THE HOME OF KODAK

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Facts about the world's largest photographic organization

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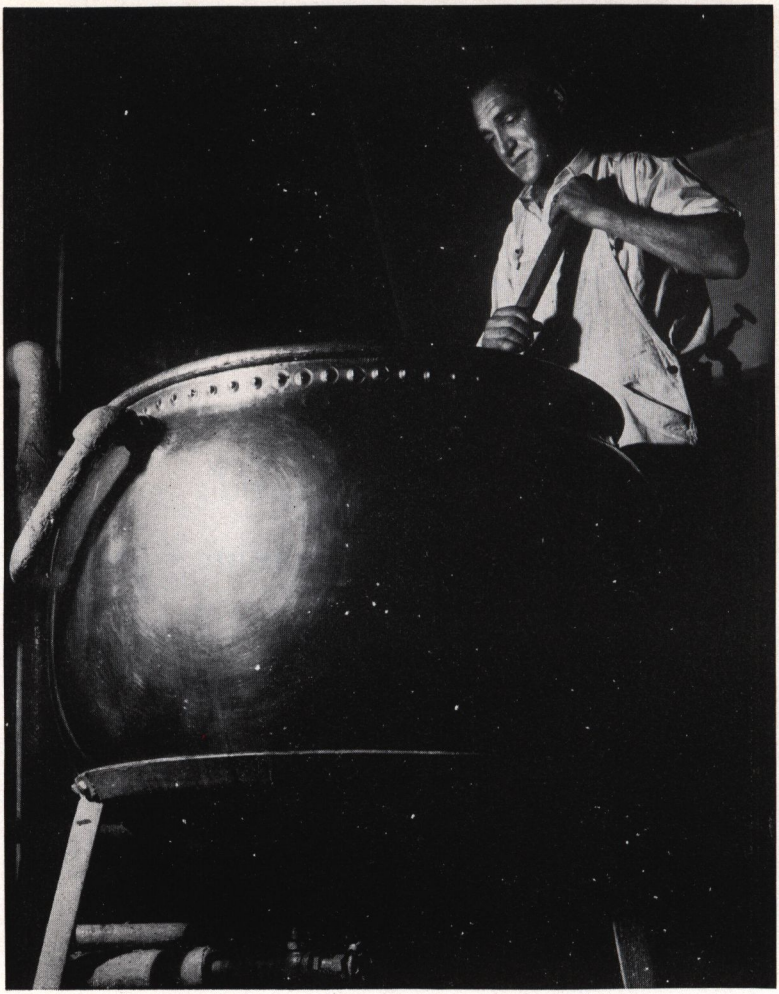
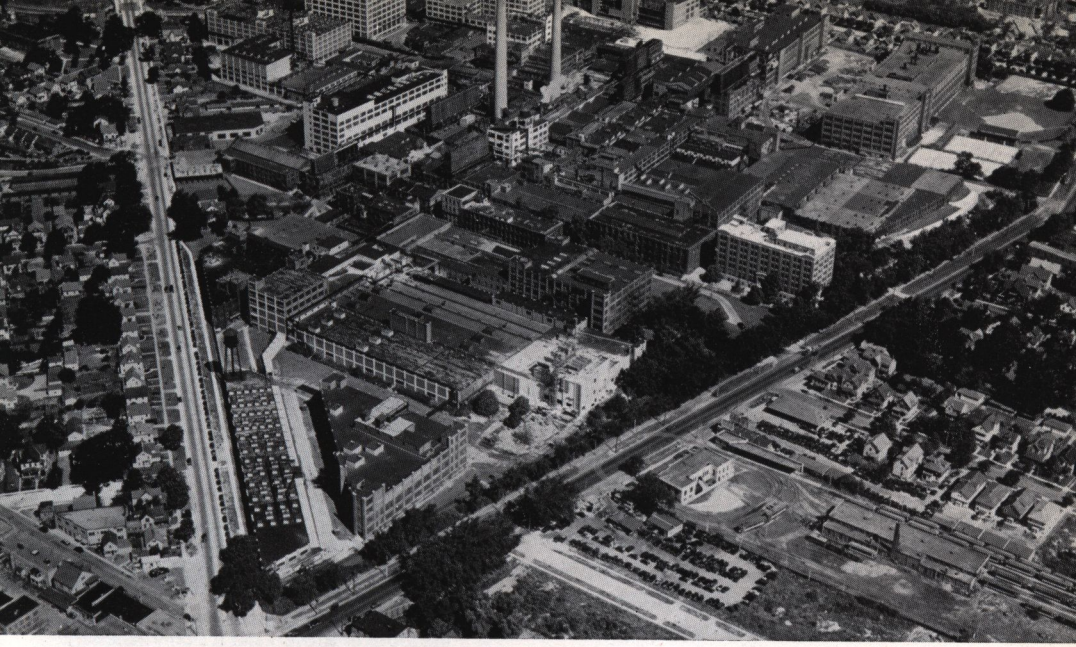




KODAK PARK

HERE IS A great plant producing essential commodities—materials vital, in their spheres, to the health, education, amusement, and scientific advancement of the world. Yet, to enter from the busy highway, we find the grime and noise usually associated with manufacturing strangely missing. Here, instead, is a calm setting of stately elms, shrubbery, tidy lawns and ivy-clad buildings.

From beyond this threshold of quiet come the muffled vibrations of industry, of machines great and small controlled by men skilled in the manufacture of now familiar products that were marvels of scientific achievement a few short years ago.

A modern Ciné-Kodak makes movies at the touch of a lever, and it's only necessary to put the film in the mail to receive it back, developed, in a few days.

MILLIONS own snapshot cameras .... The motion picture industry consumes more than 200,000 miles of film annually.... An increasing number of home-movie cameras are making fascinating records of intimate family life each year.... Portrait and commercial photographers must be supplied, not with one type of film and paper, but scores, to meet the various exacting needs of their work.... Medical and dental radiologists diagnosing the infirmities of human anatomies and teeth, x-ray technicians examining the soundness of metals, building materials, and aeroplane parts, use a huge annual acreage of their recording medium.... Photo engravers, bankers, astronomers, aviators, draftsmen, detectives, microscopists—a great variety of professions and activities have need for the photo-sensitive materials that Kodak Park supplies.

When we visit Kodak Park we are inspecting a manufactory that is unique.

With its main plant consisting of 75 or more major buildings and 400 acres of ground, obviously the industry that confronts us is large in scale. But, in that, it is not distinctive from other huge enterprises; from an automobile factory, say, or locomotive plant.

It is different, however, from any other industry in the fact that the scale of operations, the expense, the personnel of many thousands, all are concerned or active in an

Before George Eastman began his work of simplification, the photographer had to carry a portable darkroom and sensitize his own glass plates just before he took a picture.

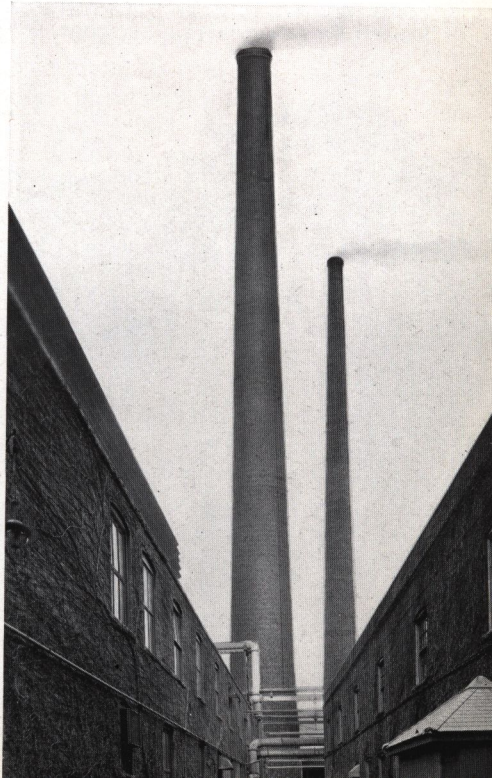
unrelenting fight against seemingly inoffensive enemies—a speck of dirt too small to be seen, a slight variation of temperature, a dim ray of light entering where it does not belong.

The trees and lawns fronting Kodak Park exist only in part to beautify the grounds. A barrier against dirt is the more important purpose. The six miles of streets within "the Park" were paved, and are constantly sprinkled, to guard not against dust that is unpleasant but against dust that endangers perfect pictures. The chimneys that carry fumes and cinders 366 feet into the air, the fireless steam locomotives, the fleet of electric trucks, the constant use of scrubbing machines and floor waxing machines, the white laundered suits worn in any buildings where photographic materials are uncovered, the employment of full-time cleaning crews, are not merely interesting innovations. They are part of a grim program that keeps Kodak Park perhaps the cleanest industrial area on earth and makes Kodak film and photographic paper and chemicals perfectly fit for whatever use they may be put to, anywhere in the world.

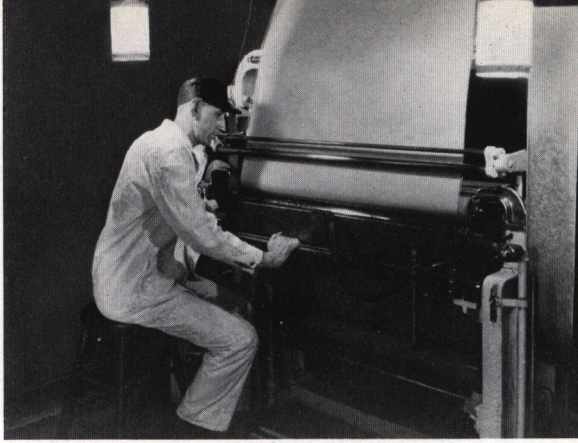
Let us take one of the passenger busses which depart every quarter-hour on routes that carry those with business, and may carry us as visitors, to the various factories and offices of this expansive area. The busses are a necessity, for there is a mile and a half of distance from the entrance gate to the remote buildings of the many that fit into the scheme of this city of well-seasoned brick and ivy.

Through streets flanked by high-walled buildings our bus travels, passing wheeled and pedestrian traffic; but the trucks move more silently and the pedestrians walk more briskly than the traffic of a less purposeful city.

On one side we see a six-story structure, a block long, which we are told is built over a reservoir that holds 5,000,000 gallons of water and that is emptied and refilled three times every day the Park is in full operation.



The famous twin chimneys of Kodak Park —landmarks that give dominating evidence of the tremendous power, heating, and refrigeration system that consumes 700 tons of coal daily.



In coating film base, dim colored lights or total darkness is required.

Down one street we observe a solid masonry wall with no window breaking its expanse. Behind it, we are informed, great, white machines with many precise moving parts are turning in dim light or none, coating the transparent, flexible film base with the "emulsion" which is sensitive to light and visual images.

Along another thoroughfare flanked by ivy-covered walls we catch a glimpse of an imposing structure which overlooks the main entrance to the Park. This, our guide answers, is the center of research for the Kodak organization. From here, we learn, has come the introduction of home movies, of Kodacolor, of film that can take pictures from hundreds of miles away; here, too, have been discovered many hidden complexities of photographic sensitivity; and here, as well, numerous patient studies have been made which have given photography and the motion picture art a scope undreamed of when they first came into being. The Kodak Research Laboratories constitute, in truth, a research university in the sphere of photographic science.

The Research Laboratories occupy this modern building near the Park entrance.

There, on our right, is a building in which silver, by modern alchemy, is turning into materials far more precious to this civilized era—motion picture film to entertain every week nearly as many persons as the population of the United States, spools of Kodak Film and Ciné-Kodak Film for pleasure and sentimental record, sensitive substances for the camera craftsmen who satisfy many civilized needs and for scientists who use photography in ferreting out the earth's remaining secrets, recording surfaces to capture the pictures that illustrate newspapers and magazines the world over—film and sensitive paper for every conceivable purpose.

Let's begin our inspection by seeing what happens to the silver. The treatment of this raw material will give us something of an introduction to Kodak Park's manufacturing methods.

Comparatively little bullion is stored in Kodak Park at one time. Every day, under heavy guard, a shipment arrives to maintain the supply. A single safe, holding about three tons of bars, which is less than a week's supply of raw material, is the repository from which the silver flows.

Into every bar a hole is drilled, a record number is punched. Chips from the drillings are promptly tested by the department handling the silver and, in addition, by the Industrial Laboratory, which is charged with responsibility for the quality of all raw materials. Impurities are rarely found in Kodak Park's silver; yet inspection continues year after year. If a trace of copper or iron were permitted, unchecked, to go into the manufacturing stream, endangering photographic effectiveness, later tests would discover and eliminate the result, but time and other materials would have been wasted in the meanwhile. Production schedules would have been interrupted. Therefore, Kodak Park tests every ingredient as well as finished product and products in process of manufacture. Of the thousands of employees at the plant, hundreds devote their whole time to the careful inspection of materials at every stage of evolution into finished photographic products.

Observing the first step in converting bar silver into photo-sensitive materials, we shall instinctively feel that we are

Photography's most essential raw material. . . . Part of a week's silver supply.

Evaporating silver nitrate solutions for crystallization—repeated until a high degree of purity has been achieved.

witnessing wanton destruction. With our realization of the worth of silver in its original form, we can not avoid a shock at seeing the bars of metal dissolved in nitric acid until all is fluid and nothing solid remains. The nitric acid, it is worthy of note, is made at Kodak Park under scientific conditions leading to purity of grade.

The silver nitrate solution we have seen compounded is siphoned from its porcelain bowls into troughs, whence it runs through glass tubing to an evaporating room on the floor below. There, men, wearing rubber aprons and rubber gloves, guide the flow into other bowls, which are set on heated tables. The heat drives off water from the solution; and, when the concentrated solution cools, the silver nitrate crystallizes. Silver nitrate in this form would be more than pure enough for most uses—but photographic manufacture is an exacting master.

Consequently, the crystals are once again dissolved in distilled water and once more crystallized. This operation is repeated many times—until all impurities are removed.

Silver nitrate purified to the quality characteristic of Eastman chemicals.

Final evaporation leaves crystals appearing like soap flakes but more vitreous and brittle. Then come careful drying processes.

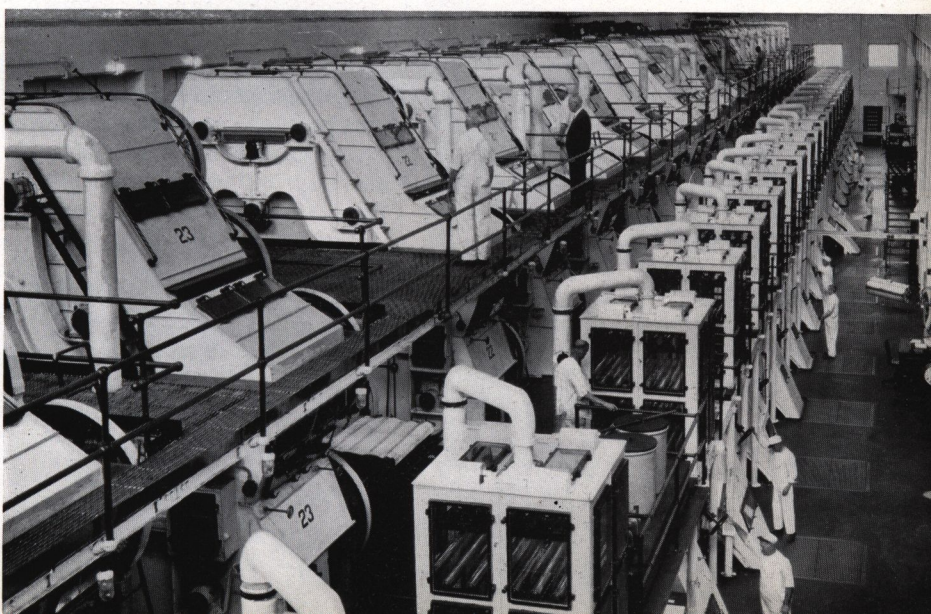
Silver nitrate is sensitive to light—a fact ascertained by Arab alchemists seven centuries before Columbus discovered America—gradually losing its whiteness under the influence of the sun's rays. It is this basic chemical fact that makes photography possible.

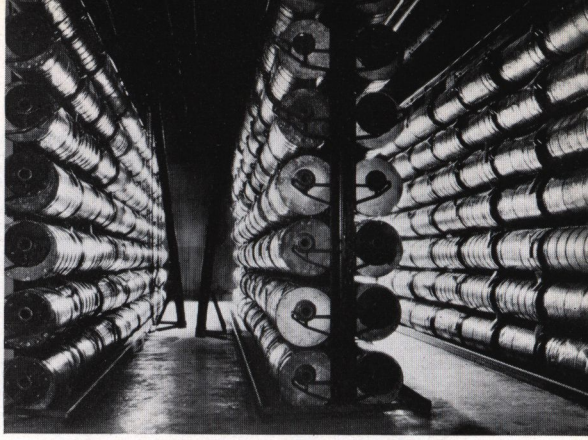
The discovery of the transparent, flexible base of photographic film constitutes the Eastman organization's greatest contribution to photography and motion pictures, and in this connection a humbler material now enters the process of film making.

The film support or base is composed of cotton which has been treated with a mixture of nitric and sulphuric acids to render it soluble in a mixture of solvents, the chief of which is methanol (wood alcohol). The "dope" thus obtained, having the consistency of honey, is spread on the polished surfaces of great wheels that run continuously, night and day, month after month. Heat around the giant wheels drives the solvents from the "dope" and permits the nitrated cotton, or nitrocellulose, to assume the form of a thin transparent layer on the surface of the wheels. After various convolutions within a machine, a wide strip of finished film base emerges and is wound up in rolls like newsprint paper.

Consider the steps that must be taken, collateral with the manufacturing process so briefly outlined, to insure the quality of the resulting film support.

A battery of machines converting fluid "dope" into endless sheets of the familiar transparent, flexible film base . . . almost invisible as it passes over the brightly polished rolls that may be seen through the heavy plate glass windows. The scale, the silence, the cleanliness of this operation are characteristic of Kodak Park.





Rolls of film base in storage prior to receiving the sensitive emulsion coating.

"Let it be remembered that a microscopic speck of dust embedded in the material might be the nucleus of a spot causing a freckle on the nose of an immaculate cinema actress, a sharp crackle in the midst of a sound-film love-scene, an extra star in some astronomer's Pleiades —or spoil a snapshot of a child in some particularly entrancing pose."

Unusual climatic conditions might bring deterioration of valuable films if such exigencies were not provided for in manufacture.

Purity and precision are imperative at Kodak Park in every operation and handling.

Samples of all cotton coming into the plant are tested before use. Three potential variables are thus governed. . . . Cotton, before being dumped into the nitrating machines, is accurately weighed. Variables of the nitrating acid, in addition to its temperature and amount, need to be controlled—and tests accomplish this. Nitrated cotton, immersed in water, flows only through tile pipelines, to avoid contact with metal. In the purification and storage building to which the flow is conveyed under a street and a railroad track, the tanks are made of material inert to the ravaging action of acids so that no impurities may be introduced at this point.

The substance inelegantly called "dope" at Kodak Park, after the nitrocellulose has been thoroughly dissolved by its solvents, actually is the direct culmination in chemical purity of the careful work of hundreds of chemists and skilled workmen; and the result of study and improvement by two generations of engineers and research scientists. The physical condition

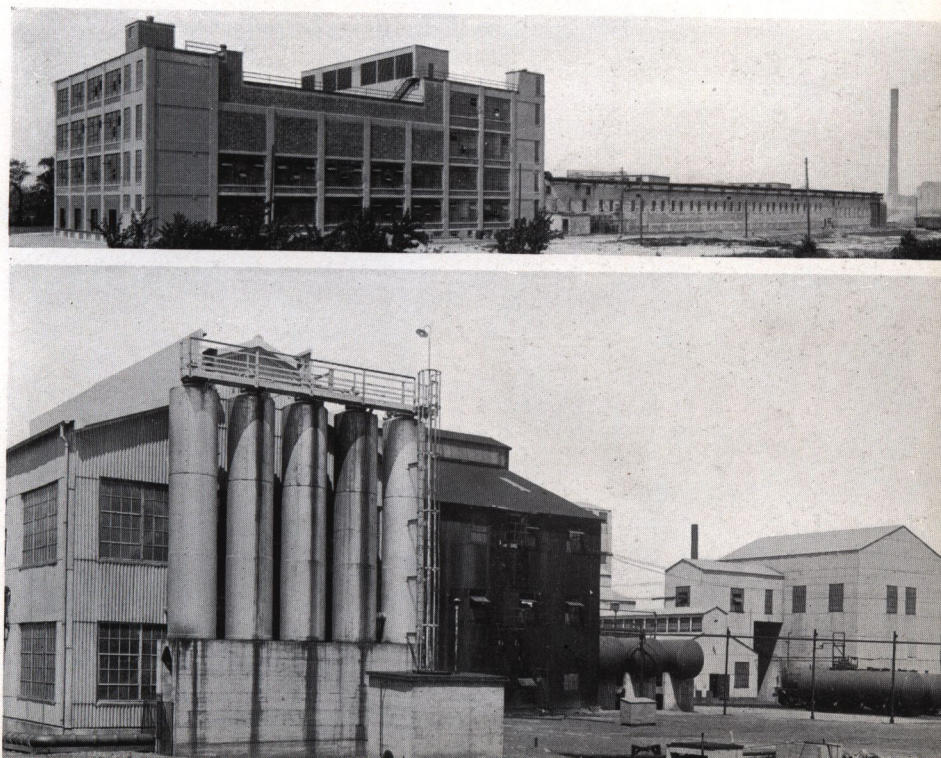
Mixers require hours to bring about the proper solution of treated cotton in wood alcohol and other solvents. The resulting "dope" is passed through filter presses before being turned into film base.

of the material, as distinguished from the chemical, becomes evident when one sees the resulting sheets of film base winding through the great machines, so flawless and transparent as to be practically invisible.

Cellulose acetate for the "safety film" of home movies results from similarly controlled manufacturing processes at the Tennessee Eastman Corporation's plant in Kingsport, Tennessee, close to the source of supply for acetic acid. In the manufacture of "safety film," acetic acid and acetic anhydride are substituted for nitric and sulphuric acids to treat the cotton. Subsequent conversion of cellulose acetate into film base is carried on at Kodak Park, just as in the case of cellulose nitrate film.

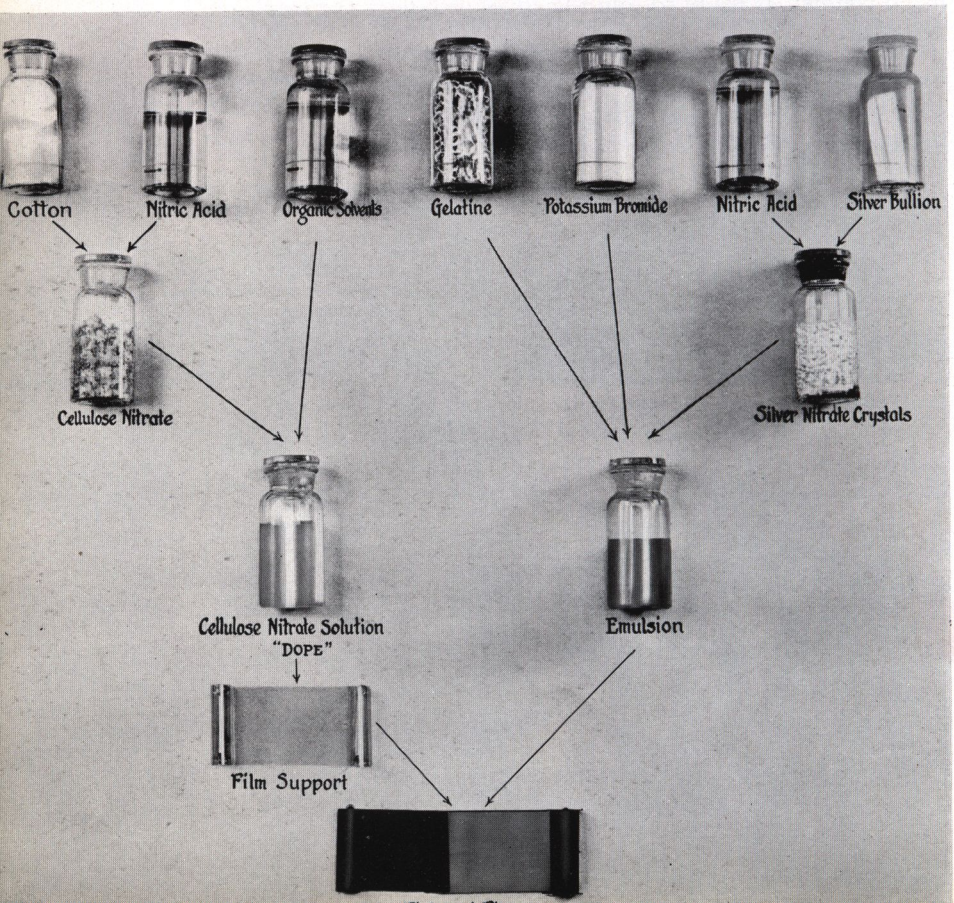
Gelatine is used in large aggregate quantities to suspend the emulsions' silver salts evenly on the film base—but gelatine for photography must be chemically purer than that used for food. Gelatine for Eastman film and photographic paper is produced principally at Kodak Park and by the Eastman Gelatine Corporation at Peabody, Massachusetts. Patient processes of chemical treatment in hundreds of covered concrete tanks prepare hide remnants for cooking. The gelatine, after washings, boilings, filtration, solidification, blending, and action to remove any accidental metal content, is ready to join the silver nitrate in the emulsion department.

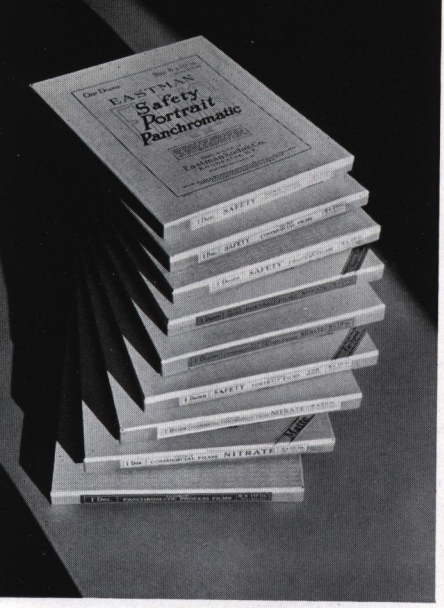
Nitric acid and gelatine plants at Kodak Park West. This comparatively new manufacturing area is larger than Kodak Park and is connected with it by road, railroad, and pipe-lines.



It may be interesting to pause now and catalog the most important raw materials of film: cotton from sunny Southern fields; saltpeter from mines in Chile and produced synthetically from the air in the United States; sulphur from Texas mines; camphor from Formosa; wood alcohol distilled from the Tennessee Eastman Corporation's sawmill waste; hides from cattle that once grazed in Texas or the Argentine; silver from Mexico; and potassium bromide from the Great Lakes brine deposits.

The making of light-sensitive emulsions—the layer of film which actually takes the picture—is a highly diversified and extremely delicate process. The Eastman organization, in fifty years of experience, has turned an art depending on chance and mood into an exact science. The genius of pioneering emulsion makers, combined with the manufacturing talent of picked chemical technologists, has established methods by which uniformity is insured to Kodak photo-sensitive materials. The press photographer snaps sharp pictures of racing planes in a thousandth of a second; the studio photographer makes softly moulded portraits with exquisite care—both require types of film that will faithfully respond to their skill, every time, year after year.





Chemical and physical control of silver salt crystals, together with the addition of extraneous materials, makes emulsions "fast" or "slow," "contrasty" or "long-scale," sensitive to light from various parts of the spectrum, and photographically responsive in still other significant ways. Combinations of these properties in various degrees result in the production of nearly 100 types of film by Kodak Park. Most types of x-ray film, and the new Verichrome Film for use in Kodaks, are actually double-coated, with two separate emulsions.

In the years following the first Eastman production of transparent, flexible film base, that material was made and sensitized on glass-surfaced tables 200 feet long. Now this work is done on great continuous machines.

For atmospheric control and other purposes, Kodak Park maintains the largest refrigerating plant in the world. A great network of air-conditioning equipment spread over the plant constantly reminds one that these manufacturing operations, despite their huge scale, are carried on under most strict laboratory conditions.

Ducts for the conditioned air that dries film.

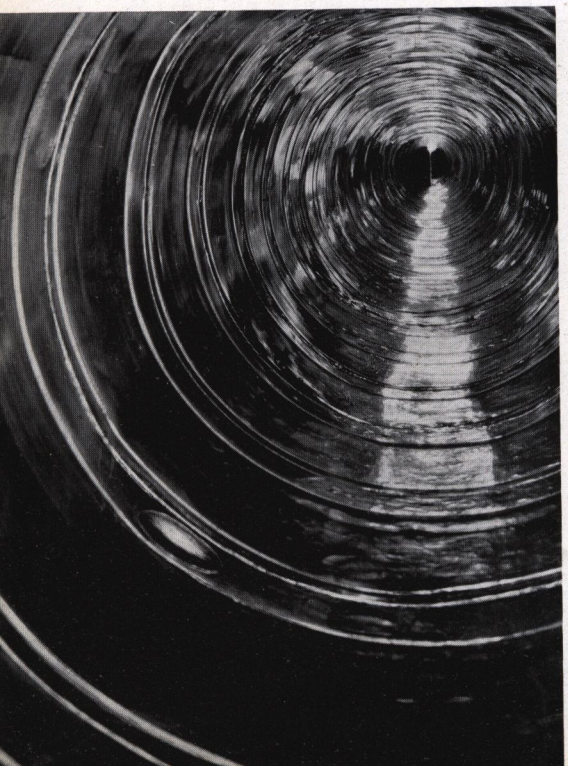
Filter bags eliminate dust from the air that will dry sensitized film. . . . Despite the external cleanliness of Kodak Park, frequent changing of these lintless canton flannel bags is necessary to maintain the standard for air supply.

Of photographic paper there are even more varieties than of film—250 types, distinguished by purpose, degree of contrast, color, weight, texture, and action under development, are produced under conditions similar to those of film manufacture.

It is remarkable that even the red and black paper which sheathes the familiar cartridges of Kodak Film, only to be thrown away after the film is developed, is of a higher grade than the best stationery of discriminating business houses; yet a similar paper sensitized to print photographs would degenerate rapidly. Because the highest grade commercial paper stock is unsuitable, Kodak Park manufactures its own paper for sensitizing.

Only the best white rags available —cuttings from shirt factories—and a new type of spruce fiber purified to an extraordinary degree of chemical inertness after years of research are suitable as raw material for photographic paper. Even so, the rags require a number of purification processes at the Kodak Park paper-mill, by sorting, dry beating, cooking, alkaline washing, and bleaching, before the actual paper-making begins.

The stages of manufacture at the paper-mill follow closely those of other high-grade paper-mills, but with these distinctions indicative of other less noticeable differences: the successive "beaters" in which the fibers are disintegrated, the vats in which pulp is stored, and the conduits through which it



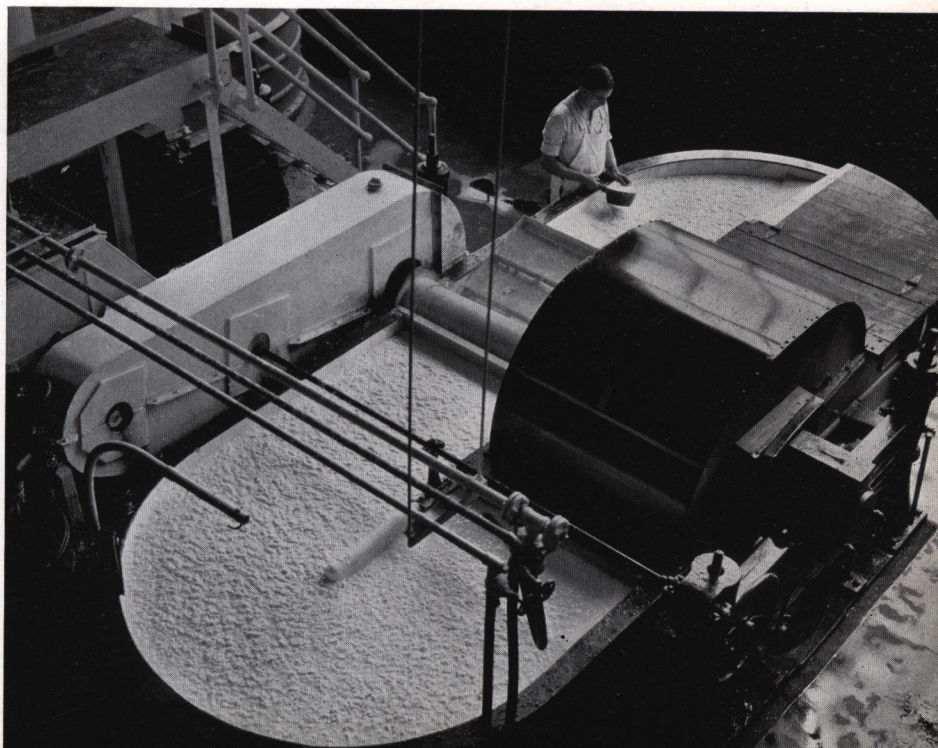
The inside of a duct supplying washed, scrubbed, conditioned air to the department which coats sensitive emulsions on film base. . . . Though such ducts carry nothing but purified air, they are frequently flushed and polished.

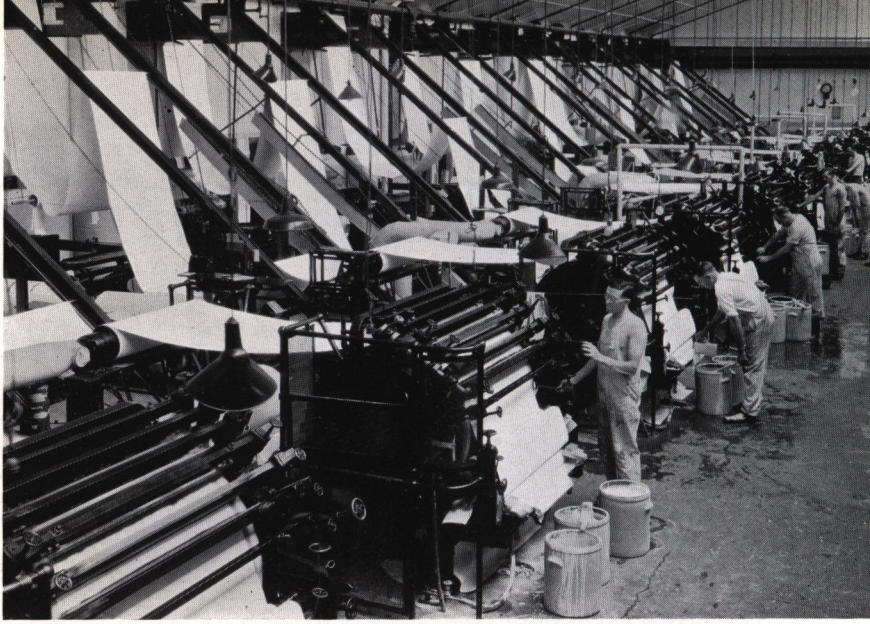
passes, are tile-lined; beater blades are adjusted with extreme fineness, lest traces of metal appear in the paper; the pulp undergoes more cleaning processes; and—for this is Kodak Park—testing, testing, testing. From pulp to the final packing of sensitive paper, samples go to the several paper-testing laboratories for relentless examination. A system of record keeping preserves for every package of finished paper test results at every stage of manufacture, and the name of the person who made each test. A similar continuity of identification is observed in film making.

Paper is not ready to receive the emulsion simply after manufacture and a period of seasoning. Baryta coating intervenes—treatment with a substance containing principally barium sulphate—and accomplishes two main objects. It helps to separate from the paper the chemical constituents of the emulsion later to be applied, serving as a barrier against the possible deterioration of paper which already has been made as proof against deterioration as possible. Secondly, it gives the necessary gloss to glossy paper and controls the degree of gloss on matte-surface papers. A varying number of coats are applied, depending largely upon the desired finished surface.

The measures taken to set this intermediate layer evenly, to dry it uniformly in great festoons along tunnels each containing 3600 feet of paper slowly progressing toward the winding machines, to control moisture content so that the

A "beater," preparing pulp to be made into photographic paper.

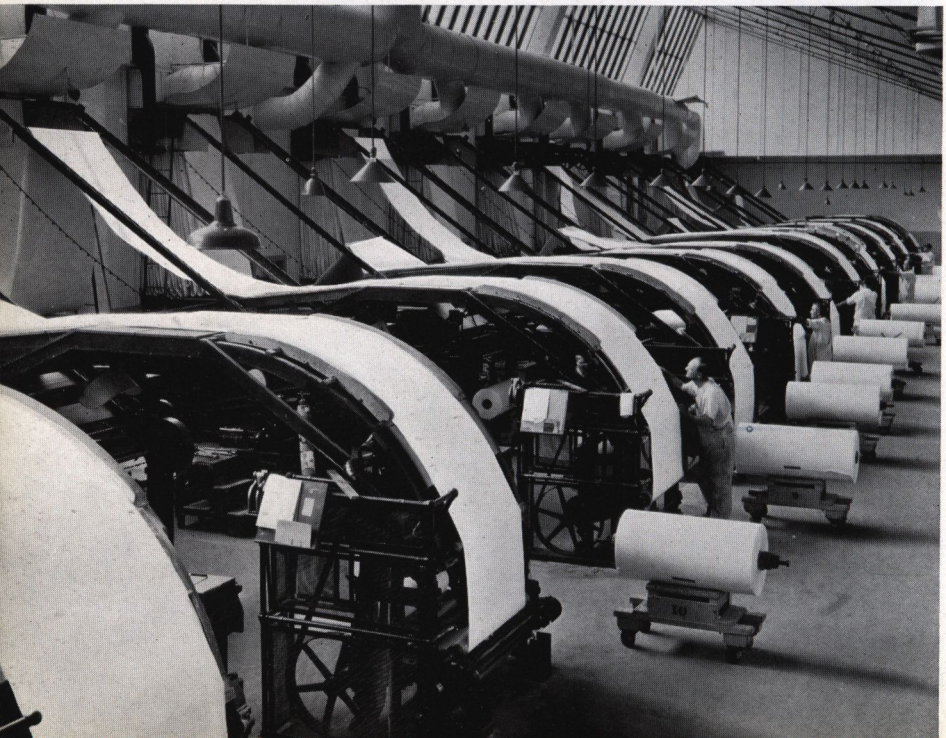




Baryta coating. Note the festoons of paper entering the drying tunnels.

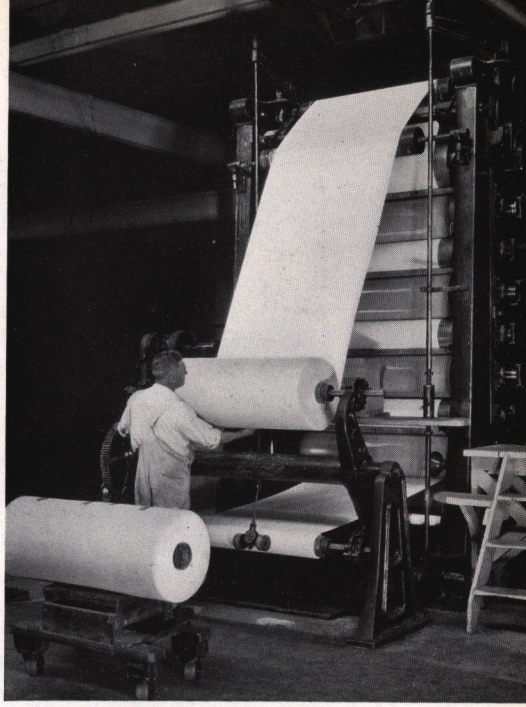
paper may not crack when it is pressed by "super-calenders," and—once again —to test it (microscopic analysis, artificial aging, tests for strength, flawlessness, degree of gloss, expansion when wet, ability to stand stretching and tearing, and a number of others, including a keen lookout for the presence of those constant enemies, dirt and metal)—these measures are on a par with the manufacturing of film base. One of the most important tests at Kodak Park, to the traveler,

At the other end of the baryta drying tunnels, the festoons of paper emerge and are rewound.



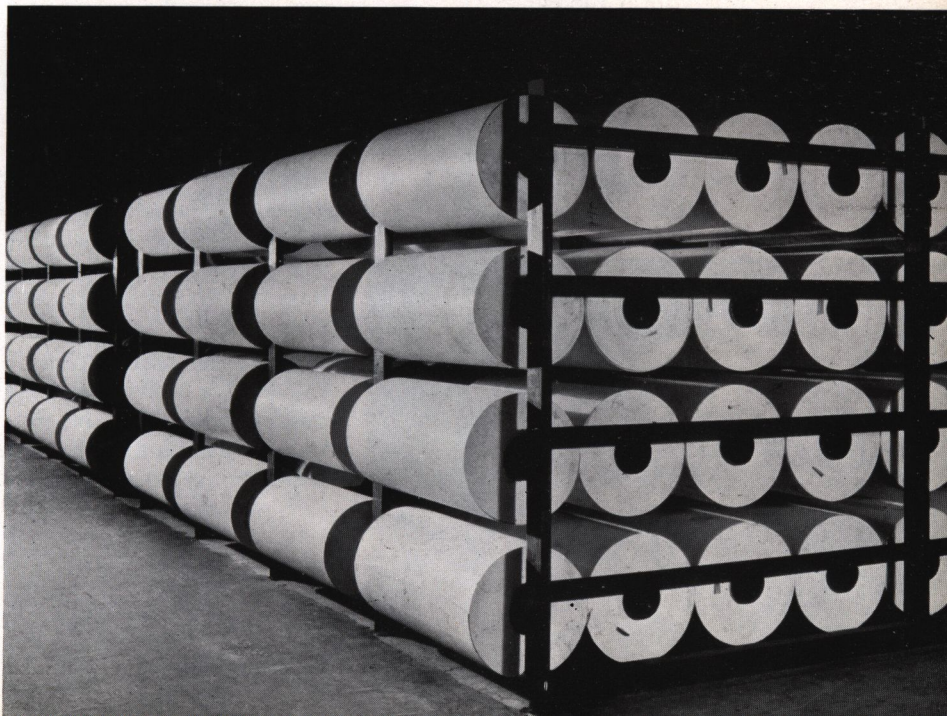
occurs in an incubator which simulates equatorial temperatures, from the cool of morning to the heat of noon and back again.

Visitors are inevitably impressed by the eerie glow of subdued orange and red lights in many of the buildings. They quickly lose all sense of direction and location. But employees, accustomed to it, work with efficiency unimpaired by these surprising conditions. The air throughout the Kodak Park darkrooms is as fresh as outdoors, at a constantly comfortable temperature, and cleaner, for it is artificially conditioned.



A super-calender. The great pressure of this machine smooths and improves the surface of paper after the baryta coating preparatory to coating with a sensitive emulsion.

The large chamber for storage of the sensitive paper prior to cutting and packing reminds one of the catacombs—dim and cool—with ghostly white rolls of paper lining many aisles. In another room, a battery of great white cutting machines, nearly invisible in the dusk, are dividing, with micrometric accuracy, large sheets of paper into the various sizes for photographic prints.



Stamping out the tin containers for motion picture film.

A military metaphor suggests itself for Kodak Park. An army is helpless without its services of supply. The production forces of this city of light and darkness need constant support from large and elaborately regimented auxiliary "troops."

Cores and reels are needed to wind film on. A metal- and wood-working plant produces them....Cartons and containers are necessary for shipment and sale. A large print-shop, a paper-box factory, and a wooden-box mill are complete within the Park....Artificial leather is required to cover hundreds of thousands of cameras. Kodak Park makes it.

Think of the machinery repair work to be done, of the 6000 electric motors to be serviced, of the plumbing and steam-fitting and carpentry activity involved in maintaining a plant of 75 buildings, of the special machinery to be constructed for Kodak Park's unique manufacturing purposes. A large corps of men skilled in these functions is on the job constantly and the various mechanical shops are a story in themselves.

Vast quantities of supplies, from coal to platinum, must be bought and tested. One department buys, another tests.

The Kodak Company has its own water-works with a capacity for drawing 31,000,000 gallons a day from Lake Ontario, five miles away, a filtration plant on the lake shore, and a 5,000,000-gallon reservoir at the Park.

The shipping departments are important, for the Park's great production must be kept on the move. Trucking, maintenance of roads and grounds and 15 miles of railroad trackage, even janitor service, constitute major projects. A hundred freight-cars a day are "spotted" at the loading and unloading platforms by the Park's special fireless and smokeless locomotives.

Kodak Park has its own fire department. A laundry is maintained. A safety department acts continually to eliminate hazards to employees and property.

In further ramification of this plant's activity, numerous materials must be provided in addition to film and paper to satisfy the pho-

tographic needs of a hemisphere—chemicals for developing, fixing, toning, bleaching, intensifying, and other mysterious manipulations of photographers, amateur and professional. One photographic chemical known as "Pyro" is made of "gallnuts" brought from China. These "nuts," imported in large quantities, are really excrescences resulting when oak trees are stung by flies.

Nearly 3000 organic chemicals are stocked by the Kodak Research Laboratories. Many new compounds are prepared each year, some of which are finding important uses in medicine. Although this branch of the Kodak Company's activities is not widely known in non-scientific circles, it is highly regarded and its products are extensively used in hundreds of universities and research laboratories where the future progress of science and industry is steadily being worked out.

Sheeting similar to film base, and solutions similar to the "dope" from which it is made, are sold to many customers manufacturing a diversity of products ranging, say, from cakes and aeroplanes to poultry supplies and electrical equipment.

Among the Eastman Kodak Company's employees 245 of the 572 principal occupations listed by the Census are represented, in addition to many jobs confined to the photographic industry. That numerical statement is scarcely needed to send us out from Kodak Park conscious that we have felt the pulse of a complex industrial organism. Henceforth, also, we shall find new meaning in the historic Kodak slogan, "You press the button, we do the rest."

Jack: Do you think baby will be quiet long enough to take her picture, mamma?
Mamma: The Kodak will catch her whether she moves or not; it is as "quick as a wink."

Send to the Eastman Company, Rochester, N. Y., for a copy of "Do I want a Camera," (illustrated) free by mail.

A Kodak advertisement in 1890. . . . This was two years after the sale of the first Kodak and a year after the Eastman discovery of transparent film.

CAMERA WORKS

KODAK PARK is three miles north of the center of Rochester, occupying what was open farm land in 1890 when the first film manufacturing building was constructed. Now the city of Rochester surrounds Kodak Park and extends five miles beyond it to the shore of Lake Ontario.

The Camera Works of the Eastman Kodak Company, on the other hand, stands just across "Kodak Street" from the site of the original Eastman factory, close to the business center of Rochester. From this solid block of six- and seven-story buildings comes forth a stream of Kodaks, Brownies, Hawk-Eyes, Ciné-Kodaks, Kodascopes, Kodascope screens, Kodatoys, Recordaks, tripods, enlargers, printers, and a variety of other equipment for photography and home movies. The Camera Works is divided into 40 departments. Production of accessories, alone, as distinguished from actual photographic and motion picture apparatus, includes 300 different items.

For persons unfamiliar with all the names in the foregoing paragraph, an introduction is in order. Kodaks, Brownies, and Hawk-Eyes are amateur cameras for "still" pictures. Ciné-Kodaks are amateur motion picture cameras, and Kodascopes their projectors. Kodatoys are motion picture projectors for children. Recordaks are used by banks and other business houses to make an automatic

photographic record of checks and other business papers.

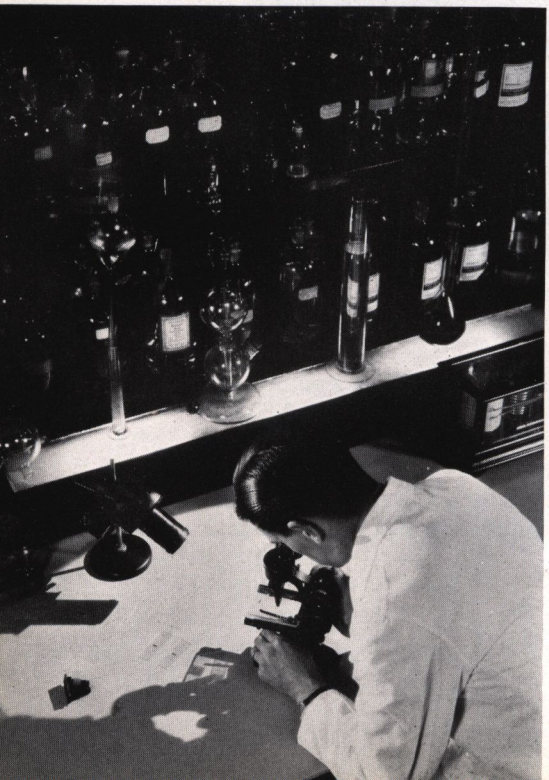
About 240 power-presses in the Camera Works stamp out various metal parts. More than 200 automatic screw machines convert long metal rods into screws, rivets, spindles, and bushings, many of them no larger than a pencil point. The normal weekly output of the screw machines alone is 2,500,000 parts. Hundreds of hand screw machines, lathes, and drilling and perforating machines, in addition, are in service.

Metal plating operations on a large scale contribute to the smart finish of cameras, and play a part, as well, in keeping rust away.

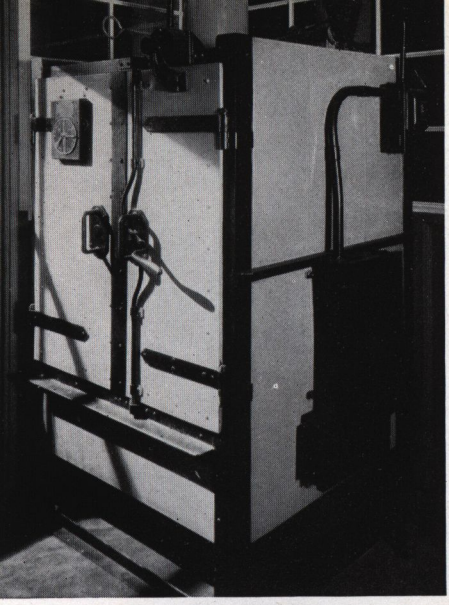
The cold tester. Materials and occasional finished cameras "off the line" are subjected to conditions saltier than Atlantic City, colder than Spitzbergen, and damper than London.

The japanning of metal camera parts that are not exposed to the eye is still more important in order to make the instruments impervious to the most severe climatic changes of heat, cold, and humidity. Wherever the completed cameras may go—to the tropics or to the far north—this treatment of the parts makes them proof against failure. Japanning is applied in several coats, after chemical cleaning operations. Giant electric ovens bake the finish. Even metal surfaces, later to be covered with leather or artificial leather or lacquer, undergo japanning first.

Bellows making—considering the necessity that wear shall not cause light leaks in the folds—is an ingenious operation. Visitors find themselves intrigued also by the sight of rooms full of skilled craftsmen at their benches assembling automatic shutters for Kodaks.



Leather, glue, metals, rubber—all materials entering camera manufacture—are tested by a laboratory in the Camera Works.



This chamber tests camera endurance with dry heat hotter than Singapore, as other tests are more humid than the South Seas, brighter than Death Valley's glaring sand and beating sun.

Stages in sub-assembling and assembling the numerous types of apparatus are in such relationship to the various specialized production departments as to make the Camera Works a model of "straight-line production."

These and numerous other detailed processes enter into the manufacture of Kodaks and other Camera Works products; yet the most compelling group of facts about this plant relates not to manufacture but to the measures taken to insure the quality of manufacture.

After a visit to Kodak Park, discussion of quality insurance may sound like repetition. Nevertheless, it is true that Camera Works inspection routines are as stringent in regard to precision, workmanship, and standards of mechanical excellence as those at Kodak Park are in assuring the performance of photo-sensitive materials. They make possible the perfect functioning of Kodaks after years of constant use.

Since the very start of George Eastman's business career, the Kodak Company has refused to tolerate defective production. As that principle works out today in the Camera Works, months of intensive experimentation go into models, with the merits of an instrument's design thoroughly established before any production is begun; the efficiency and reliability of a new camera or projector thus proved, extremely accurate machine-tools and dies for production are fashioned by a corps of expert tool makers; all materials are tested in advance of use; workers are trained to reject defective parts, are made "quality conscious"; the finished product is examined thoroughly under conditions of invigorating atmosphere and proper lighting that permit the exercise of employees' faculties at maximum alertness—and then the cameras are turned over by the manufacturing forces to departments which do nothing else but inspection. Thus, products of the Camera Works have the advantage of two separate sets of examinations.

It is well worthy of note that the traditions of a pioneer industry and the loyalty called forth by sympathetic management policies have built into the Camera Works' employee group, as in the other Eastman factories, a fine spirit and a remarkable cohesion.

Inspection of Kodatoys—motion picture projectors for children, though their performance is superior to that of a toy.

This is a positive factor in the manufacture of fine photographic instruments.

Let us observe some of the requirements that must be met by Eastman photographic apparatus before it is considered worthy of sale.

To prove the accurate focus of the lens in the camera, inspectors examine with a magnifying-glass the image of a fine-link chain 25 feet away as it appears on a ground glass held against the open back of the camera. Even before this, shutters and lenses have been inspected prior to assembling into cameras. Because they are more discerning mechanically, men do the most critical examining—men who are highly skilled and whose eyes and health are checked periodically.

Light-leak tests are carried on in darkened booths where even the tiniest needle prick or a threatening dent in a metal light lock would be betrayed by the strong detecting light that is used.

Finder inspection makes certain, by a mathematically infallible test, that the finder shall reveal no more than the camera will photograph.

During the period of establishing the quality of any new camera, an automatic check-up on shutter speed determines the dependability of exposure in terms of hundredths of a second.

Survival by Kodaks of a period in a "jigging" machine insures that no screws or rivets can jar loose in a generation of hard usage.

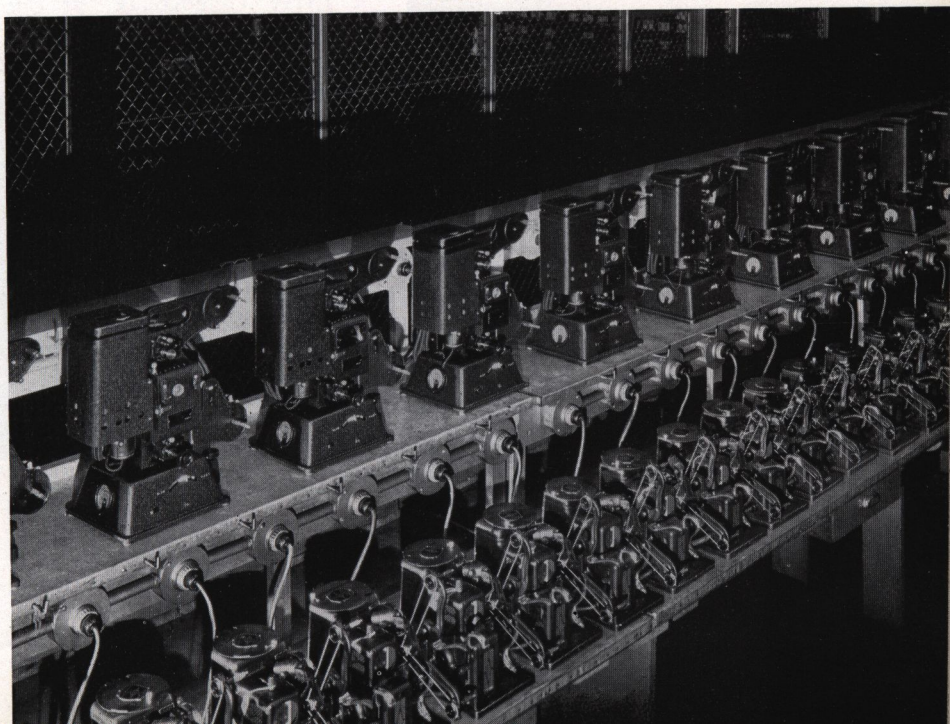
A crew of half a dozen men spends full time taking pictures outdoors with a percentage of the Kodaks produced, selected at random from the manufacturing stream. The results give a double-check, by actual use, against remotely possible manufacturing defects that might have escaped the manufacturing department inspections and the inspection department tests.

Ciné-Kodak and Kodascope inspection requires additional stages because the element of motion occurs in these machines.

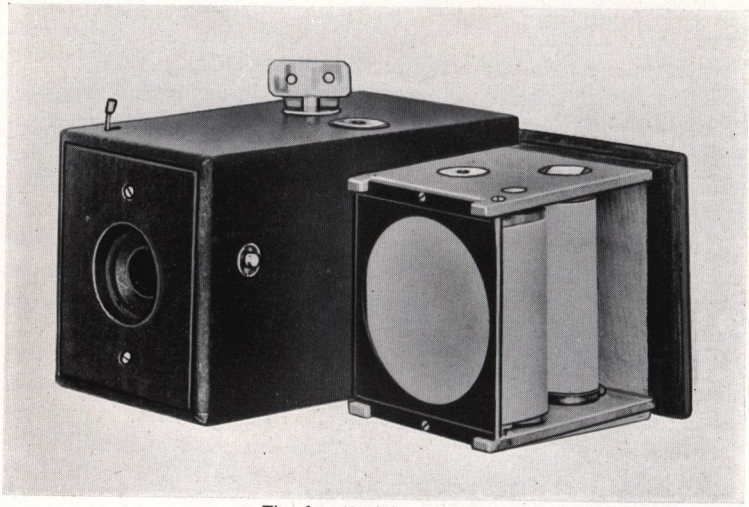
Through every Ciné-Kodak a roll of unexposed film is run to test the uniformity of speed, the freedom of the film passage, the operation of the footage indicator, the steadiness of operation, the pulling power of the motor, the silence of the machine. Then an exposed roll of film is put through; and that is followed by a roll that has been highly humidified, to simulate conditions to be met if the camera under test happened to go to the tropics.

A small percentage of all Ciné-Kodaks made are given a "breakdown test"—that is, they are run until they fail. Time records are kept and subsequent inspection reveals the cause of failure. The Ciné-Kodaks thus treated are a loss, for they can not be used again; but the loss is gain from the point of view of providing manufacturing information that will make Ciné-Kodaks more and more proof against failure in actual operation.

Actually, in the "breakdown test," the cameras do not fail until they have run for longer than the average movie maker would use them in a life-time. From this margin of mechanical reserve strength that is built into Ciné-



Like expensive automobiles, Kodascopes and Ciné-Kodaks are "run in" to assure the smooth and uniform operation of the motors.

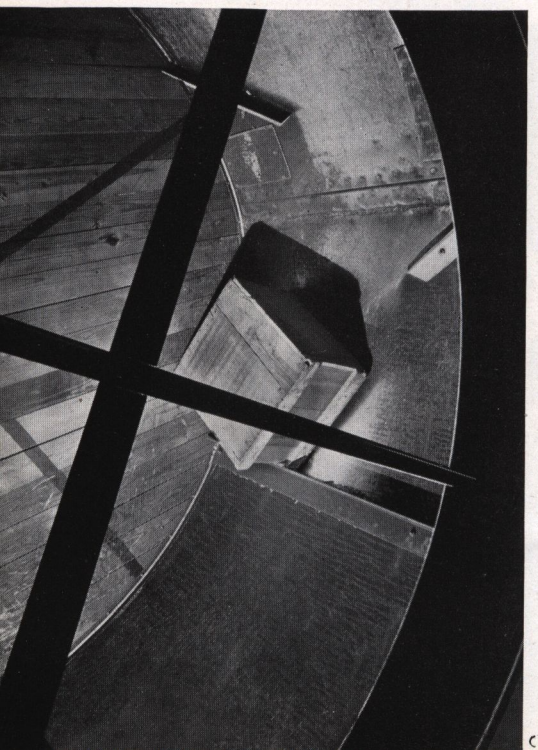


The first Kodak—1888.

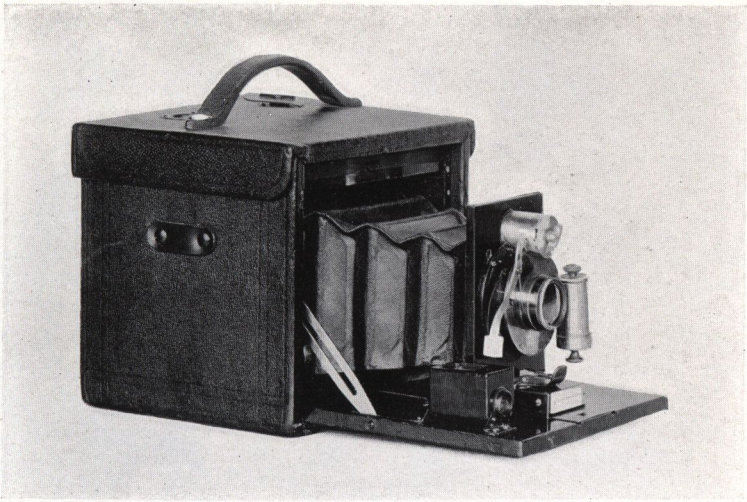
Kodaks some idea may be had of the Camera Works' integrity of workmanship.

Kodascopes, which are likely to be called on for more arduous service, can not actually be broken down without running continuously for months. Therefore, a fixed percentage of the production of Kodascopes are run for a definite period of several hundred hours and then are taken down and inspected for wear of the various parts.

Every Ciné-Kodak, at one stage of its inspection, is loaded with fresh film and transported to a room suggestive of a rifle gallery. There, from distances of 2, 3, 4, 6, 8, 10, 12, 15, 20, and 25 feet, every Ciné-Kodak is "shot" at a wall covered with strongly lighted "pie charts." The film from these cameras is



Kodaks reaching Valparaiso or Manila or Nome must be in perfect condition. A revolving steel wheel in the Camera Works gives to occasional packing-cases full of cameras a test-battering more than equivalent to the handling that would be received in transit across the world, and then the contents are removed and thoroughly inspected for injuries.

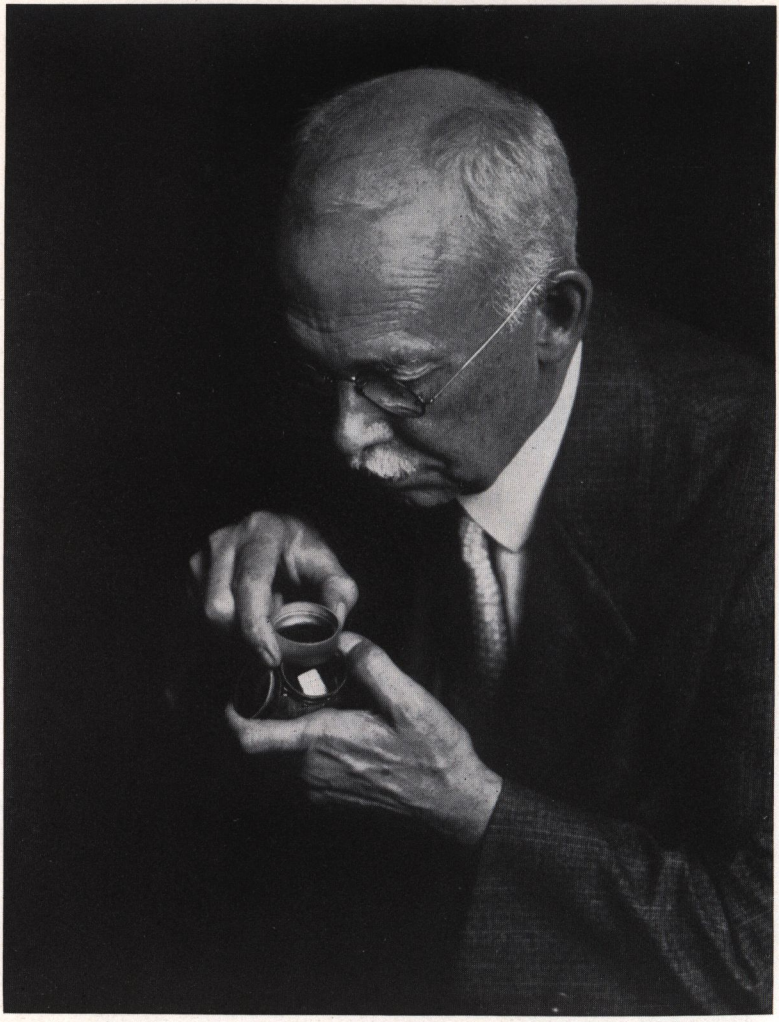


The first folding Kodak—1890

developed and then inspected with a magnifying-glass to insure that focus is perfectly sharp, as indicated by the reproduction of the figured wall on the film. For every Ciné-Kodak manufactured, the Camera Works retains on file 15 feet of film showing that the camera passed its focus tests.

Kodascopes undergo focusing tests similar to those described for Ciné-Kodaks, except that the process is reversed. Master-test films, made in perfect focus, are projected by Kodascopes in darkened tunnels for optical check-up of the machines. The bizarre assortment of diagrams used for these tests confuses the eye, but Ciné-Kodaks and Kodascopes must reproduce them sharp and clear.

The home movie camera of today. A Model K Ciné-Kodak with f.1.9 lens.

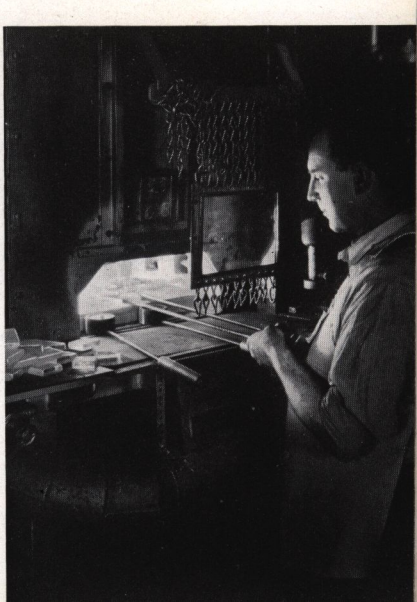


HAWK-EYE WORKS

NAMED after the brand of camera formerly made there, the Hawk-Eye Works stands on the brink of the Genesee River's deep gorge. This third plant of the Eastman Kodak Company in Rochester furnishes lenses in their mounts to the Camera Works.

To the Hawk-Eye Works credit must go, in large measure, for the relative inexpensiveness of modern Kodaks and Ciné-Kodaks equipped with "fast" anastigmat lenses — cameras not balked by weather or time of day. When every such lens had to be hand ground by artisan labor, the counterpart of a Kodak that now costs $18 cost $50. Alert modern methods have made the difference.

Except for types of lenses not made in quantity, where hand grinding still obtains,



Optical glass is softened in a furnace with a temperature of 1600 degrees and is then moulded into lens discs by a punch.

An electric annealing oven removes any strain that may be present in lens discs by subjecting them to heat which rises automatically to a temperature of 1000 degrees and then cools down gradually over a period of four or five days.

lens manufacture is accomplished at "Hawk-Eye" by mechanical means, with an efficient division of labor. The skill and judgment of lens makers have now been transferred largely to the function of inspection. Exacting specifications have to be met by lenses throughout the process of manufacture from the moment the raw optical glass enters the factory until the last stage of mounting for installation in a camera. Each Kodak Anastigmat must emerge successfully from ten rigid tests, performed in ten different departments. In two final tests, which are identical, the judgment of one set of inspectors is pitted against that of another.

Despite the size of the inspection force thus employed, not to mention the mechanical operators, the greatly increased number of lenses now produced per worker—equivalent in quality to hand-made lenses—has permitted successive important price reductions.

Large rooms in the Hawk-Eye Works are occupied by long rows of machines grinding or polishing lenses, machines swaying monotonously as matched convex or concave parts rub abrasives over the surface of glass discs mounted with pitch on "shells," forming thousands of lenses at a time into proper contours. The sight of these rooms is impressive evidence of the advance of the machine age in the realm of optics and photography.

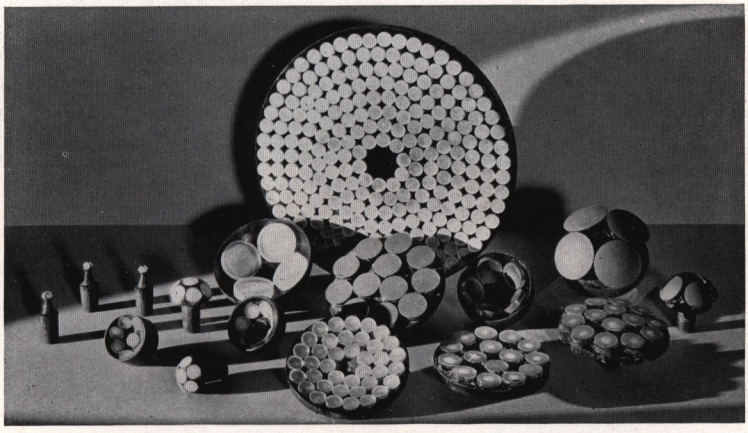
Machines which grind and polish lenses.

Canada Balsam, softened by heat, is used for cementing together crown and flint glasses. The presence of two kinds of glass in a single lens element corrects certain optical aberrations.

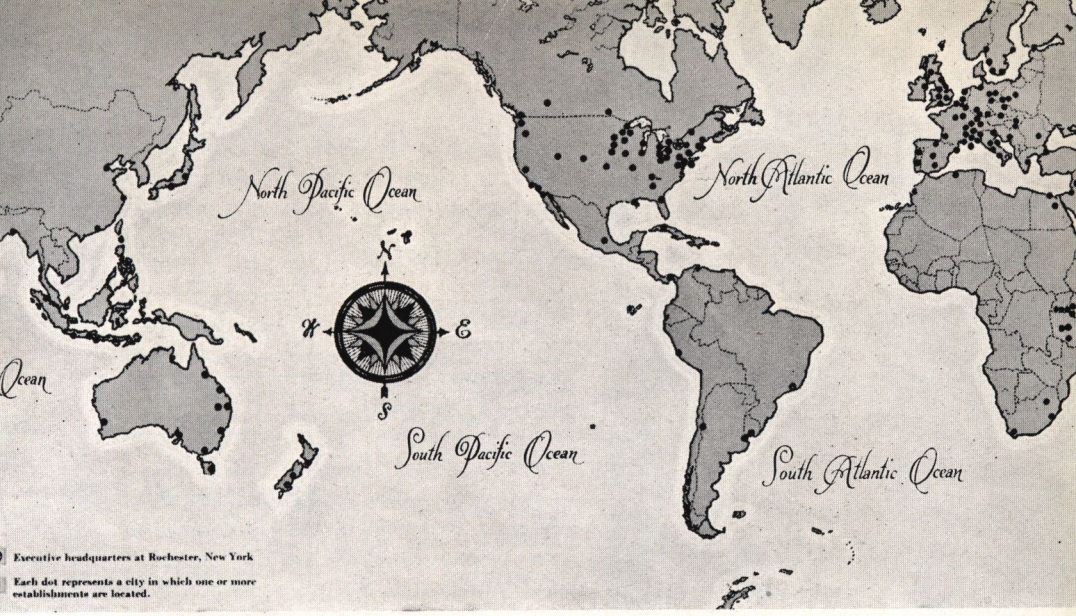
Grinding special prisms, a work that requires a high degree of skill.

During polishing, attendants constantly survey the course of the process by examination through test glasses with the inversely correct curvature of the lenses under manufacture. If the two curves differ by 1/30,000th of an inch, circles of color—"Newton rings"—will appear.

It is noteworthy that distinguished optical research, as well as the manufacture of lenses, is carried on at the Hawk-Eye plant. Not only does the continued refinement of lenses for Eastman cameras result from the patient formula calculations of the staff of lens designers, but also "Hawk-Eye" may claim prestige for the production of a number of lenses that have served the cause of science in the United States Army's aerial photography branch as well as in the photographic experimentation of other organizations.




KODAK



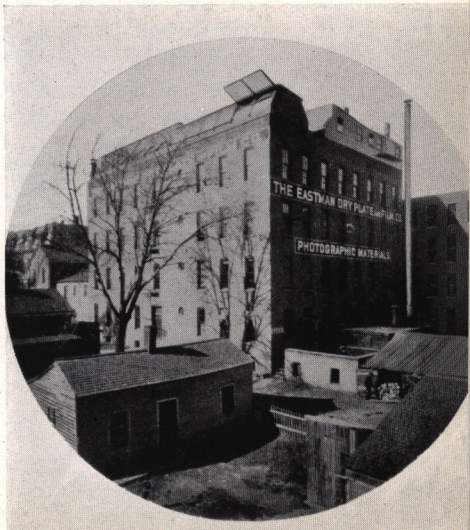
KODAK OFFICE

THE sturdy tower of the Eastman Kodak Company's main office is just across Kodak Street from the Camera Works. This nineteen-story building, 366 feet tall, is a landmark for travelers entering Rochester.

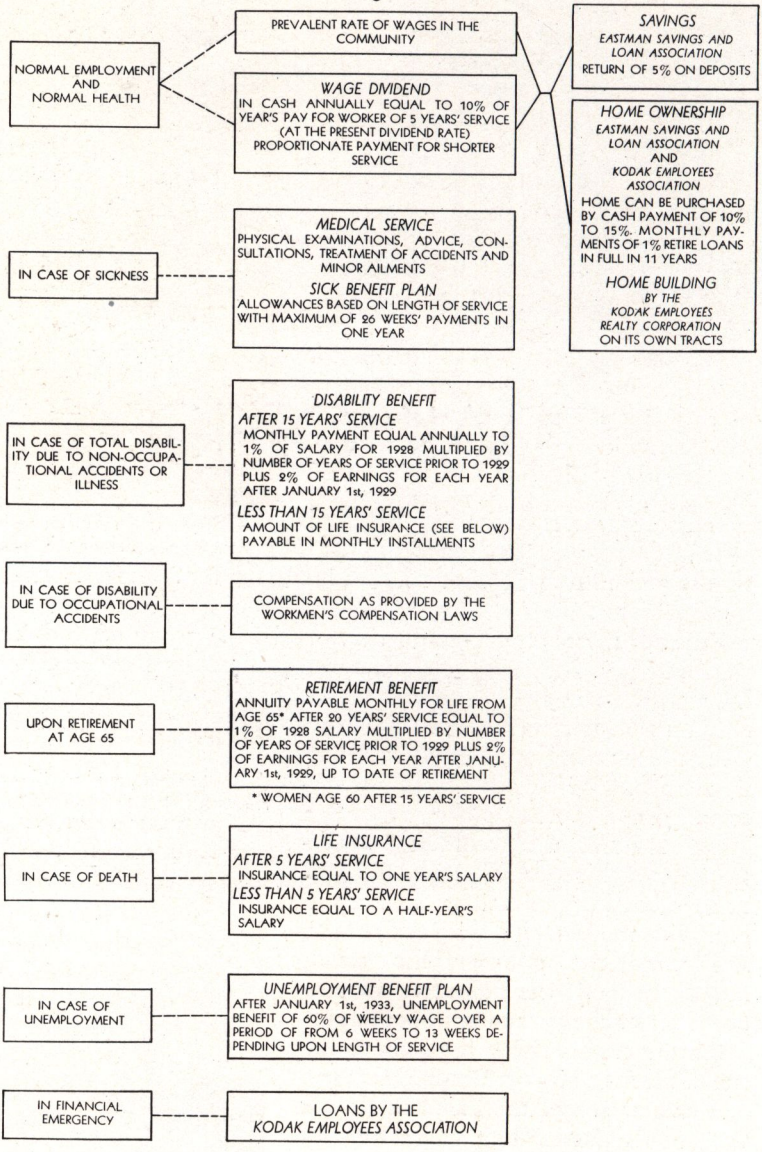
Here are the nerve-centers of the world-wide group of Kodak organizations. Subsidiary manufacturing companies elsewhere in the United States and in six foreign countries coordinate their operations through Rochester. Sales units throughout the world, the chain of Eastman Kodak Stores in American cities, Ciné-Kodak processing stations girdling the globe, Eastman Teaching Films, the Recordak Corporation, the Kodascope Libraries, and still other related organizations, all keep in gear with the factories, with each other, and with the photographic trend, largely through the figurative switchboard under the pyramidal roof and surmounting cupola rising high above the site of the first, obscure Eastman factory.

A summation of the Eastman Kodak Company's outstanding characteristics

A photograph, made with one of the first Kodaks, of the original factory. The Kodak Office tower now stands on this site.



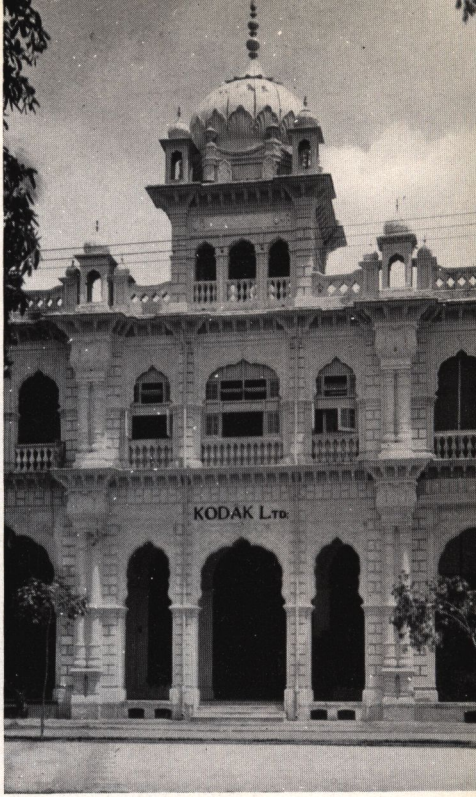
STATUS OF AN EMPLOYEE
OF THE
EASTMAN KODAK COMPANY



would list, probably, its extreme measures to insure chemical purity and mechanical precision, its photographic research, and the friendly, helpful relationship among its thousands of employees all over the world.

A brief description should be made of the last, for personal industrial relations are one of the Company's most characteristic and important considerations and activities.

Years ago George Eastman, then president of the company, now chairman of the board of directors, came to the realization that trained, steady workers were highly valuable to the Eastman Kodak Company. Mr. Eastman and his associates thought it proper to recognize such value. In consequence, in 1912 the Eastman Kodak Company paid a wage dividend, representing a share in the earnings of the company, to qualified employees. The wage dividend has been paid annually ever since, and the total payments have exceeded $30,000,000. The wage dividend payments have been entirely over and above wages.



One of many Eastman outposts: the wholesale establishment at Lahore, India.

After the war, as a reward to employees for the part they had played in the growth of the company, Mr. Eastman personally contributed 100,000 shares (present capitalization) of Eastman Kodak stock, and the company provided an equal amount, to be divided among the personnel on a basis of length of service. The stock was sold to employees at a nominal figure which was paid by the dividends while the shares were held in trust before delivery to their new owners. The allotments of stock for this purpose are now exhausted, but the distribution, in addition to the annual wage dividend, helped many employees to build up satisfying financial reserves for themselves. The proceeds of the sale of the stock donated by Mr. Eastman were turned over to the Kodak Employees Association to be used in various ways for the benefit of all employees.

More recently, the Eastman Kodak Company has accorded extensive benefits to employees in the form of life insurance, disability insurance, and retirement annuity payments. A Savings and

A street of homes built for employees.

Loan Association, cooperating with the Kodak Employees Association, has for years made home ownership easily possible for Eastman workers by means of mortgages and group building projects. Thorough and unremitting attention has been given to working conditions, and the contentment of workers essential to efficient work has been further promoted by enjoyable noon-hour activities, organized sports and entertainment. A large medical department with dispensaries in all the plants, adequate and attractive cafeterias, and pleasant rest rooms, are part of the company's equipment.

For many years, but with increased emphasis since 1920, the company has maintained a program of production control designed to stabilize employment. This plan has practically eliminated seasonal unemployment in the plants, despite the fact that most of the products are highly seasonal in sales. Of course this is a boon to the community as well as to the body of employees.

The Eastman Kodak Company has joined with thirteen other Rochester companies in building up funds to provide unemployment benefits for workers who might be laid off as a result of any future business depression. This scheme constitutes a pioneer cooperative effort by a group of diversified industries to recognize and solve a major problem of industry.

There is more to any industry than cog-wheels and chemistry; than energy and engineering; than money and markets.

The Eastman Kodak Company, to an extraordinary degree, depends on certain "intangibles": projects and products hewn from the future by research and far-sighted planning; an active fairness in the relationship between management and employees, resulting, on the one part, in loyal workmanship, on the other part in fuller and more secure lives; the tradition of having brought new arts to the service of civilization—photography and motion pictures in their various aspects.

These factors, motivating large plants and personnel, animating the operation of processes worked out by the ingenuity of half a century, form the truest picture of the Kodak organization throughout the world.

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KODAK