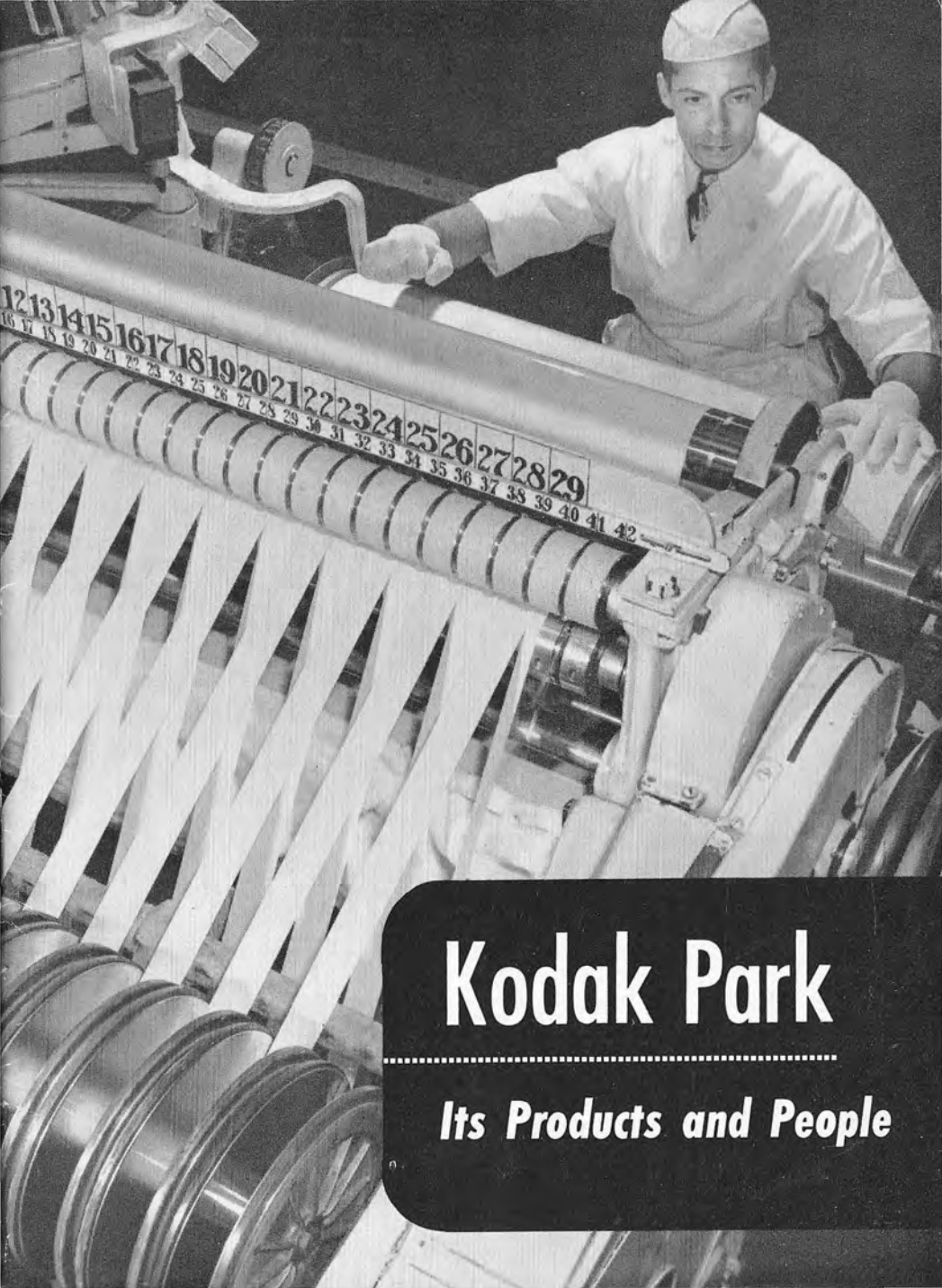
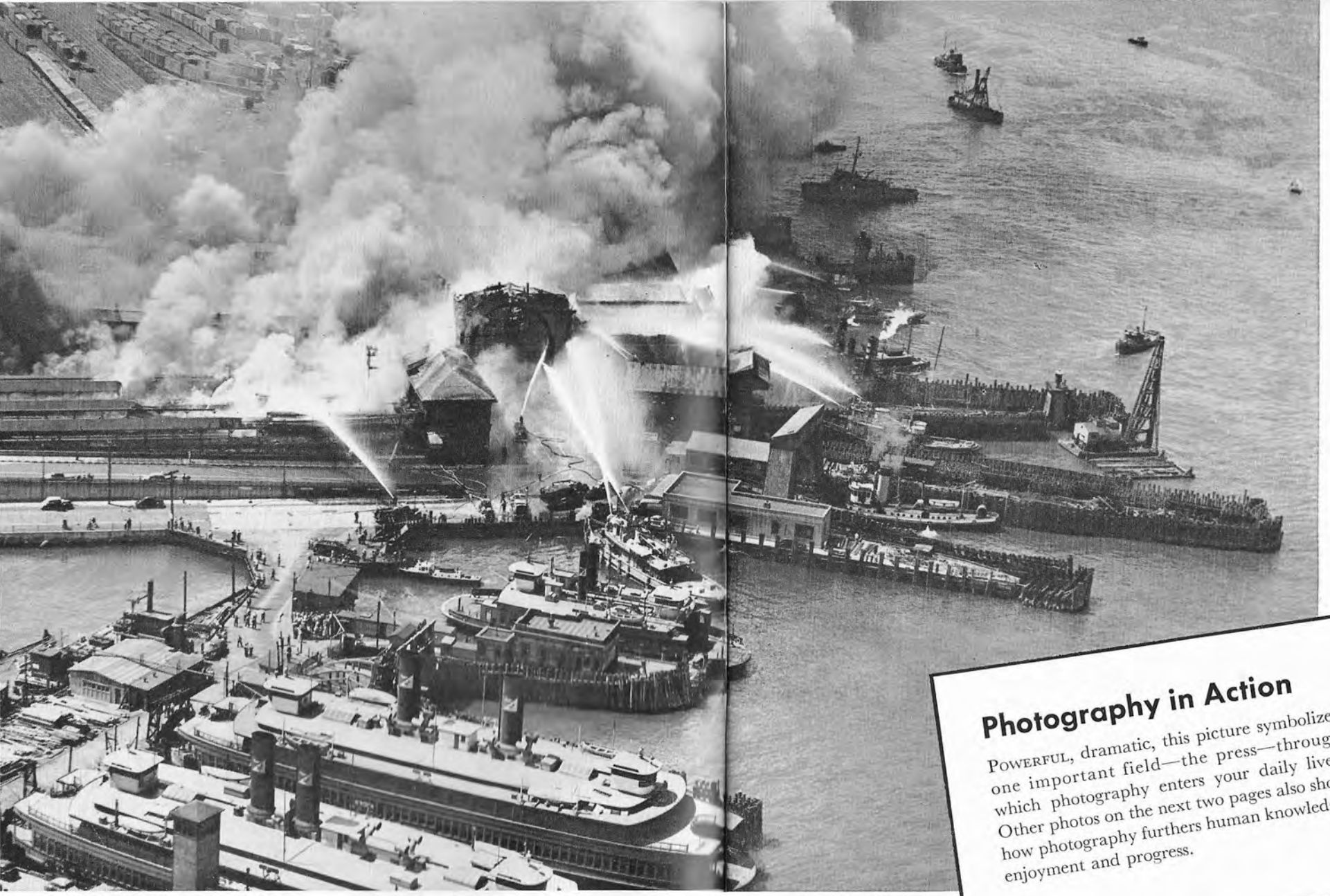


Kodak Park

Its Products and People



Photography in Action

POWERFUL, dramatic, this picture symbolizes one important field—the press—through which photography enters your daily lives. Other photos on the next two pages also show how photography furthers human knowledge, enjoyment and progress.

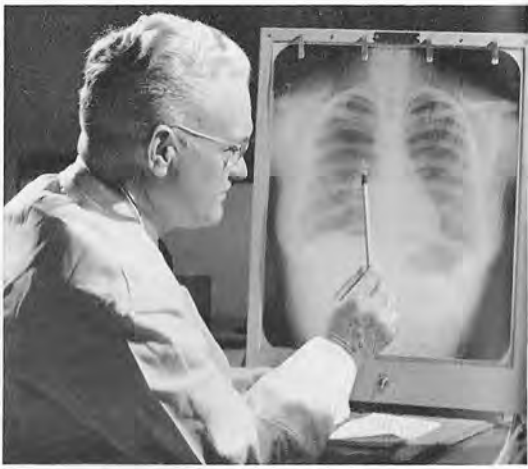
Cover *Photo*: Slitting film into roll-widths.

AT WORK

AT HOME

PICTURES: *In your work and play*

IN SCIENCE



IN MEDICINE

IN THE STUDIO

ON THE SET

THESE pictures mark some of the pursuits that photography has joined as a full-fledged partner.

They show a few of the ways and the results of using various kinds of photographic goods.

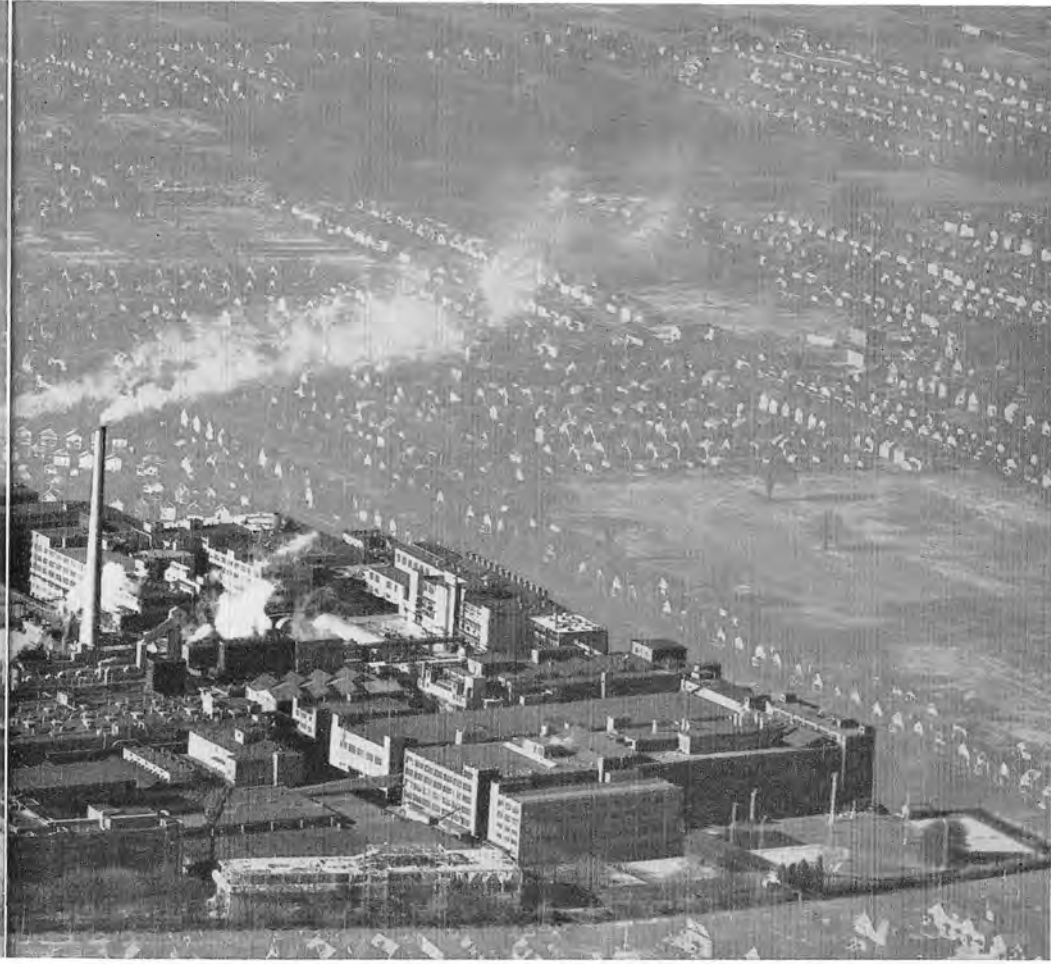
But they can only start to touch on the part photography plays in your life today.

Physicists are probing the secrets of nature's smallest bits of energy through photography. Astronomers are exploring billions of miles into the universe with the aid of special photo-plates.

In a more workaday world, we are all familiar with what photography means . . . from home to Hollywood, from treasured snapshots to national picture magazines.

For the story behind some of photography's "raw materials," we would like to take you, by means of this booklet, into our Kodak Park Works.

From this, our largest plant, flow great quantities of Kodak films, papers, plates and chemicals. And these are the "sensitized" materials that help to make modern photography.



KODAK PARK: *Symbol of an Industry's Progress*

CITY-WITHIN-A-CITY, Kodak Park covers almost 400 acres, stretches from east to west for 2¼ miles. Yet at the first of this century, "the Park" was mostly farmland. Today the plant has some 20,000 employees and is a dynamic sign of the progress of the photographic industry.

But Kodak Park is most interesting not for bulk but for its manufacturing methods. Sprinkler trucks wash the streets . . . interior production areas are vacuumed, scrubbed, mopped . . . certain employees wear white uniforms of surgical cleanliness . . . some cosmetics are banned because they would, on contact, ruin film.

Here, too, much work is done in air-conditioned, darkened rooms where a single stray shaft of light could spoil thousands of dollars worth of photographic material. Why? Because many photo-products are made to react to light itself. Thus the utmost in production controls is necessary to insure products of the highest quality.

PRODUCTS: *For People All Over the World*

KODAK PARK's varied output consists chiefly of:

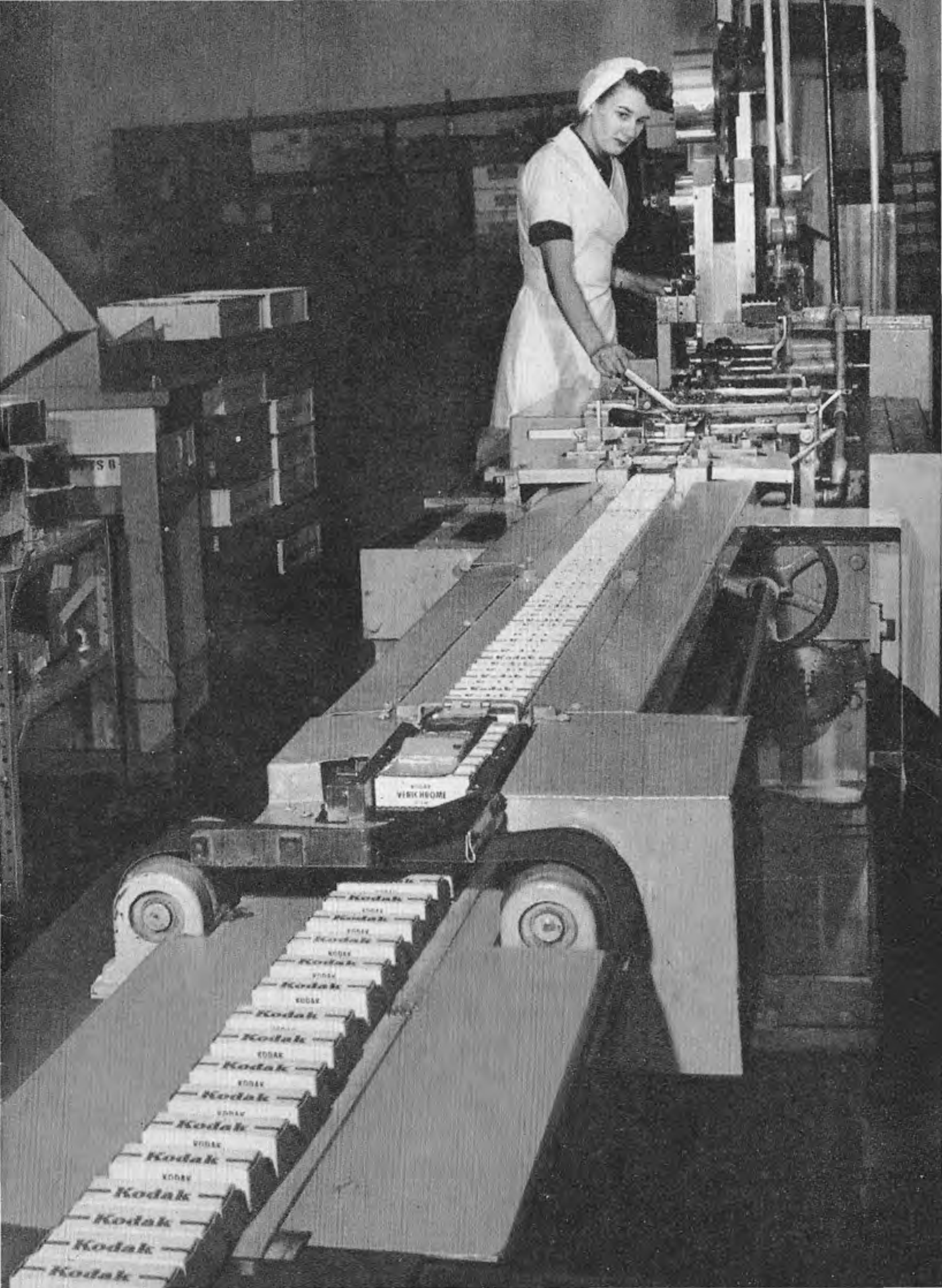
Films and Photo-Plates: 85 roll, 100 sheet and 10 film-pack sizes; nine amateur and 40 professional movie films; 40 different kinds of plates in 45 sizes.

Paper: 35 types cut into 1,000 sizes of sheets and rolls and put into 20,000 types of packaging.

Chemicals: 160 kinds of chemicals for photography; 3,000 synthetic chemicals for research purposes; 500 miscellaneous chemicals.

A sidelight: Only about one-third of the entire photographic industry's production is for amateur use. The rest goes to commercial, professional, business, scientific and industrial fields where photography contributes to the day-to-day living of all of us.

Photographic paper base (above) in storerooms for aging; chemicals (below) being funneled into cans; amateur roll film (opposite page) coming from automatic boxing machine.


KODAK
Kodak

Eastman Dry Plate and Film Co., 1888.

Kodak Park Works in 1890.

Early film was made on glass tables.

KODAK MILESTONES

In Photography's Advance

SOME of the company's important dates:

1880—George Eastman launched photographic dry-plate business in Rochester, N. Y.
1884—Paper-based roll film.
1888—No. 1 Kodak Camera.
1889—Transparent roll film.
1896—Motion-picture positive film.
1900—Brownie Camera.
1909—Cellulose acetate (safety) film.
1913—Panchromatic movie film.
1914—X-ray film.
1923—Home movies on 16mm. film.
1928—Amateur color movies.
1935—Kodachrome Film for color pictures.
1938—Lens coating ("Lumenizing").
1941—Color prints from Kodachrome transparencies.
1942—Kodacolor Film for color photos.
1946—Ektachrome Film, another advance in color.

George Eastman (left) and Thomas Edison at the first showing of a Kodak color motion picture process in 1928.

THE MAGIC OF FILM

What It Is . . . How It Works

PHOTOGRAPHIC FILM (see picture below) is "built" much like a layer cake.

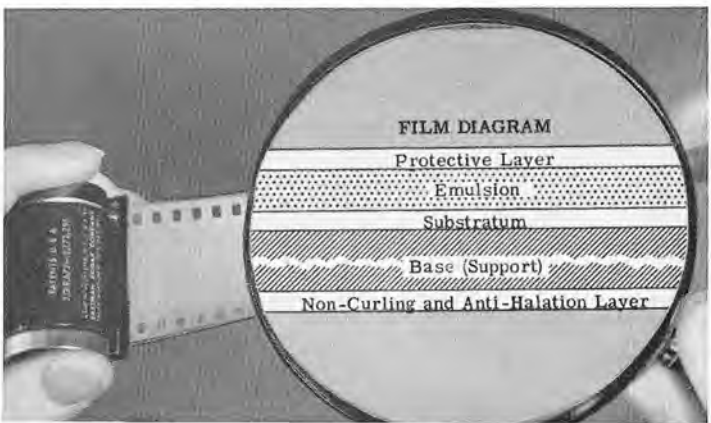
The "frosting" is the emulsion on the face of the film. Supporting it is a flexible, transparent base. Another layer, the anti-halation backing, absorbs some light and prevents shiny halos in your pictures. (Color films are similar—but much more complicated.)

The emulsion is light-sensitive. It's the key to film's power to record an image. Gelatin and silver salts are the main ingredients of the emulsion.

When light strikes the film, the microscopic silver grains are "tagged." This is an internal, photo-electric action forming what is technically called the "latent image." Upon development of the film, the latent image takes physical form. The developing solution does this by reducing the exposed grains of silver bromide to metallic silver.

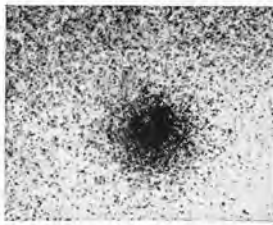
The silver, retained in the emulsion, becomes the "dark part" of the photographic "negative," from which "positives" or prints are made.

The basic structure of photographic film is illustrated by the cross-sectional diagram (shown below) of a roll of amateur film.

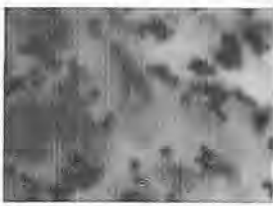


Photographic negative.

Enlarged 25 times.



250×—Silver grains show.



2,500×—Grains growing.

25,000×—Grains become "fibers."

SILVER: *Photography's Lifeblood*

SIXTEENTH-CENTURY alchemists, seeking a way to turn common metals into gold, stumbled onto an important fact: silver nitrate reacts to light by turning black.

Unknowingly, they discovered the basis of photography. Thus silver has become the prime part of a photo-emulsion. Kodak uses 12 tons of it a week for photo-materials.

To begin the process, silver ingots (75 pounds each and 99.97% pure) are dissolved in nitric acid. The resultant liquid is piped to crystallizers. These are 1,000-gallon drums in which the liquid is stirred by pumps, and cooled.

This causes silver nitrate crystals to form and grow. Soaking wet, the crystals are drawn from the crystallizer, then whirled in perforated baskets to "wring out" much of the moisture. Then the whole process is repeated. This step purifies the crystals even more.

Next, the crystals are dried, loaded into stainless steel barrels (each holding $5,000 worth) and trucked to the emulsion makers.

Photographic gelatin enters the scene at this point. Gelatin, as described on the next page, serves to keep the film's silver salts in their proper place in the emulsion.

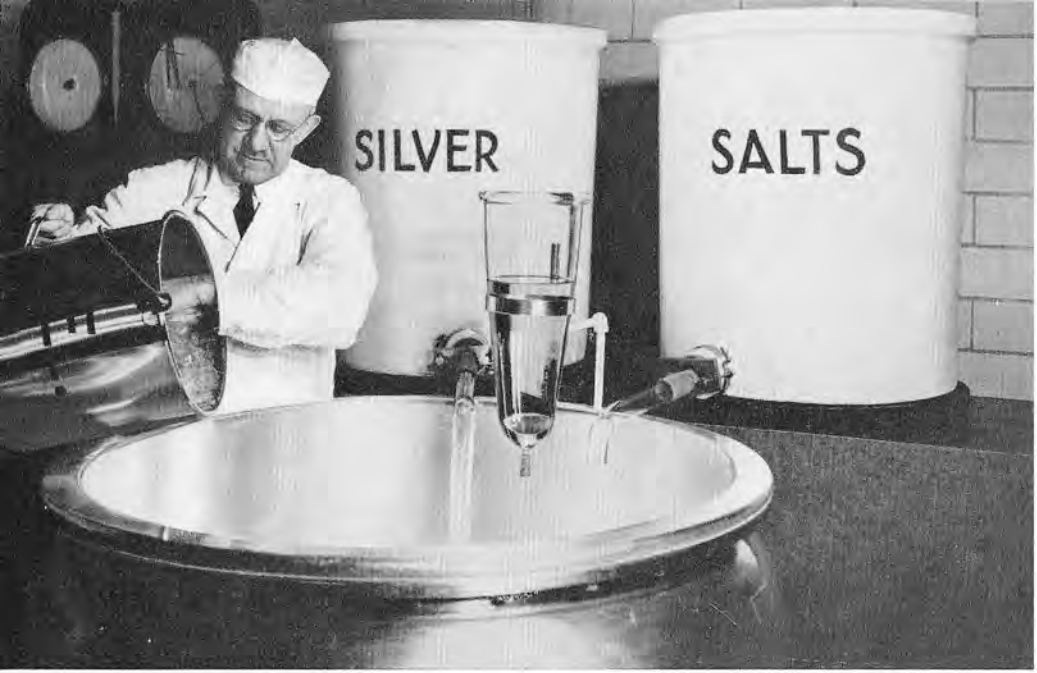
Kodak produces its gelatin in much the same way as that made for food. And our "photo-gel" is just as pure—to meet the quality needs of the emulsion formulas.

Left: Silver ingots for use in making photographic film are stored in this vault at the Kodak Park Works.

Ingots ready for dissolving in tank.

Crystals purified by redissolving in water.

Final crystallization process.



Combining ingredients for photographic emulsion.

FILM MAKING: *Art and Science*

Now we come to the final steps in producing film.

Broadly speaking, these involve: (1) making the emulsion from the silver salts and gelatin; (2) preparing the base on which the emulsion, or emulsions, will (3) be coated.

Each step demands precise controls, careful engineering, scrupulous cleanliness and a great deal of an indefinable "art."

First, the emulsion: In warm, syrupy form, the gelatin is mixed with silver nitrate and potassium bromide. Because the silver crystals are light-sensitive, this operation must take place in almost total darkness. The nitrate and potassium combine as potassium nitrate, which is washed away. Silver bromide crystals are left in the gelatin. This is the emulsion. Kodak makes some 200 different kinds.

Next, the film base: Let's take safety film as an example. Purified cotton linters or wood pulp are first treated with acetic acid. This creates a white, flaky product—cellulose acetate.

The cellulose acetate is then dissolved in organic solvents like the solvents used in nail polish or fast-drying lacquers.

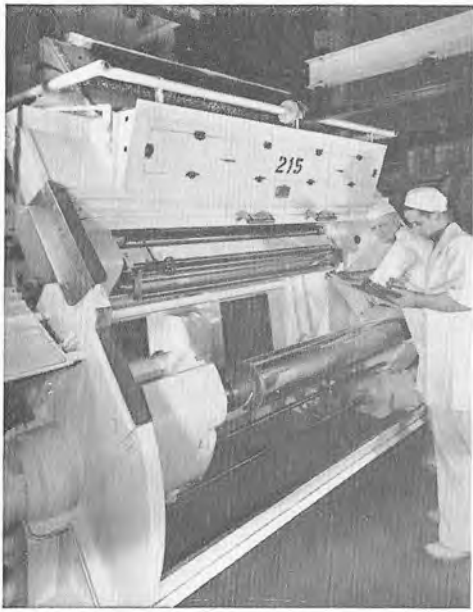
The product of this operation is a clear, thick fluid known to the industry as "dope."

The dope is fed evenly onto gleaming, chromium-plated wheels, four or five feet wide and 18 feet in diameter. As the wheels turn, heat drives off the solvents, and the dope becomes a thin, flexible, transparent sheet.

Upon further drying, it emerges from the roll-coating machines as finished film base.

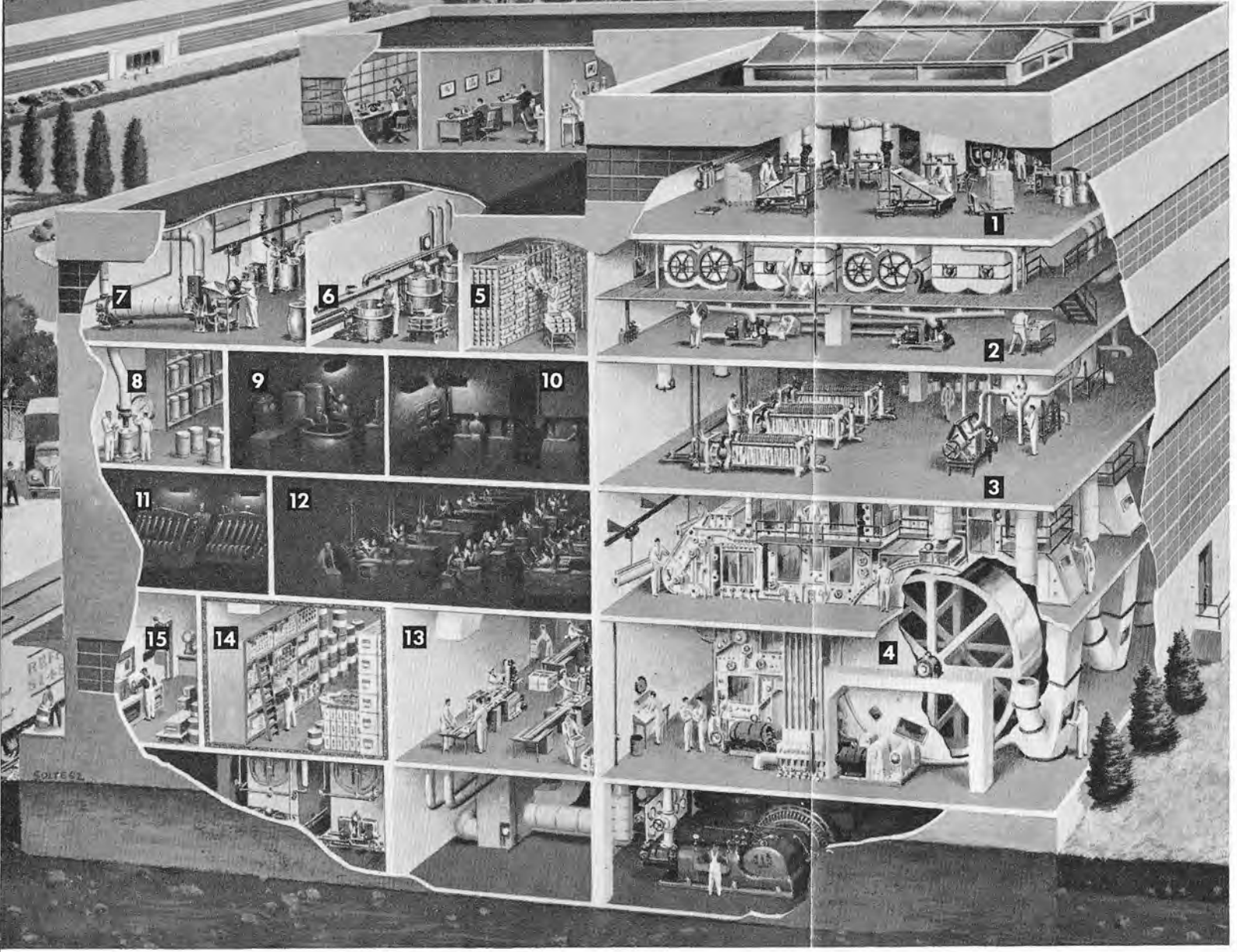
Finally, the base is coated with the emulsion, as in the photo below.

Bale of cellulose acetate being broken up and dumped into a solution containing solvents.



Photographic film base emerging from a roll-coating machine. This is the "windup."

Film base receiving a coating of emulsion.



Model Film Plant

THIS CUT-AWAY drawing of a simplified film plant sums up the production steps.

In (1) cellulose acetate bales are broken up and put into mixers (2) containing solvents. Then the dope is filtered (3) and flowed onto the roll-coating wheels (4). From these machines comes dry film base.

To make the emulsion, meanwhile, silver ingots (5) are dissolved (6) in nitric acid, crystallized and dried (7). These crystals are loaded (8) into barrels for sending to emulsion makers (9).

Film base is coated (10) with the emulsion. Dry film then is slit (11) into proper widths and spooled (12). Steps 9 through 12 take place in darkened rooms.

Quality-control inspections have been constant in the entire process. Finally, the film is packaged (13), sent to insulated, air-conditioned storerooms (14) before shipment (15) to dealers.

Paper pulp, in sheets, is dumped into a vat containing water. Whirling blades grind sheets into fine mixture.

Photographic paper base is inspected after receiving baryta coating, which serves as a foundation for emulsion.

PHOTOGRAPHIC PAPER:
Pulp to Prints

MOST PEOPLE associate "pictures" with "prints." The print—in still photography, at least—is the culmination of the entire picture-taking process.

To make the best prints, you need photographic paper that is tops in quality, of correct texture, contrast and surface.

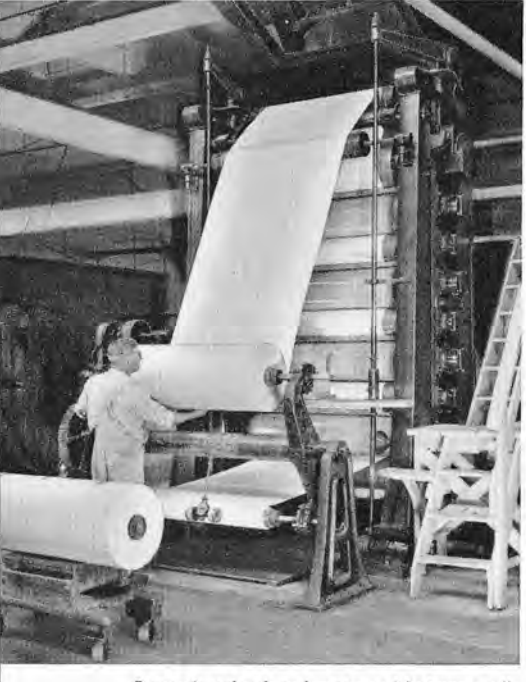
Photo-paper, too, must be tough —long-lasting. At the same time, it has to be pure. This means freedom from metallic or chemical substances that would play tricks with your pictures.

For years the best papers were made from rags. Good as these papers were, they did get brittle and yellow with age. Impurities in the papers' fibers caused the trouble.

Kodak scientists finally overcame this problem. They succeeded in obtaining wood pulp with cellulose purity equal to that of new-grown cotton.

This was a major achievement. It has resulted in papers with qualities of remarkable stability and permanence.

This roll, fresh from the mill, will provide paper for a million snapshot prints.



Paper is calendered—pressed between rollers—to give more gloss and strength.

Kodak paper pulp comes from selected logs that have been cut into chips and treated with chemicals. This changes the pulp to pure fibers—sulphite pulp.

After being mixed with water and churned in large, tile-lined "chests" or tanks, the fibers are cut and sheared by rotor blades moving at great speed.

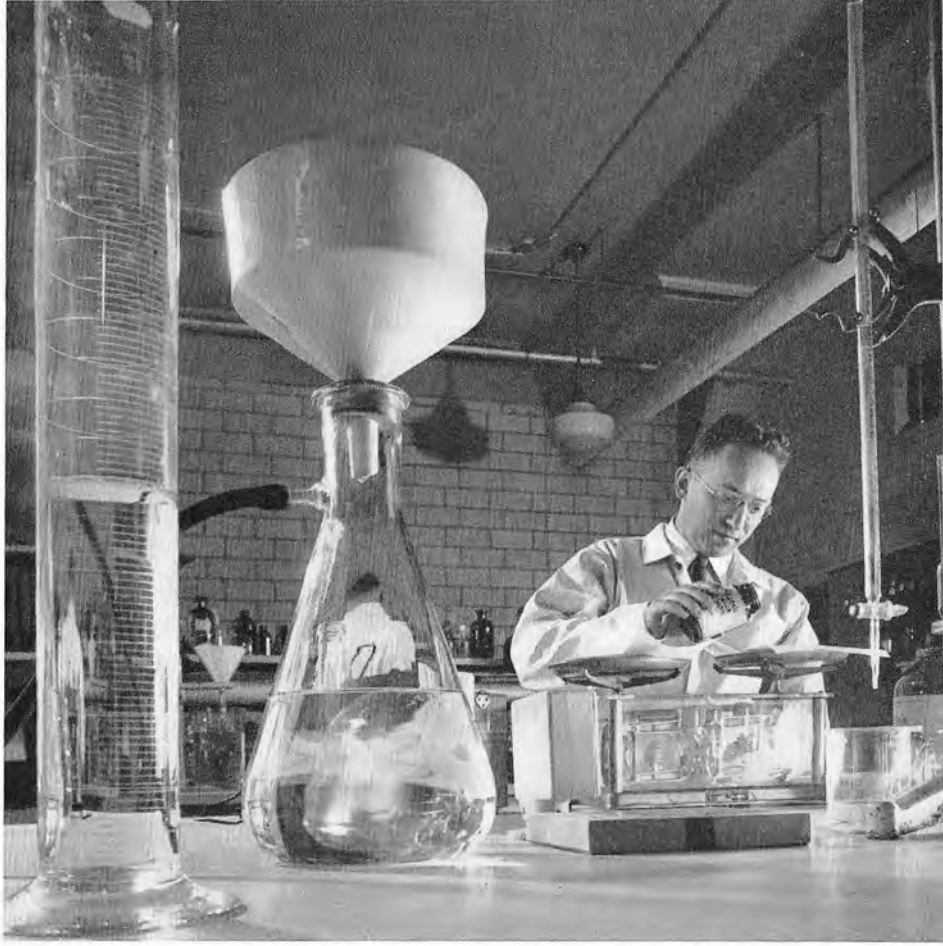
Drained on a moving wire sheet, this water-soaked mixture becomes a rough form of paper.

The making of one pound of paper, by the way, involves the removal of about 140 pounds of water from the pulpy mixture originally fed into the mill.

During these steps, meanwhile, sizing materials have been added to give the pulp more "body," and the entire product has been carefully screened to remove any foreign matter. Then, as the continuous wet web of paper slides from the wire belt, it is dried on a series of chromium-plated rollers. Heavy steel calenders squeeze the paper further, increasing its strength, and it is wound into rolls.

Baryta—barium sulphate and gelatin—is next applied to the paper. This fills in the pores, gives gloss and provides a foundation for the emulsion, which is applied in a way similar to that by which film is coated.

This is the baryta mixture which, in diluted form, is coated on photographic paper.



Testing quality of photographic chemicals.

CHEMICALS: *They 'Make' the Pictures*

CHEMISTRY pervades every nook of photography.

Kodak Park produces a large number of photographic powders and solutions plus a wide range of synthetic chemicals for universities, laboratories and research institutions.

This activity and the operations involved in making film and paper mean that Kodak Park is essentially a chemical industry.

Where film solvents are distilled.

Here is an indication of how demands on the plant have grown: In 1891 two small barrels provided ample capacity to make all the film base dope required. Now Kodak Park's chemical division produces far more than 1,000 tons of it a week.

Chemicals for general photographic use—mostly for processing films and papers—are turned out in really large quantities.

A push-button control system, for example, is used in mixing solutions in 1,000-gallon batches. This enables company technicians to compound tons of chemicals as simply as a housewife whips together a bowl of cake batter.

Despite these large-scale methods, the mixing of photographic chemicals takes place under conditions of extraordinary cleanliness, and every batch is lab-tested before being released for shipment.

Included in the plant's chemical operations are several relatively small but interesting manufacturing jobs.

One is the making of imitation leather, embossed by a 400-ton press, for use in covering some Kodak products.

Another is the production of monomethylparaaminophenol-sulfate. That's the stuff which is the essence of photographic developing powders. Its non-jawbreaking trade name is "Elon."

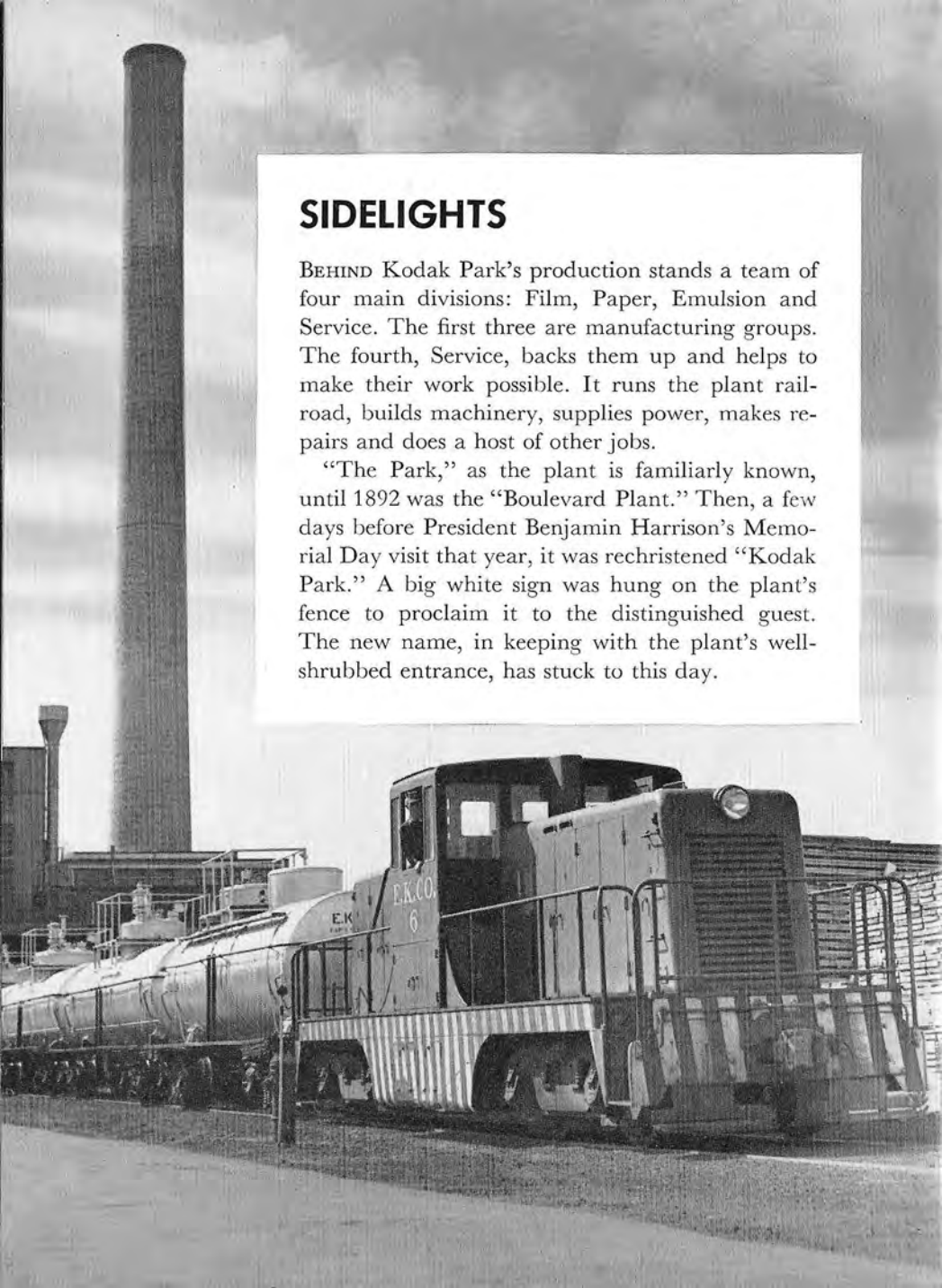
Right: Mixing color chemicals.

Left: Push-button chemical control panel.

SIDELIGHTS

BEHIND Kodak Park's production stands a team of four main divisions: Film, Paper, Emulsion and Service. The first three are manufacturing groups. The fourth, Service, backs them up and helps to make their work possible. It runs the plant railroad, builds machinery, supplies power, makes repairs and does a host of other jobs.

"The Park," as the plant is familiarly known, until 1892 was the "Boulevard Plant." Then, a few days before President Benjamin Harrison's Memorial Day visit that year, it was rechristened "Kodak Park." A big white sign was hung on the plant's fence to proclaim it to the distinguished guest. The new name, in keeping with the plant's well-shrubbed entrance, has stuck to this day.



Kodak Park, landmarked by twin 366-foot smokestacks, is a bustling community in its own right.

Here are a few physical statistics. The plant:

Contains more than 100 major manufacturing buildings;

Operates 3,200 telephones in a dial system;

Maintains a complete fire department;

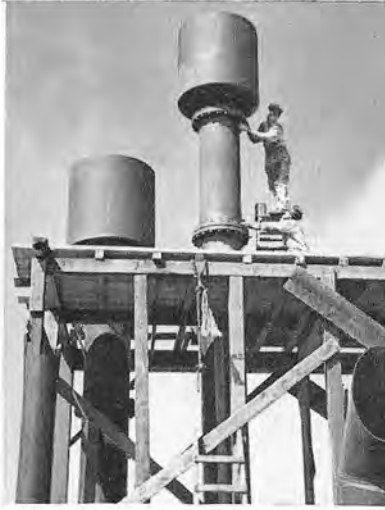
Makes enough refrigeration in its own machines to supply all the homes in New York City, or the equivalent of 1,500,000 mechanical refrigerators;

Uses 25,000,000 gallons of water a day;

Recovers about $150,000 a month in silver from scraps of discarded film and paper;

Runs a fleet of 160 trucks and other vehicles over 12 miles of intraplant roads;

Turns out enough perforated film (mostly amateur and professional movie types) a year to make a strip 520,000 miles long—enough for a round trip to the moon and twice around the world!



Engineers working on a stack atop new Kodak Park powerhouse.

A step in recovering silver from scrap film—refining the crystals.

Inspecting a highly polished, nickel-plated drum used in making photographic materials.

Rapid-processing unit snaps and projects picture in a few seconds.

RESEARCH: *Constant Quest for Better Products*

SCIENTIFIC RESEARCH is one of Eastman Kodak's keystones.

In 1877, 23-year-old George Eastman tackled photography as a hobby—and found it to be a formidable one. In a small way, when not working as a bookkeeper in a Rochester bank, he experimented with ways to make photographic "dry plates." For at that time there was no flexible film available as we know it today.

His early "research laboratory" was his mother's sink. But his efforts led to the start in 1880 of the Eastman Dry Plate and Film Co. It was a part-time business venture, regarded skeptically by many of the citizens of Rochester.

The business, nevertheless, soon took hold and grew steadily. In 1886 Eastman took a virtually unprecedented step—he hired a chemist for full-time research. This was a startling concept. But the principle has continued to be an important Kodak policy, and research is now an accepted practice of many progressive industries.

Eastman believed that his company would prosper and gain stature only as it looked ahead, scientifically. This conviction was given form in 1912 with the establishment of the Research Laboratories. Today a

staff of more than 500 trained men and women serves in the main laboratory at Kodak Park. This laboratory operates much as a research university of photography. The idea and practice of research, however, extend far beyond the limits of laboratory headquarters.

To get a new film, for example, from the laboratory stage into mass production requires much more research and experimentation. Thus, Kodak Park has a large technical staff of engineers and scientists which is constantly seeking new or better ways of commercially making various products that originally stemmed from laboratory experiments.

Every Eastman plant, moreover, has its development units. In these, pure science and practical production techniques are successfully blended into new Kodak films, papers, cameras, optical goods or chemical products.

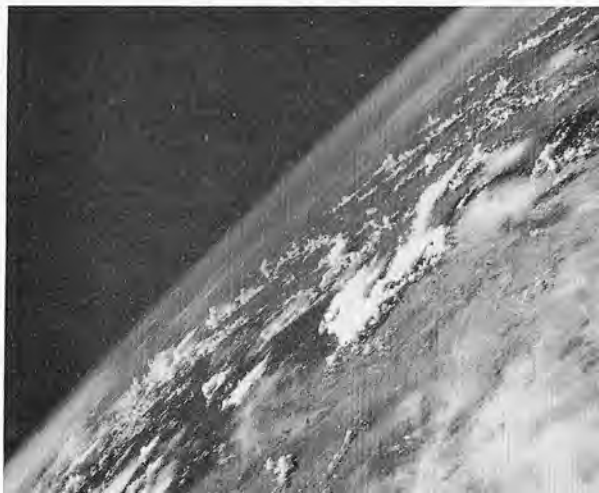
Each "Kodak milestone" noted on page 10 is, in fact, a tribute to intensive research and development work. Such achievements as amateur motion pictures and modern color films are among the brightest in the history of the Research Laboratories.

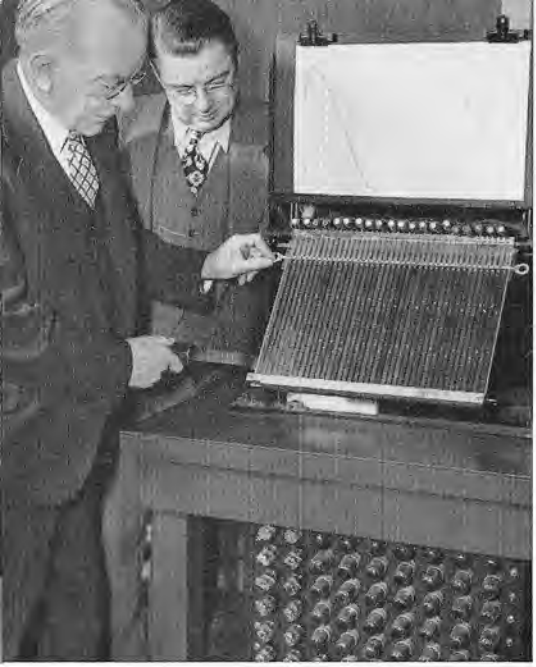
And often the bypaths of this kind of research have led the way to discoveries of great usefulness—sometimes in fields quite distant from photography.

In studying ways to improve films for tropical use, a Kodak researcher

White streak on special photo-plate shows track of uranium atom which was split by a bombarding neutron.

Rocket photo, shot on Eastman film at an altitude of 57 miles, indicates earth's curvature and surface haze.





Electronic device, used in film research, that "sees" much as the human eye does.

came up with a method that ultimately produced vitamin concentrates. This led to the organization of a new concern, Distillation Products, Inc., a company subsidiary located within Kodak Park's boundaries. DPI makes vitamins and high-vacuum equipment.

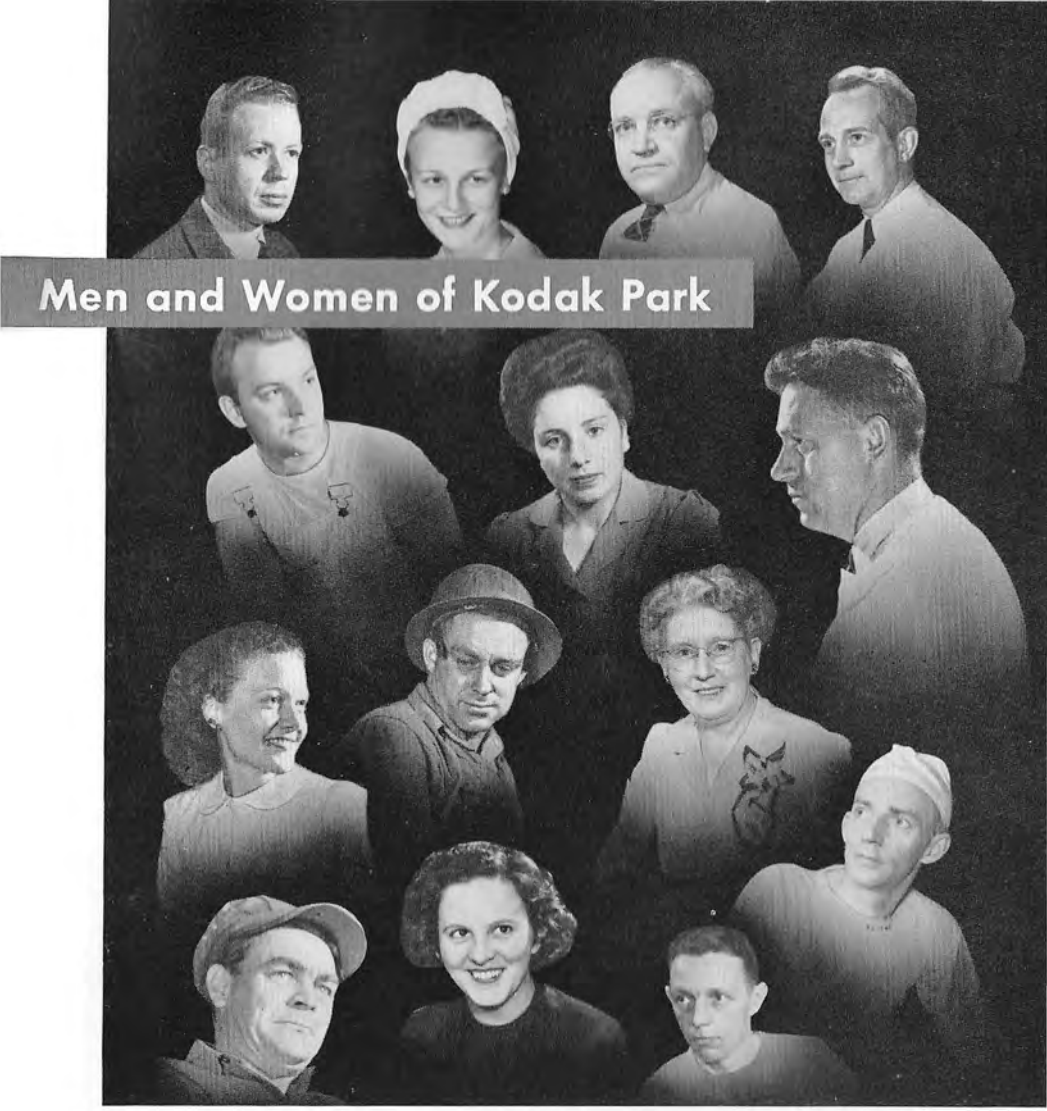
A group of Kodak scientists found that a cellulose product they had made was useless for film but was an innovation in medicine. It is now a surgical dressing that need not be removed from a healing wound—it dissolves harmlessly into the patient's bloodstream.

Rapid-processing of film is still another field of research. It is one with important potentialities —such as in photography for television and newsreels.

Even in astronomy and nuclear physics, photography is important. Some photo plates, for example, are extremely sensitive to starlight. Others provide pictures of what happens when an atom splits or an electron bounces.

These are but samples of the results of Kodak's research efforts. They have extended the horizons of science . . . and made photography work for us all.

Kodak scientist working on synthetic chemicals. About 3,000 such compounds are made at Kodak Park.



BIG AND FRIENDLY—an apt description of Kodak Park. Here are some of the people who keep it operating and producing. Their jobs are just a few of the hundreds of different types of work done in the plant.

Kodak Camera Club facilities are used constantly by more than 5,000 members.

The Park is a large and busy place . . . but it has never lost the "human touch."

A new, six-story Cafeteria-Recreation Building serves as a center for many off-hour activities. Outdoor sports are equally popular at Kodak fields.

The cafeteria provides healthful, economical food for employees the clock around.

* * *

Kodak Park people participate in a number of employment benefits. These include wage dividends, sickness allowances, liberal vacations with pay, six paid holidays, low-cost group life insurance, certain free medical care during working hours and a retirement plan.

The athletic and recreational program at Kodak Park includes a variety of team sports, such as bowling and basketball.

Left: Part of plant's new cafeteria.

Employment stability is one of Kodak Park's marked characteristics. Although its products have a seasonal demand, the plant has been very successful in smoothing out job peaks and valleys.

Expert sales forecasting combined with a system of slack-time production for busy-time seasons is the prime reason for the stabilization plan's record.

Right and below: Other scenes in cafeteria building, including kitchen's dozen 100-gallon steam kettles.

We hope that you have enjoyed this brief glimpse of Kodak Park . . . and that it has told at least a part of the story of how the plant's products serve people everywhere.

PRINTED IN U. S. A.

Scene in the Dark

This picture was snapped in the dark—by means of infrared film and invisible infrared light. It shows one of the air-conditioned rooms at the Kodak Park Works where panchromatic film is spooled.