

MORE than a catalog, this work is dedicated to users of glass everywhere. It is our hope that within its pages will be found much of interest, much of beauty, and above all, many practical solutions for all sorts of packaging problems.

Owens-Illinois Glass Company

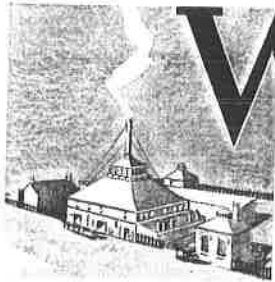
F O R E W O R D

TO give some idea of our facilities for service . . . of our ability and willingness to be of assistance to users of glass . . . to demonstrate the value of our experience as exemplified in finished products . . . these are the reasons for this effort.

“Glass Containers” is designed to live for a period of years. Supplemental pages will be forwarded from time to time to keep before you the very latest developments.

HISTORY OF THE

Owens-Illinois Glass Company



Writers of fiction delight in creating a situation wherein the girl of his dreams comes dramatically into the life of a man. There's romance too, in the story of the mating of the two largest and most progressive bottle companies . . . the fulfillment of a dream of years.

The Illinois Glass Company was born in Alton, Illinois, in 1873. Wm. Eliot Smith was its President and Edward Levis, Secretary and Treasurer. As so often is the case when men are really interested, limitation of capital meant nothing against the brain, brawn and energy of its founders.

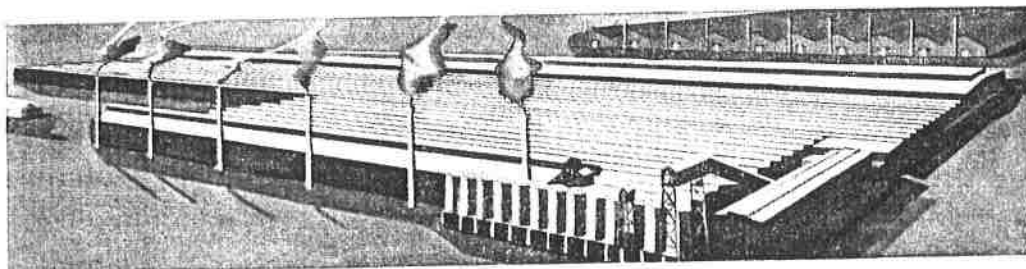
Besides his own devotion to the glass industry, Edward Levis gave six stalwarts to the cause. Each of them became a practical glass man in the accepted manner . . . personal experience. Through glittering beads of perspiration they saw the birth of bottles from their conception in an admixture of sand and soda ash and lime, to their delivery at the end of a tortuous annealing oven. Thus they became fitted to carry on . . . a fact which time has clearly demonstrated. When the Owens Bottle Machine Co. was formed in 1903, the Illinois Company had already attained a commanding position in the industry, which was later fortified by the acquisition of the assets of the Thompson Bottle Company and the Cumberland Glass Company.

The Owens Company was the outgrowth of an idea conceived by the late Michael J. Owens that bottles could be blown automatically. Years of hard work fraught with bitter disappointments and coupled with the expenditure of a tremendous amount of money from the purse of Edward Drummond Libbey, resulted in the first successful automatic machine.

Over a period of years the Owens Company grew steadily and acquired the plants of the American Bottle Company, The Graham Glass Company and the Chas. Boldt Glass Company.

The Illinois Company with customary foresight, was quick to grasp the possibilities in mechanical bottle blowing and became one of the first of the Owens licensees. Immediately there developed a spirit of keen rivalry between the two organizations which has continued through the years. The result is a degree of progress that could not have existed under other circumstances.

Every major improvement in bottle manufacturing . . . in packaging . . . and in service, can be credited to one or the other of these great concerns. It is quite fitting therefore that they and their subsidiaries with their gas lands and sand quarries . . . possessing unequalled facilities for production, and for service, and for research . . . should unite . . . that the dream of yesterday become today's reality . . . the Owens-Illinois Glass Company.



Statement of Policy



A successful business today is no more than the shadow of the men whose minds direct and whose muscles create the product to which it owes existence . . . no less than a measure of the service rendered.

TO . . . MAKE the very finest bottles in the world . . . to package them intelligently . . . deliver them promptly . . . and price them fairly.

TO . . . ACCEPT a customer's processing and marketing problems as our own and stay with them to a successful solution.

TO . . . LIVE up to the highest standard of modern business ethics.

These are the ambitions of the men who are carrying on for the founders whose vision, faith and hard work, led to the establishment of the

OWENS-ILLINOIS GLASS COMPANY



The slightest variation in glass batch may cause endless grief and trouble for the furnace man. Extreme care is used in weighing raw materials.

elements . . . essential for the melting of uniformly good glass. Furnaces, some of them of 350 ton capacity, are things of precision and rugged besides. To a depth of approximately four feet the glass seethes and boils against bottoms and sides which are composed of blocks a foot thick.

Above, where the natural gas flames roar, is another type of fire brick . . . the whole encompassed and supported by a web of steel.

The furnace man, upon whom heat seemingly has no effect, obligingly offers a "blue" glass permitting a view of the furnace interior. Far back is a wall which separates the "melting" from the so-called "refining" end. At the bottom is a throat through which the thoroughly melted glass flows into the chamber of lesser heat for some hours of refining before delivery to the revolving pot. A peculiarity of glass is that it sinks as it purifies, and another . . . it is melted from the heat of flames above.

Against the outside of the furnace, cold air is constantly directed through a maze of wind pipes and occasionally, where the walls have become alarmingly thin, are "water patches" metal boxes through which cold streams of water are constantly flowing. These devices add materially to the life of a furnace which at best is short . . . twelve months a good average.

Furnace blocks are processed under pressure and extreme heat. They are composed almost entirely of the same materials from which glass is melted so that as they disintegrate under



At regular intervals new batch is fed into the furnace mouth, familiarly known as the "Dog House". It's a hot job requiring no little intelligence and skill.



This gives some conception of how melting heat is applied to glass batch. Note the dividing wall between the melting and refining chambers.

the intense heat, no foreign substances are introduced into the batch to cause blisters, seeds and off-color. It is noticeably hot back of the furnaces and around the machine but not unbearably so . . . thanks to the great height and ventilating facilities of the building which houses them. Every effort is made and no reasonable

expense is spared to keep the furnace tenders and their hundreds of fellow bottle makers, comfortable and happy. The torturous labor and heat of the old processes have been removed in modern factories.

Molds are very important to successful automatic bottle blowing. Each style of bottle requires a different set and each mold of the set must be as nearly alike as it is humanly possible to make them and they must be scientifically designed to hold and carry away heat at essential points. Molds are the measure of a bottle. The "blank" in which the vacuum is created to draw the hot glass from the revolving pot is the control of a bottle's weight. The "finishing mold" is an exact duplicate of the bottle's contour or shape. In the "thimble" the finish is formed.

Hand in hand with the development of automatic machines have come improvements in mold production and design. Profilers, for instance, from a "master" mold are capable of making two and even four at once and repeat the operation over and over without measurable deviation from the original. But for intricate work and design, dependence is still and probably always will be put on



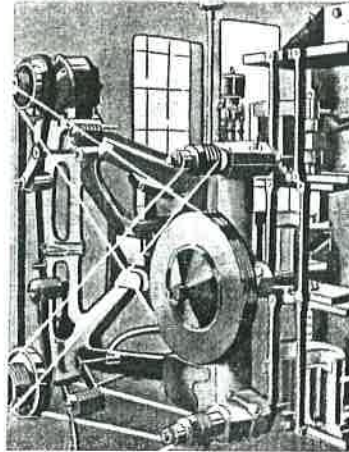
A mold chipper must be something of an artist as well as an artisan. Fine examples of his work are in daily use.

the "chipper". With infinite patience and deftness, the chipper accomplishes in metal what the pattern maker does in wood and with about the same degree of swiftness.

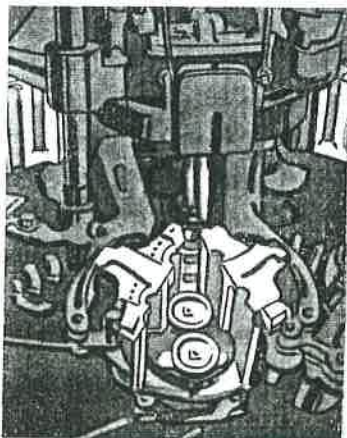
With proper mold equipment, each of the many arms of a machine is capable of blowing two or more bottles (depending upon their size) during the course of a single revolution, the aggregate for twenty-four hours . . . a tremendous total.

With his eye constantly roving over the automatics under his supervision, Jack the machine foreman, directs attention to the "blank" mold as it passes over the revolving pot rim and dips for its charge of molten glass. He points out that no two blanks dip in the same area because of the revolving of the dish-like pot. Its greater portion is under cover making it possible to hold the heat uniform and present a fresh glass surface to each successive blank. Observe the cut-off which neatly slices the slug free from the body of glass and retaining its position, acts as a temporary bottom for the mold.

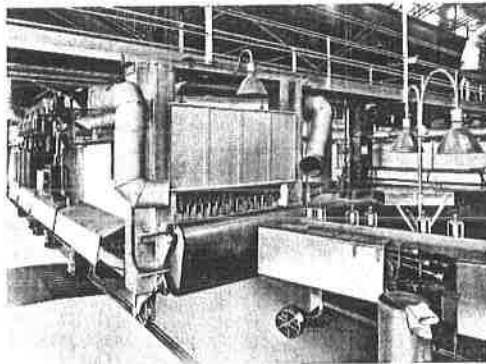
Now watch the blank mold part and leave the hot "slug" exposed for an instant. Then the finishing mold rises quickly and closes and the blowing operation begins. For half a turn the air is applied and then the thimble which up to this moment has held the bottle, itself parts and the finishing mold carries the bottle down under the revolving pot to the point of release. Here as the mold halves part, a clever "knock-out" arm grasps the completed con-



The guide mold is in the center. Above and below sharp tools are cutting identical cavities. Smaller molds can be made four at a time.



The "Blank" mold has parted and the "Finishing" mold is rising and about to close over the bottle slugs. The "Bottom Plates" are clearly shown.



Receiving end of one of the new electric lehrs. Bottles are tempered for strength and automatically become sterile through the medium of clean heat.

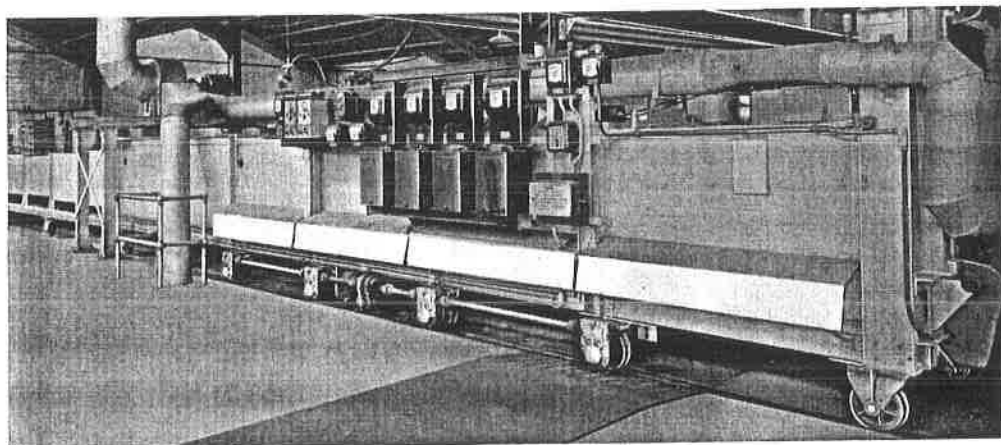
tainer and delivers it to a conveyor for transportation to the lehr.

Jack quickly demonstrates the value of a lehr or tempering oven in bottle manufacture. From his inspection table he

takes a bottle which was lifted from the machine for observation and has cooled without tempering. As it comes in contact with the heat of his hand it bursts into a thousand pieces. Any bottle to be merchantable must be tempered to prevent a lack of molecular cohesion between the inner and outer walls and surfaces. Tempering is accomplished by re-heating to practically the melting point (1150°) and then slow cooling over a period of from four to seven hours.

With the recent introduction of electricity as agency for annealing, Owens-Illinois has modernized one of the most important of bottle making processes. Electrical control is absolute and is clean beyond compare.

At the "cold" end of the lehr, Sue and her sisters enter into the drama of bottle production. Women have proven to be far better bottle selectors than men.



Side view of electric lehr. Note the instruments which make it possible to maintain absolute temperatures. Like sentinels, they keep watch and record and correct the slightest deviation day and night.

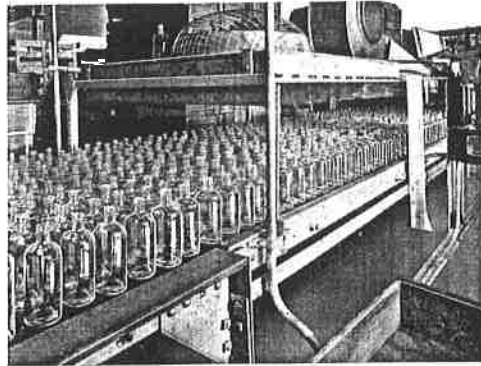
They possess the requisite keenness of eye and nicety of selection. They are quick and deft.

Space is provided at the Lehr ends for enough girls to care for the vast army of bottles passing through it, the quantity in reverse ratio to the size being run.

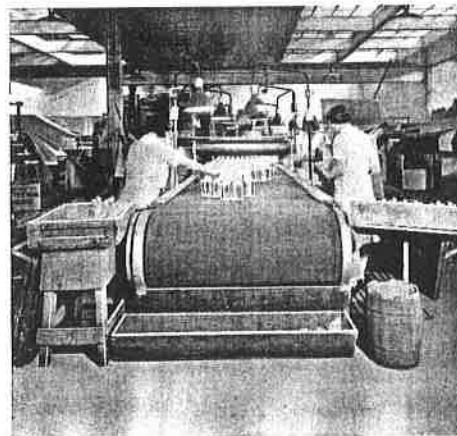
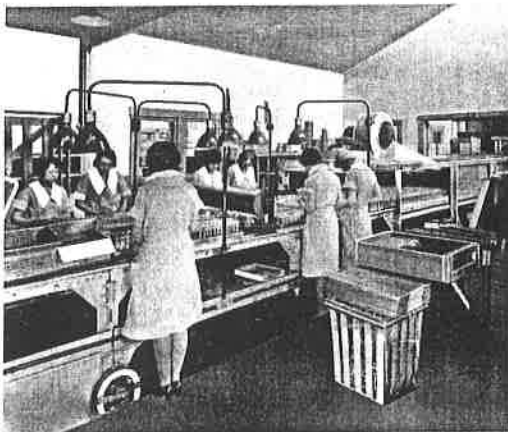
Against possible oversight, a reselection is made before placing the bottles in cartons or cases for shipment or storage as may be. A bottle either "is" or "isn't" with Owens-Illinois . . . there are no seconds.

Tremendous storage facilities are available at all plants where stocks are accumulated against customer demand. The most modern of trucks, trailers and mechanical pilers traverse the canyon-like aisles and seemingly make play of an arduous and important task.

Owens-Illinois employees, men and women, are well paid, well cared for . . . and happy. They join with the management in an honest effort to make the most perfect of bottles, package them properly, price them fairly and deliver them promptly.



Like soldiers a never ending army of bottles marches forward to battle the hosts of disease or meet the needs of commerce.



As much care is exercised in selecting selectors as they are required to use in examining bottles. This neat crew is typical of the many who are responsible for the quality of Owens-Illinois bottles. Note the cleanly, light and airy surroundings in which the girls work.



These illustrations give some idea of the size and scope of our Chemical Research and Development Department. The most modern of equipment, generous floor space, facilities for practical experimentation and actual tests — all are at the command of a properly trained personnel who have behind them, years of experience.

In this same building is housed the Engineering Department, to which we look for mechanical improvements and inventions. This large and active group of experts while laboring behind the scenes are nevertheless essential to modern high grade container production.

Science Plays a Leading Role in

GLASS PRODUCTION AND BOTTLE MANUFACTURE

Within the last three decades the glass industry has undergone more radical changes in its manufacturing processes than any industry of which we know.

Only twenty-five years ago most bottles were blown by hand and little or no attention was paid the quality of raw materials which went into the making of glass. The result was a great variety of glass and a customer had no assurance of a uniform and dependable supply of bottles.

Old glass blowers tell of throwing a large potato into the furnace of glass when its condition became too unsatisfactory, which was often the case. They did so because for generations before them it was done under similar circumstances and the act came to border upon superstition. But it was not as silly as it sounds, nor can the result be regarded as a phenomenon. The fact is that, when the potato fell into the seething glass, a reaction was apparent and it permeated the whole mass somewhat in the manner of the ever widening ripples caused by a stone thrown into water. During the agitation the dissolved gases in the solution came to the surface and the result was cleaner, less blemished glass.

The potato method does not fit into modern practice however, the introduction of automatic equipment necessitating the elimination of all variables. New methods of melting glass and the selection of a higher grade of materials is the logical outcome. More and more it becomes necessary to depend upon scientific instruments and technically trained men to work out and control formulae and processes.



This is known as the Balance Room. Here in glass cases, are found weighing instruments of utmost accuracy.

To accomplish these things it is necessary to provide the vendor with rigid raw material specifications and through periodic checking, make

sure that he consistently adheres to them. Producers' quarries and plants are inspected regularly by our representatives and samples of raw materials received are sent in periodically from our own plants for test and inspection. That there may be no possibility of error, in addition to safe-guarding materials and melting, hourly tests of finished bottles are made. Careful examination of the bottle itself is followed by a temperature test more severe than are the requirements of customers' filling processes.

Heat elements are important factors in the production of glass and upon their quality much of the value of the finished product depends. Natural gas is the cleanest practical fuel obtainable for glass melting. Southern plants lie close to gas fields and it is piped to the others wherever practicable. The requirements of our Alton Plant, for instance, are pumped thru direct line from Louisiana and like other raw materials, the gas is analysed daily.

Furnace blocks, previously described, are built according to exacting specifications. Melting temperatures are controlled and recorded by pyrometers. Annealing or bottle tempering is accomplished electrically.

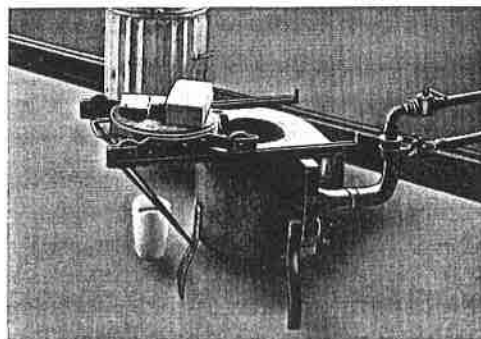
As has almost invariably been the case in bottle production advancement, Owens-Illinois pioneered the extensive

application of electrically heated annealing lehrs. Because electricity can be so readily and accurately controlled—because it is clean beyond compare—it is obviously superior to other agencies. Bottles from electric annealing ovens are incomparably strong and sterile.

It is the ambition of Owens-Illinois research and chemical men to be ahead of any demand which our trade may make. Search is constantly being made for another ingredient which might possibly improve glass quality—for another element which will provide a more attractive or greater variety of color—for the ultimate in bottle beauty and design.

Seventeen men comprise the Chemical Research and Development Staff of the Owens-Illinois Glass Company. Fifteen thousand square feet of floor space are devoted to their efforts. The very latest and most costly equipment is at their disposal. A one hundred and fifty ton furnace is available for their practical experimentation.

New discoveries and refinements through the years have made it possible to meet the demands of our own and our customers' producing facilities, as well as the latter's selling and marketing problems. The result is appearance, quality and service beyond the dreams of the most optimistic of potato hurlers—bottles which are basis for comparison the world over.



One of several retorts used for melting experimental glass batch. Extremely high temperatures are quickly obtained.



AND now, having delivered the "ideal container," let us give thought to the question of contents and the manner of sealing and closing.

The day of speculation in packaging, like that of horse-drawn vehicles, is about over. No longer is there need for guesswork because scientific research makes it possible to ascertain the correct elements in the package and the proper method of closure for any given product.

WHAT *may We do for You?*

IN the interest of our customers and prospects, with the thought of assisting them to pack worthy products and market them profitably, the Owens-Illinois Glass Company maintains a New Uses and Research Division. It is comprised of a fully equipped laboratory and a highly trained staff of packaging experts.

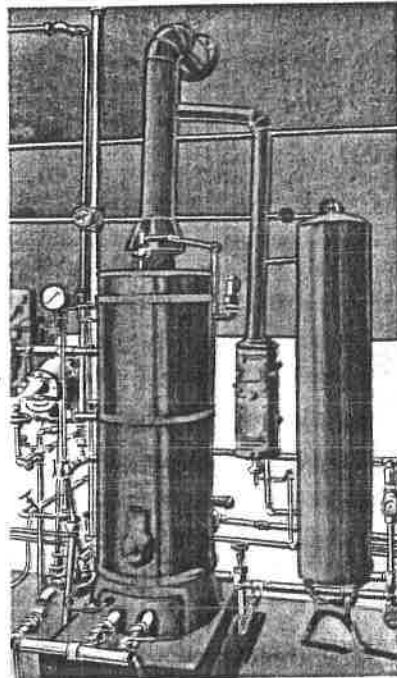
Whether you depend wholly upon advice from outside organizations or have technical men in your own institution, our facilities are at your command. To actually make original tests and recommendations or merely to collaborate as the case may be, is a matter of keen interest to us. In either event, the knowledge and experience garnered over a period of years in handling similar and related problems, is yours.

There's no end of satisfaction in being able to quickly demonstrate the salability of a new product without annoying delays and worry over its practical features and limitations. Of equal importance is the saving of money and the elimination of bad reactions which so often result from spoilage and returns.





All practical equipment for volumetric and gravimetric analysis of foods and other preparations are found in the research laboratory.



This boiler is capable of generating steam and hot water for varied requirements of processing and testing. It is provided with automatic controls.

Behind our staff of technicians is the most modern and complete apparatus yet developed. Experience has given them a knowledge of fundamentals and facts which eliminate time, effort and expense for you.

Give thought if you will for a moment to the problems of the Likto B. Rite Company who are about to introduce a product which, while entirely different than the one upon which their fine reputation has been built, fits into their selling structure nicely and may be expected to materially reduce charges to overhead.

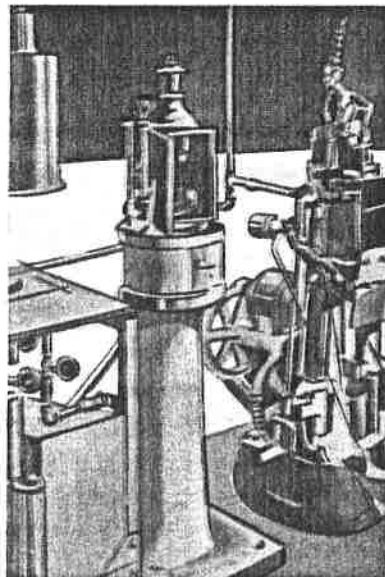
In most instances there is no question about glass being chosen for in this modern age, it is everywhere recognized as the ideal container. But what of the closure? What type shall it be to function most perfectly? How can it be made to add to the dis-

tinctiveness of the package? Does the cap seat properly to prevent leakage . . . is the liner heavy enough to withstand the pressure of application . . . will it resist the acid content . . . will it "fatigue" or lose its resiliency . . . is a compo rubber correct for hot pack . . . what vacuum is necessary and how will it be obtained? Of the product itself . . . will it separate . . . what ingredient is likely to induce spoilage . . . is discoloration to be feared and how will it be prevented?

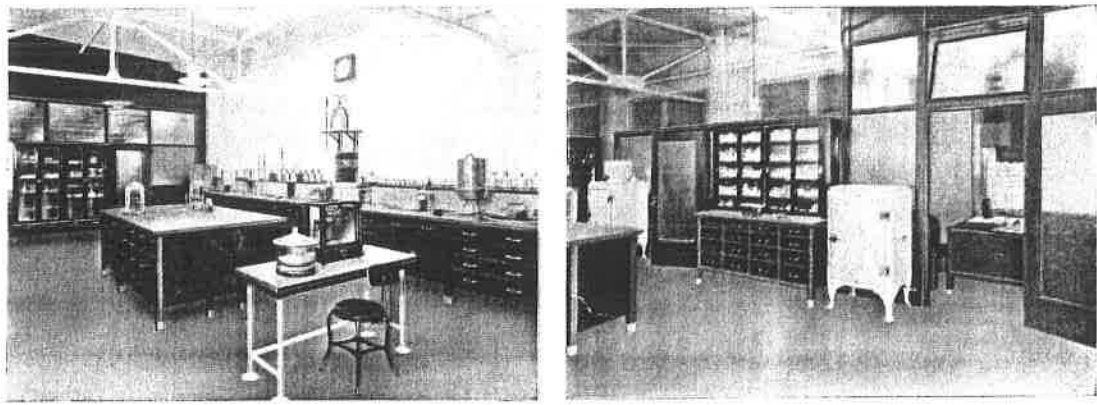
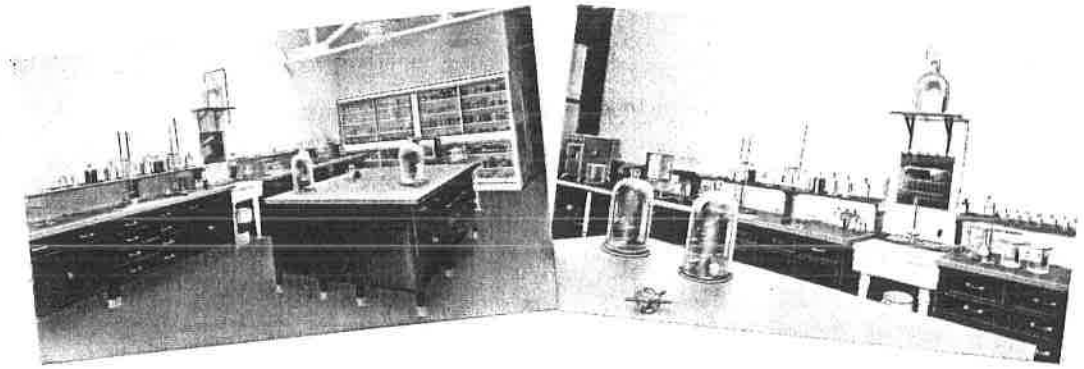
These are the problems that Owens-Illinois technicians have in mind when they ask "What may we do for you?" Upon the correct solution has depended the success of many products now enjoying a substantial sale. Yours will be analysed with as much interest and be given the benefit of a similar degree of intelligent consideration.



This miniature retort affords the same opportunity for sterilization under pressure as is had by the larger equipment found in canneries. Automatic pressure and temperature controls are combined with it.



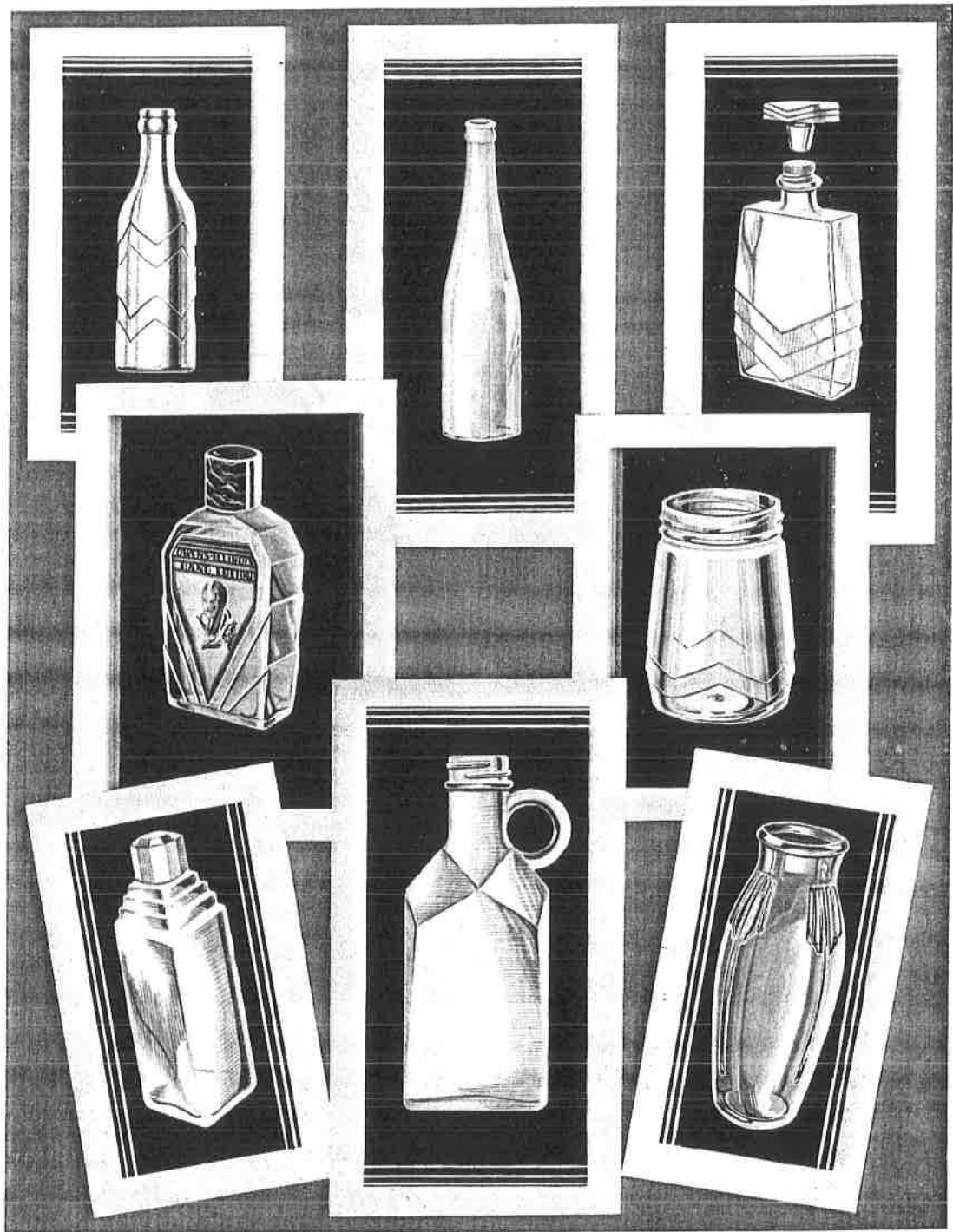
Capping machines for practically every kind of closure are available. Commercial tests can be made at any time with the ordinary type or vacuum seals.





AN important part of our New Uses and Research Division's activities is that of Design. This department is comprised of skillful artists who devote their time to new creations. They are men who have full appreciation of modern trends and tendencies and are thoroughly trained to give due consideration to practical limitations.

A distinct shape for a new product, one with a maximum of "eye appeal" . . . the redesigning of an antiquated package . . . a colorful and attractive label or carton . . . fitting "tie-ups" in the color harmony and appearance of metal closures . . . these are all in the day's work and supplementing the New Uses and Research Division's efforts, are effective answers to the query "What may we do for you?".



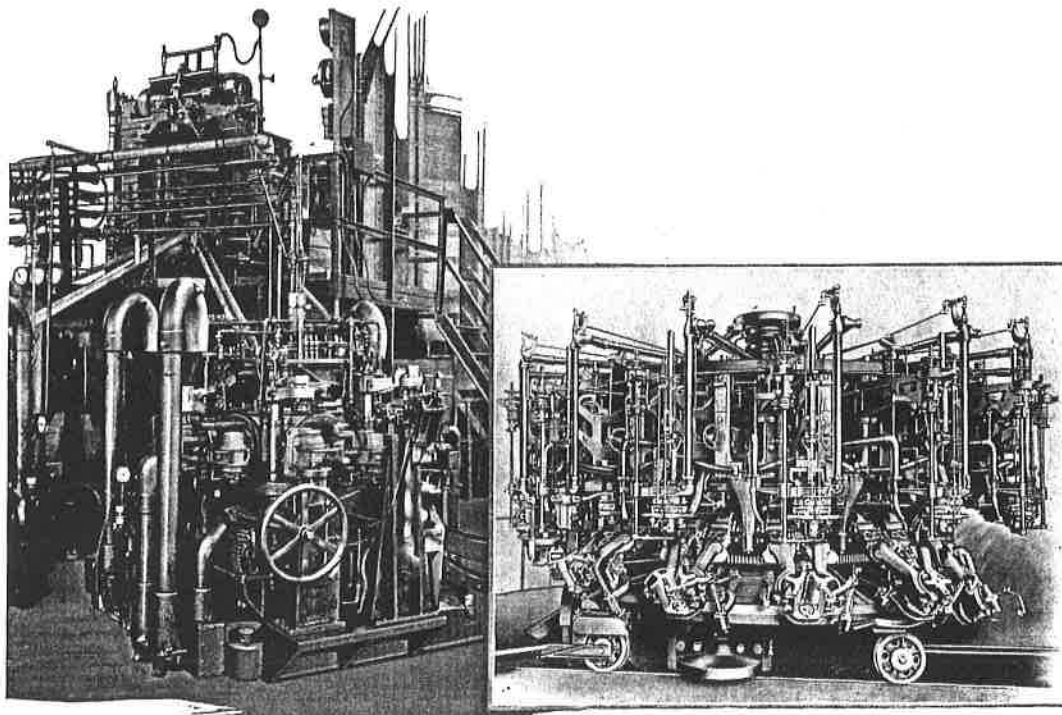
Above are illustrated a few of the many new bottle designs which have recently been created by our Department of Design. They reflect the moderne to a pleasing degree yet have been designed with full recognition of manufacturing and packaging limitations. They are as practical as they are beautiful.

OWENS-ILLINOIS

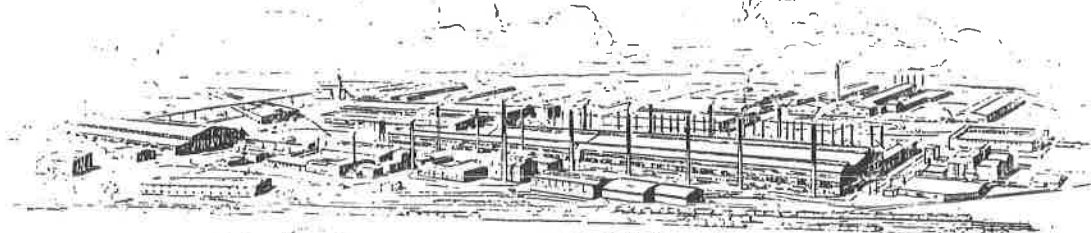
PLANTS — MACHINES — MOLDS

Pictures fail to do justice to the intricate yet rugged machines to which Owens-Illinois bottles owe existence. Words fail, too, in describing the human-like acumen with which mechanical parts rise and fall—breathe and blow—in perfect synchronism while shaping to practical form man's and nature's triumph—glass, the indispensable.

Below are shown two of our several available types of bottle blowing equipment—a “feeder” on the left and the famous “vacuum” on the right. The latter dwarfs its several human operators, has 10,000 separate parts and possesses tremendous productive capacity. It is a matter of record that every type of successful bottle blowing machine is operated by Owens-Illinois. This versatility in productive equipment reacts advantageously to customers from the angle of economy and quality.



OWENS-ILLINOIS PLANTS



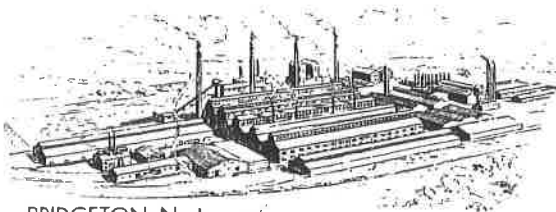
ALTON, ILL.



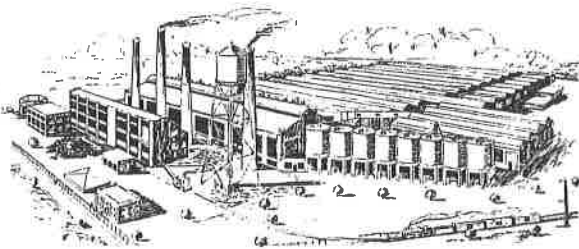
EVANSVILLE, IND.



CHICAGO HEIGHTS, ILL.



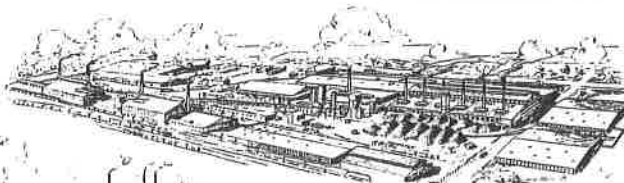
BRIDGETON, N. J.



GLASSBORO, N. J.



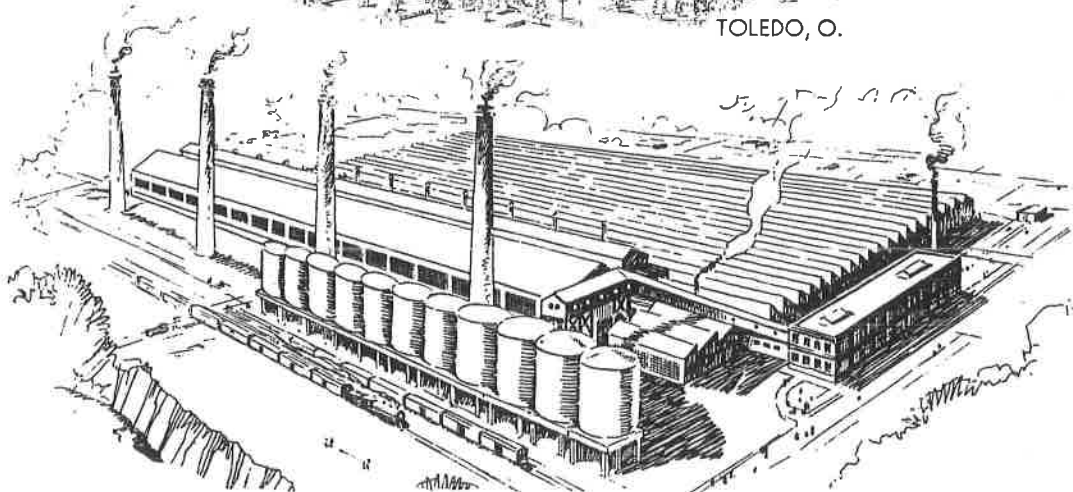
OKMULGEE, OKLA.



STREATOR, ILL.

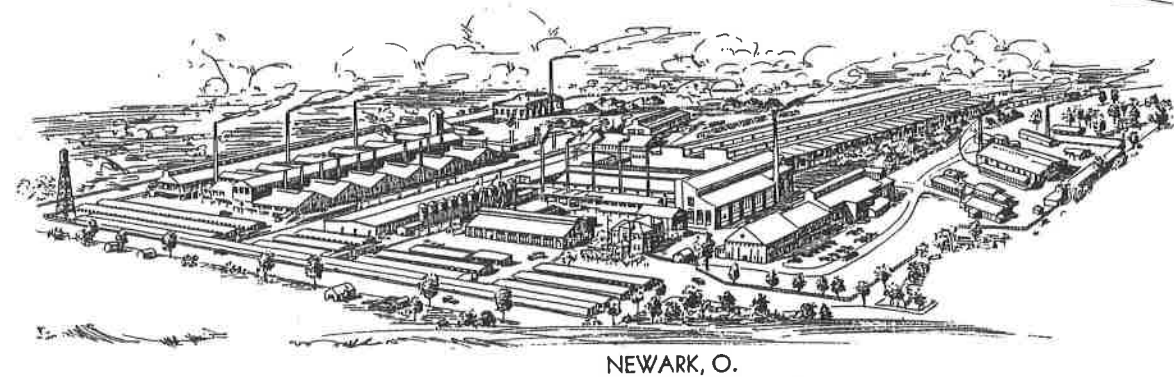
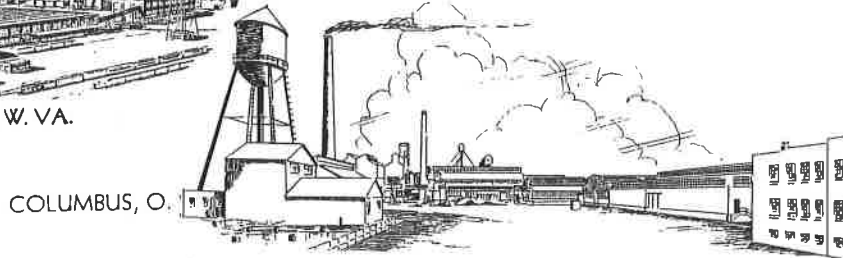
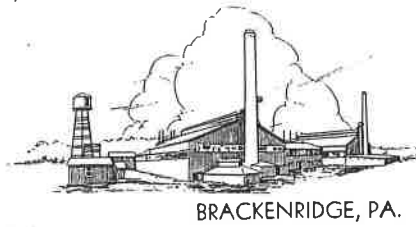
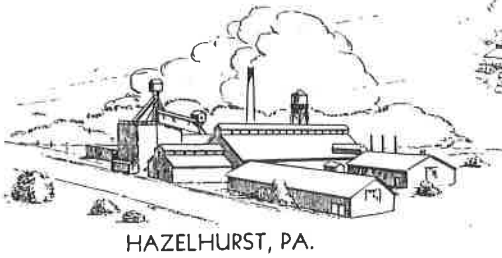
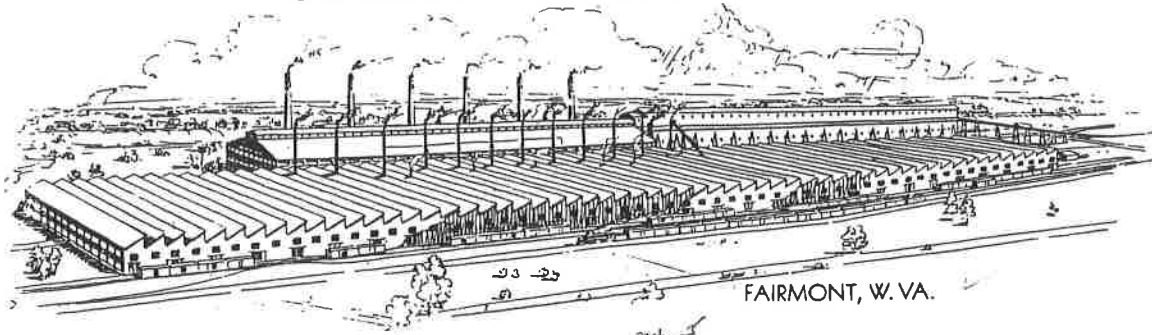


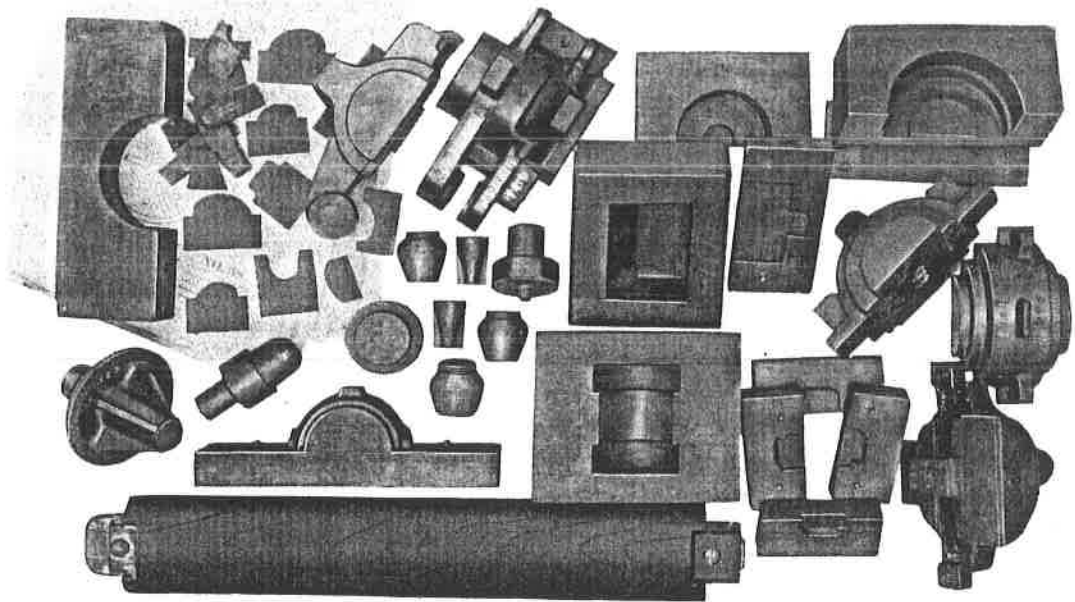
TOLEDO, O.



CHARLESTON, W. VA.

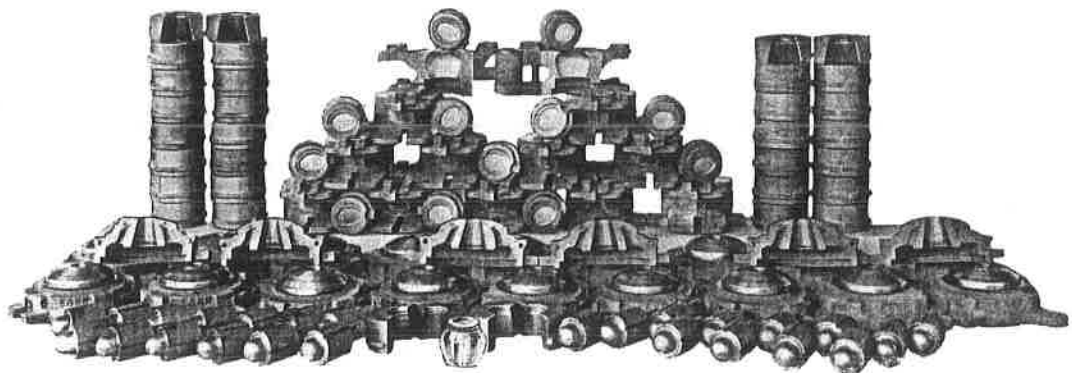
OWENS-ILLINOIS PLANTS

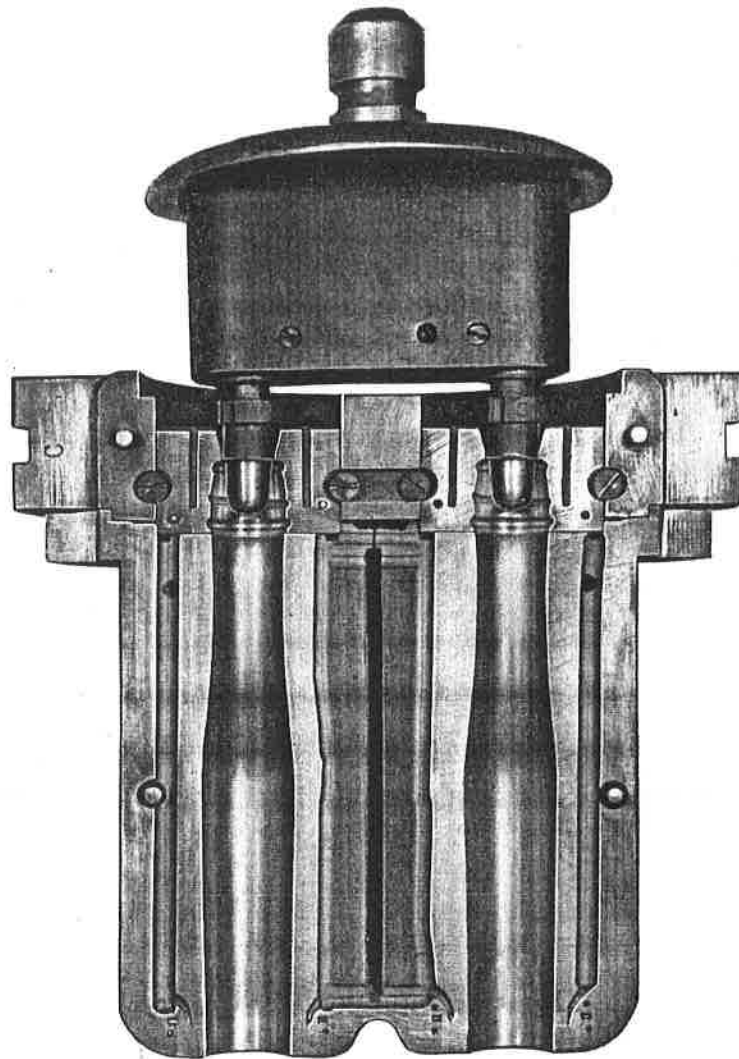




Accurate molds are as essential to good bottle production as are tracks to the train which speeds across the country. Their proper construction is a matter of scientific knowledge, years of experience and skilled workmanship.

Note the patterns and templates illustrated above. They are merely preparatory details and are made after the final approval of the wooden model is had but before anything can be done in metal. Below is a ten-arm set of completed molds for small bottles and of simple design. For each of the eleven finishing molds (one alternate) there are two blank molds, a like number of tips and a quantity of thimbles. When studying these molds consider that they are for a squat shape, two-ounce bottle and allow your mind's





eye to picture the equipment for a fifteen-arm, double set of molds for champagne pints or fluted catsups.

Mold metal must be heat resisting and flawless. Mold machining is done to within thousandths of an inch. Mold parts fit accurately and are as near alike as it is humanly possible to make them.

At the top of this page is a so-called "blank" mold for the vacuum machine with its thimble and tip. The bottle finish is clearly seen and also the swell in the blank which is designed to counteract the pull of gravity and guide the glass to an even flow in the interest of strong shoulders.