and engineering. The science of chemistry was evolved by pharmacists, and most famous chemists received their earliest training in a pharmacy. Some processes in pharmacy are simple, but others are extremely complex.

The small pharmacy was naturally swayed by local conditions. Not only does the manufacture of chemicals require a chemical knowledge, but even the simplest pharmaceutical preparation—for uniformity in product is an essential quality. The wholesale manufacturing establishment must supply uniform, carefully controlled products.

The knowledge of physics enters largely—critical temperatures, distillation temperatures for the largest yields, shapes of apparatus for best results, so that one can produce economically—all this knowledge is necessary in *Volume Production Pharmacy*; not only necessary for a better product, but so that it may be produced economically.

Formerly, before the pharmacist was a super-salesman and before the communities were so closely populated as they are now, the pharmacist had much spare time and manufactured these products; only the ingredients were charged in the cost, not his labor. With such conditions the manufacturing pharmacist has to

compete and therefore also engineering knowledge is utilized in the construction of apparatus and machines that will lower the cost of production.

Good management, with scientific knowledge and specialized training, is very necessary. Good management eliminates waste; waste in industry is one of the most serious problems of to-day, and in the pharmaceutical business it can be extremely large. Formerly it was not possible to value in so many figures the waste in industry—we audit our books and know exactly in dollars and cents where we stand; we analyze our merchandise and know if it is 95% pure; we analyze labor turnover, but we have not given the same attention to mathematically calculated and audited management—this is most important. The Committee on Elimination of Waste and Industry of the American Engineering Council has formulated a valuation sheet for determining waste in industries.¹

The question of organization is next of importance. The type of organization should be defined in order to create mutual confidence and coöperation. By having the organization and the duties of each executive defined, it relieves each one of the petty duties, it creates internal harmony and an interchange of ideas. To lay out the scope, privileges, and duties of the various officials and correlate them so that the coöperation is for the good of the firm and harmony—it is important that plans are carried out promptly.

It is even more necessary to define the duties of every employee and where possible give him a manual telling him just how he must do his work. This places the burden of planning on the management.

Again we are back where we started—applying the principles of Frederick W. Taylor to the work and making it easier for everyone.

In our plant we have solved a great many of these questions by establishing a Planning Department.²

In his concluding remarks Mr. Gesell said: "The system of follow-up is original with us—it is a modification of Taylor's methods. It gives each one a specific job to do, makes everyone toe the mark, gives a rigid control, and no one is inclined to 'pass the buck.' It gives a great deal of independence to the foremen of various departments, but it absolutely controls the work and avoids delays in deliveries. We have looked into many other systems in other factories, especially those in the same business, but have never yet found a simpler system with as little red tape. All of the planning, routing and control is done by two people."

LABORATORY OF
LEHN & FINK, INC., BLOOMFIELD, N. J.

MEMORIES OF 'SEVENTY-TWO.

BY THOS. D. MCELHENIE.

Eighteen seventy-two to Nineteen twenty-two—quite a smart jump.

What a wealth of memories comes with these figures. For a man who has been for some months reading Wells' "Outline of History" to speak of some event

¹ While this questionnaire has great value for wholesalers and manufacturers, it has not sufficient general interest for reprinting.—EDITOR.

² The speaker described in detail the manner of handling orders for preparations, so that complete checks are kept throughout the transactions.