history of the 35 MM CAMERA

First of Two Articles . . . by Beaumont Newhall

Today's 35mm miniature camera represents the greatest advance in camera design since the turn of the century. First produced to facilitate taking amateur snapshots, it was almost at once adopted by professionals, and was perfected to satisfy their needs. An exquisite precision tool, it has, in combination with specially designed lenses and films, increased the scope of photography enormously. The camera is the symbol of an approach to photography for which we have yet to find a name.

"Miniature camera photography" is an awkward and misleading name. There is nothing new about miniature cameras. Indeed, today's typical 35mm camera is bulkier and heavier than the roll film vest-pocket cameras which were so popular a few decades ago. And ever since Fox Talbot's "mousetrap" cameras of 1835, there have been dozens of cameras which produced negatives miniature in size. The advance which the modern miniature camera has made over the earlier ones is primarily in quality: today enlargements can easily be made from 35mm negatives which will stand comparison with prints from negatives of much greater area. Precision machining, to tolerances never before demanded in cameras, accounts largely for this success. It is significant that the first truly successful 35mm camera was designed and built by a firm experienced, not in the manufacture of cameras, but microscopes.

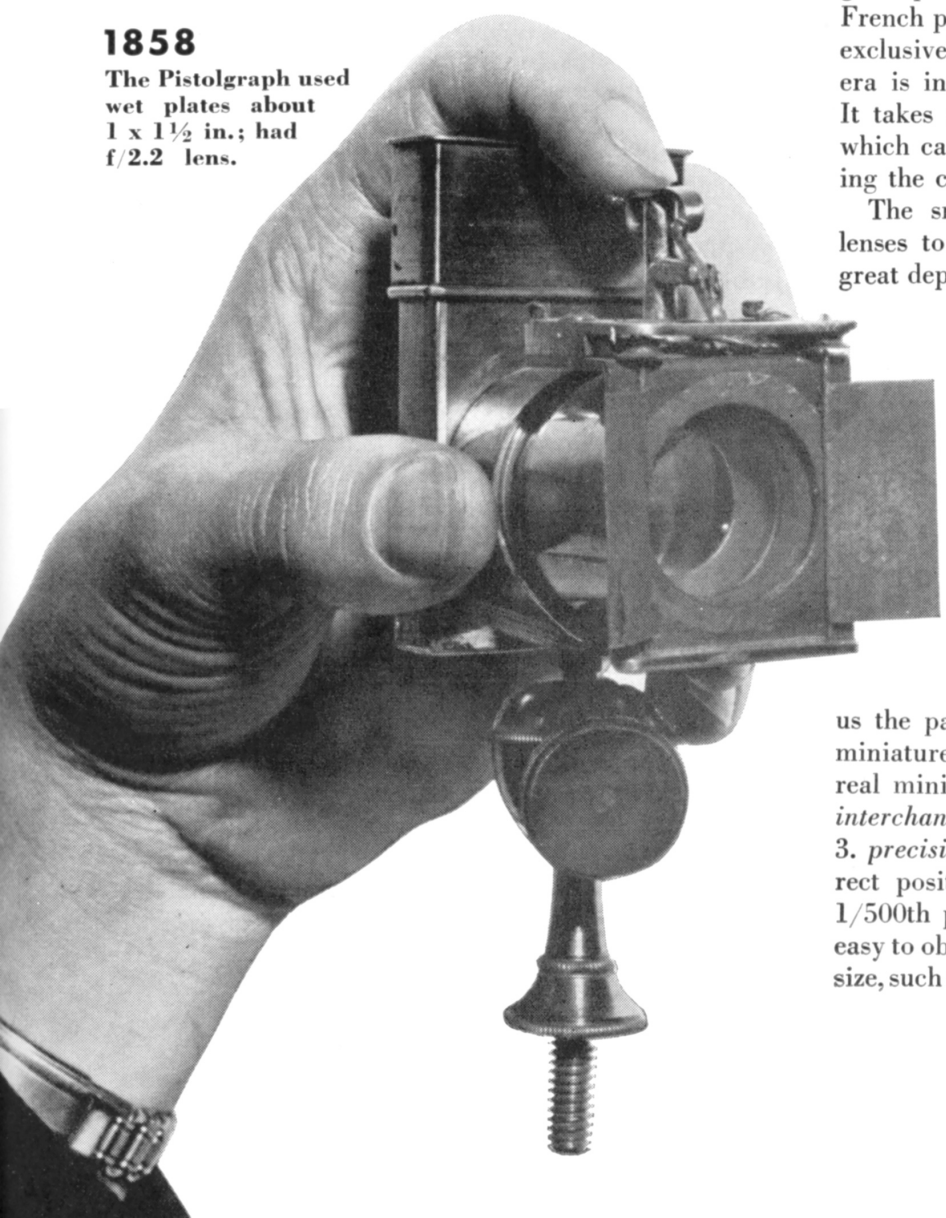
Yet the production of large prints from tiny negatives is but one feature of the miniature camera as we know it. The facility with which it can be operated has given photography a new flexibility. Cartier-Bresson, the French photographer who uses the 35mm camera almost exclusively, calls it "the extension of the eye." The camera is inconspicuous and can be used inconspicuously. It takes enough film in one loading for 36 exposures, which can be made in rapid succession, without removing the camera from the eye.

The small negative size enables short focal length lenses to be used. They have the advantage of giving great depth of field even when they are of large aperture. With them snapshots can be taken even under the most adverse lighting conditions. By providing interchangeable mounts, lenses of different focal lengths can be used, so that the photographer can choose the one most fitted for his particular purpose.

The best definition which I have found of the miniature camera is given by Lancelot Vining in *My Way With The Miniature*. "I have often [he writes] to answer the question 'Is any small camera a miniature?' The answer is 'no'—we have had the vest-pocket, button-hole and many similar cameras with us the past fifty years, but they were never known as miniatures. There are four essential features that the real miniature camera must possess: 1. *large aperture, interchangeable lens*, 2. *precision-made range-finder*, 3. *precision-made film track guide* that will ensure correct position over the whole area of the film to the 1/500th part of an inch, and 4. *small format material*, easy to obtain, perfect in construction and of standardized size, such as cine-film 24x36mm. *(Continued on next page)*

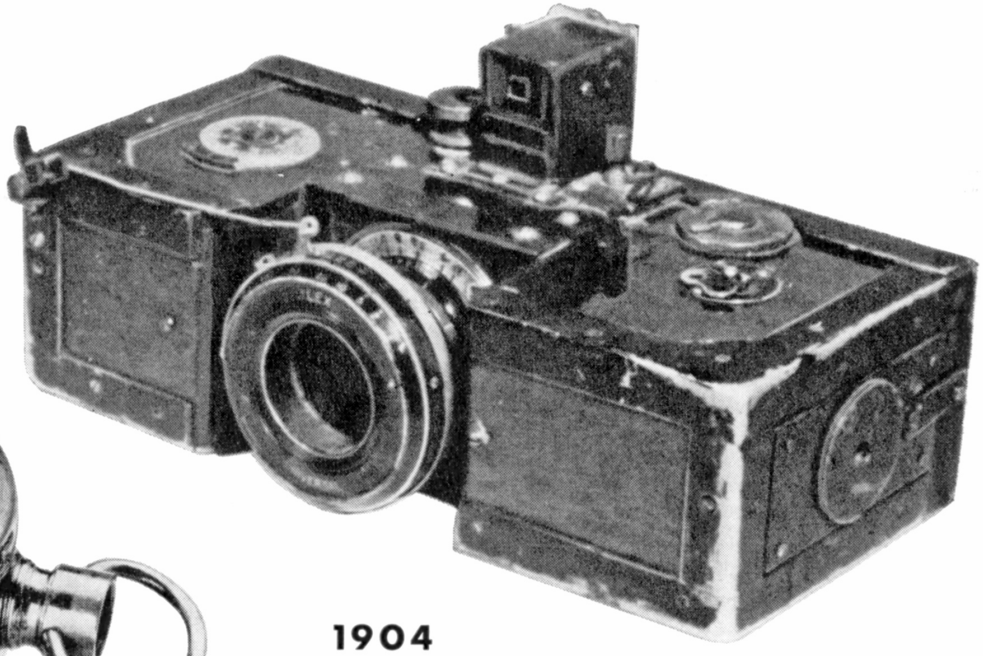
1858

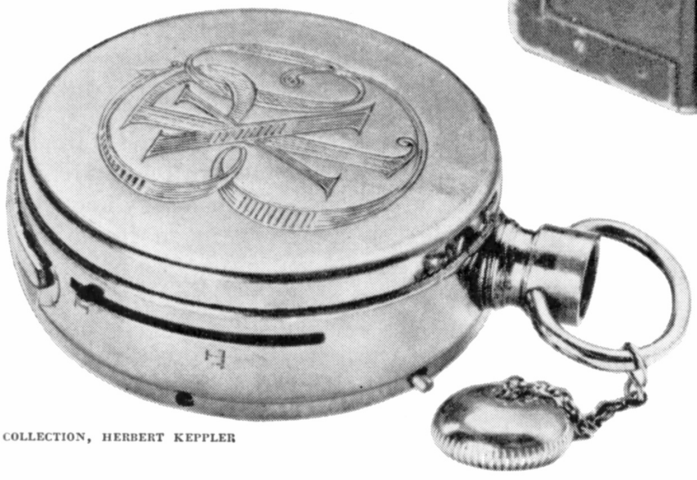
The Pistolgraph used wet plates about 1 x 1½ in.; had f/2.2 lens.



1912

Probably the first double frame 35mm camera—made by George P. Smith of Richmond Hghts., Mo.





COLLECTION, HERBERT KEPPLER

1904

With lens set in stem, the Expo Watch Camera took 25 5/8 x 7/8 pictures at one loading.

"These four features are the foundation of the real miniature camera, which is not just 'a small camera'; it is a *modern system of photography*."

To these should be added a fifth: automatic film transport coupled to the shutter-winding mechanism, so that pictures can be taken in rapid succession.

The first cameras to combine all these factors were the Model II Leica and the Contax, both first put on the market in 1932. Behind these cameras lay almost a hundred years of experimentation.

The program was outlined in 1840, shortly following the invention of photography. John W. Draper noted that he had "made many copies of my more fortunate proofs, with a view of ascertaining the possibility of diminishing the bulk of traveler's Daguerreotype apparatus, on the principle of copying views on very minute plates, with a very minute camera: and then magnifying them subsequently to any required size, by means of a stationary apparatus. The arrangements will probably add great facilities to the practice of the art."

When glass plates took the place of metal daguerreotypes and paper calotypes, the miniature camera system first became a reality. Thomas Skaife invented in 1858 his Pistolgraph, an all-metal camera to take wet plates just over 1x1½ inches. The lens was a doublet by Dallmeyer of a focal length of approximately 1½ inches and a diameter of ¾ inch. With this f/2.2 lens Skaife could take snapshots, by means of an ingenious shutter placed in front of the lens. Two doors were kept closed by the tension of a rubber band. When a decorative trigger on top of the shutter was released, the doors sprang open for a fraction of a second. I have not been able to find any old-time pictures taken with this forerunner of the modern miniature. It is said that Skaife, when he was pointing his camera at Queen Victoria, was arrested on a charge of attempting to shoot Her Majesty. Positives—he called them "crystal productions"—were either enlarged onto large wet plates—thus giving large negatives—or were projected on drawing paper, to be sketched. Enlarging directly onto light-sensitive paper was at that time impractical. Even at a slight degree of enlargement, the exposures lasted hours if the sun was shining brightly.

But this did not deter the design of similar miniature cameras. In Paris an "Automatic Camera" was invented by Adolphe Bertsch in 1860. Like Skaife, he made the body entirely of metal. The "automatic" feature was simply that the lens was fixed focus, eliminating the need

This modern shot made with Expo, shown *above*, was taken by Benn Mitchell using Super-XX, electronic flash.

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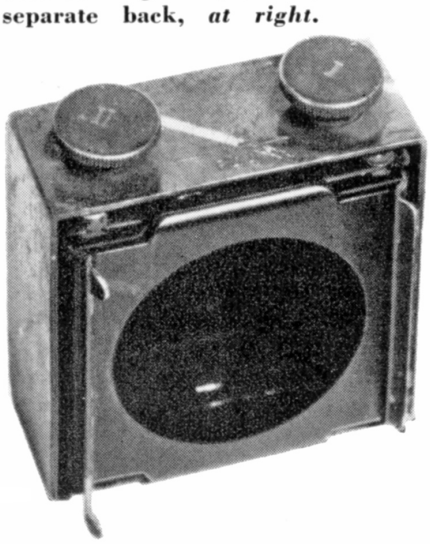
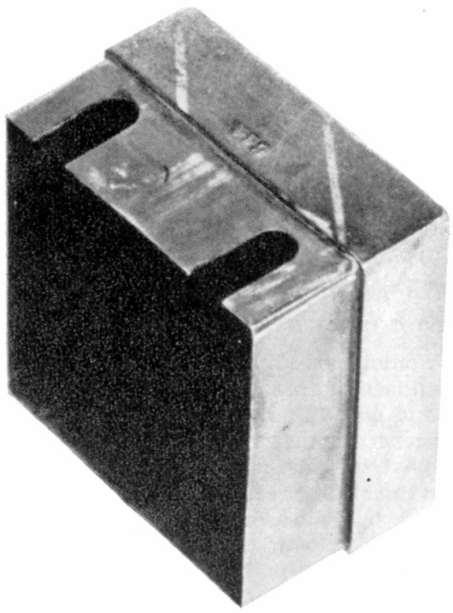
1893

The popular Kombi with film loading unit, *center*, separate back, *at right*.





1914

The Tourist made 750 single frame 35mm negatives on a single roll of film.

of the conventional ground-glass screen. The plates of the smallest 1861 model were one inch square. He designed an enlarger, and claimed that with it large negatives could be made "instantaneously" on wet plates. "Our friend," we read in the magazine *Le Monde*, "has completely transformed photography, has brought it within reach of all, and has almost made of it a game which can be played anytime, anywhere. The happy idea of taking everything small without focusing, and then enlarging at home when convenient, has been the point of departure of these charming creations; we offer them to amateur photographers as a welcome Christmas present."

The most ardent exponent of the miniature camera in the Victorian period was Charles Piazzi Smyth, the Astronomer-Royal for Scotland. The Great Pyramids of Egypt were his passion; to solve the mystery of their construction was his ambition. He needed detailed photographs of them. Despite his official position, he could not obtain a grant for the purpose, and so he traveled to Egypt privately. To save money, he took a miniature camera of his own design, instead of the bulky equipment of the expedition photographer.

His camera—which is now preserved in the Royal Photographic Society in London—had a lens of 1½-inch focus, working at about f/5. The plates were standard microscope slides, 1x3 inches, but he used only one square inch of the surface, which he sensitized with collodion. Exposures were made with a focal plane shutter which had a trapezoidal aperture, so that the sky would receive less exposure than the foreground; it was actuated by twirling a knob. The camera had to be used from a tripod, even when the brilliant desert sun enabled Piazzi Smyth to expose at "instantaneous" speeds.

He enlarged these miniature *(Continued on page 112)*

HISTORY 35MM

(*Continued from page 79*)

negatives on glass. Fifty of them, ranging in size from 2¾ x 3¼ inches to 8 x 10 inches, were shown at the Edinburgh Photographic Society in 1869. They are now lost. To judge from his own description of them, they must have been remarkable: "In the way of definition, I may call attention to No. 24; for, although it is magnified up to 10 x 8 inches from one of the small or one-inch-sized negatives, and although the Arab before the tomb door occupies only a subsidiary portion of the whole scene, yet the threads composing the cloth of his garment are discernible in those parts not affected by his breathing."

The camera gave Piazzi Smyth a freedom he had never enjoyed: "To work with an aperture of only 1-5th (i.e. f/5), and wet collodion, under a bright Egyptian sun, imparted the beginning of great satisfaction. For then in all the experimental trials at the landscape view from East Tombs cliff, there was no occasion to ask any one to go and stand in such and such a position and be very still; but, as soon as a plate was ready, it was fired off; and if there was any one in the scene, either far or near, going or coming, in motion or stationary, he was sure to be taken."

The modern way

His approach to photography anticipated by decades the "miniature camera system." In his book, *A Poor Man's Photography at the Great Pyramid*, he tells how the poor man, by examining his negatives through a microscope, "wanders at will, truly the monarch of all he surveys, over the various parts of each picture; recalls the circumstances under which it was taken; discovers characteristic detail which he never dreamed of before; and then—each picture you will remember having been taken square—he decides whether a positive copy should be shaped as a long, *i.e.* horizontal, rectangle, or as a tall, *i.e.* vertical rectangle; whether it should include from side to side of the negative plate or stop short of its extreme parts, in order to secure a better balance of light and shade, or a more harmonious composition of light and angles; whether he should give preponderance to the sky or to the foreground; or whether some special scientific purpose may not be better served by extracting one little subject alone out of the whole scene, and making a very high magnified picture of that one item by itself."

This approach to photography, which today is commonplace, was as radical a departure in 1865 as the Astronomer-Royal's miniature negatives. When a photographer prints by contact, any such selective cropping as Piazzi Smyth suggests will reduce the size of the picture. But in a system where enlarging is an integral part, it is—within reason—no more difficult to "blow up" a detail than the full negative. The small size of negatives intended for enlarging influences, too, the photographer's attitude. With sensitive material which is relatively cheap and not bulky, the photographer naturally takes many exposures. One of the virtues of today's miniature camera is that a great many pictures can be made in rapid succession. The final selection of the most effective negative is an essential part of the photographer's work. Like Piazzi Smyth's poor man, the modern 35mm photographer "with his little box of very little negatives brought home modestly in his waistcoat pocket" edits his work, and prints but a fraction of what he took.

Modern picture made with Pistolgraph.

Piazzi Smyth could not take pictures in rapid succession. With wet plates, which had to be sensitized immediately before exposure, it was absolutely impossible to do so.

Next, dry plates

Following the invention in 1874 by Richard Leach Maddox of gelatin dry plates, the miniature idea became closer to practicality. The new material remained light sensitive for months after the gelatin had dried, and it was more sensitive by far than any earlier material. Collodion plates became obsolete. Why coat your own plates when you could buy better ones more cheaply? Why lug a tripod when you could photograph almost anything with a hand camera?

Cameras now were made small. Innocent looking boxes with a lens and shutter at one end and a plate holder at the other were called "detective cameras" because you could take pictures of people with them unawares. Ingenious

(*Continued on page 114*)

(*Continued from page 113*)

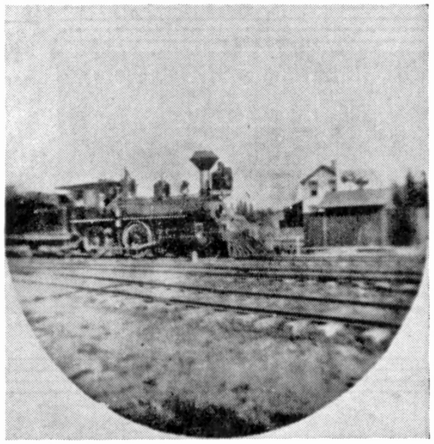
mechanisms were designed so that a dozen or more glass plates could be loaded inside the camera and exposed one after the other.

If gelatin emulsion could be coated on glass, why could it not be applied to other surfaces? Gelatino-bromide paper was introduced in 1879. It was so much faster than the old albumen paper that prints could be made by artificial light. It could be used to make direct enlargements, with an ease and speed unknown before.

In 1888 George Eastman showed that enough flexible sensitive material could be rolled up inside a box camera to take as many as a hundred pictures merely by pressing a button and turning a key. His famous Kodak camera was immensely successful. In the following year he began to manufacture roll film.

The first film cameras were intended for a new class of amateurs—men and women and children who wanted, with a minimum of effort, to make records of their daily life, their loved ones, and places they visited on vacations. Contact prints were sufficient; enlargements were not demanded. Even the small negatives of the Kombi camera (a little over an inch wide) were not intended to be enlarged.

This tiny camera, introduced at the 1893 World's Fair, must have been produced in great quantities, to judge from the number which have survived. It was a



COURTESY AMERICAN MUSEUM OF PHOTOGRAPHY

1892 picture made with Kombi camera.

metal box, with a lens of extremely small aperture and a simple shutter. The film—in a length sufficient for twenty-five exposures—was wound on two rollers fitted into the back of the camera. A separate cover was supplied for the back, so that it could be removed and another back, loaded with fresh film, substituted; as this operation could not be done in daylight, a changing bag was sold as an accessory. Either round or

(*Continued on page 117*)

(*Continued from page 114*)

square frame pictures could be made.

The Kombi was large compared with the Expo of 1904, which was exactly the size of a pocket watch; the lens was set in the stem, and the film—supplied in daylight-loading cartridges—was wound on with a key. Each negative measured 5/8 x 7/8 inch, and twenty-five could be taken at each loading. Certainly the novelty of this camera would indicate that it was more a toy than a serious instrument, and its price, $2.50, would bear out this assumption. Yet the distributors, Burke & James, Chicago, stated in their catalogue that "the New York 'Herald' and other leading newspapers have their reporters equipped with Expo Watch Cameras."

In the development of the miniature camera, the Expo marks an important step because the negatives were intended to be enlarged. A fixed-focus enlarger, for making prints 2 x 3 inches, was sold for $1.50.

More small cameras

In the meantime there was a general trend to produce small cameras of all types for the specific purpose of making negatives which could be enlarged. The British Ensignette of 1909 was the first vest-pocket folding camera; in 1912 the Vest Pocket Kodak camera was introduced and a critic could write: "it produces negatives so perfect in detail that enlargements may be made any reasonable size and yet have all the quality of contact prints." "Do you want a camera to fit in your pocket to take pictures which will enlarge with microscopic detail to 14 x 17?" asked the International Photo Sales Corp. in 1913. Amateurs began to build their own enlargers, using their camera lenses. One luckless enthusiast, in an article *Take It Small—Then Enlarge*, told how he burned out the diaphragm and shutter leaves of his favorite lens in a homemade projector with a 500-watt lamp. It is surprising that the 35mm camera came so late. In

(*Continued on page 118*)

(*Continued from page 117*)

1914 two cameras for taking single pictures on standard moving picture film were announced in America. They were the Tourist Multiple Camera of Herbert & Huesgen Co., New York, and the Simplex Multi Exposure Camera of the Multi Speed Shutter Co., New York. Both cameras took fifty feet of 35mm motion picture film.

Of the two, the Tourist was the more expensive ($175) and the better constructed. It was precision made, was fitted with either an f/2.5 or f/3.5 lens, and had automatic film transport coupled with the focal-plane shutter mechanism. "It is only necessary to move a lever up and down with one motion of the hand to set the shutter, wind the film and register the exposure number," the manufacturer boasted. The frame size was that of the standard cinema camera; 18 x 24mm. Each loading of film enabled the photographer to take as many as 750 pictures. Small enlargements were reproduced in the catalogue; they show tolerably good definition.

Finally, double-frame negatives

The Simplex was made in two models—the Special ($65) with a Compound shutter, a Tessar 2-inch lens of aperture f/3.5, and an adjustable mask so that 800 single frame (18 x 24mm) or 400 double frame (24 x 36mm) negatives could be taken on one loading of film. Model B, which took only 24 x 36mm negatives, was fitted with an f/6 lens in a simple Time-Bulb, Instantaneous shutter. We have no photographs made with this camera, and so cannot prove the claim that the negatives were "microscopically sharp, and may be used for making bromide enlargements up to 8 x 10 or 11 x 14, having good detail and being superior in pictorial effect to large photographs printed direct from negatives of those sizes." But the Simplex, with its 24 x 36mm negative size, pointed the way to the future. It was not the first camera, however, to use the double frame. In 1912 George P. Smith of Richmond Heights, Missouri, built his own 35mm camera to make 24 x 36mm negatives. This homemade miniature was exhibited in the 1938 First International Photographic Exposition in New York. It has since been lost. We reproduce a photograph of Smith's camera, in the hope that some reader may have more information about it. If the date of manufacture can be documented, it is the first 35mm camera in the world.

(Editor's note: The second part of History of the 35mm Camera *will appear in the next issue of* MODERN PHOTOGRAPHY.)

history of the 35 MM CAMERA

Second of Two Articles . . . by Beaumont Newhall

Before World War I was declared, there were three 35mm miniature cameras on the market. In America, there were the Simplex and the Tourist; in Germany, the Minnigraph. These cameras incorporated most of the features which distinguish the modern miniature camera: precision construction, automatic film transport, and—in the case of the Simplex—the 24 x 36mm negative size which has since become standard. Large aperture lenses were not yet available (although the Tourist boasted of an f/2.5), and nobody had thought of incorporating in the camera a built-in rangefinder.

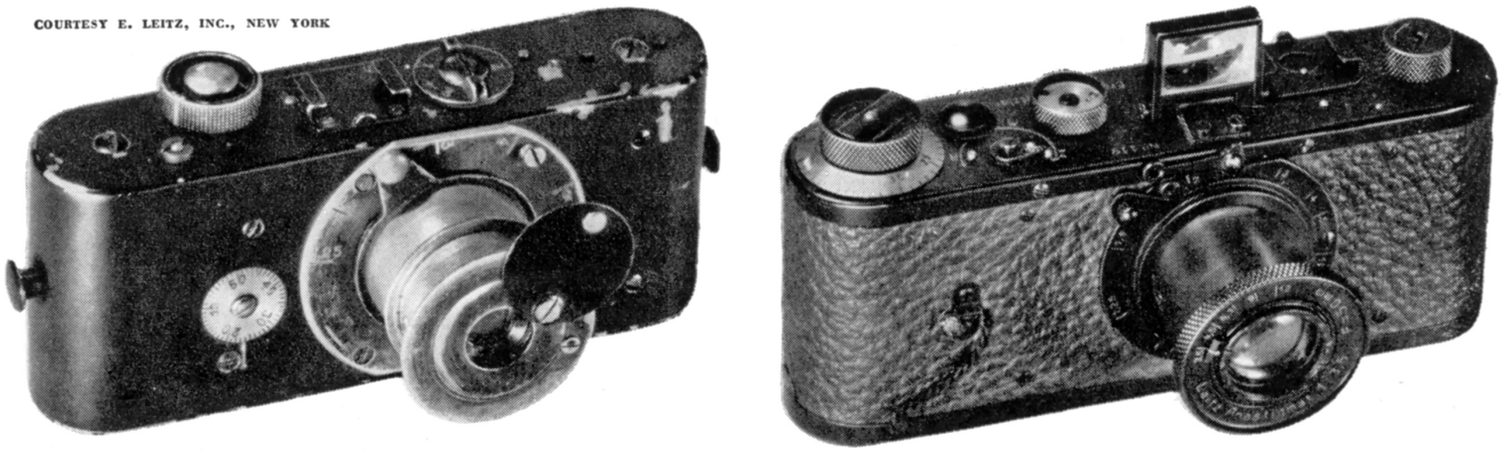
In Germany—apparently unaware that others were designing similar cameras—Oskar Barnack, an instrument maker at the E. Leitz microscope works in Wetzlar, had just made a 35mm camera in time to photograph a crowd gathered around a mobilization poster in August, 1914 (*shown at right*).

The story of how Barnack invented the Leica camera has become a legend. An amateur moving picture maker, he found difficulty in calculating exposures. The thought occurred to him to construct a small hand camera with which he could make test exposures on the very film he planned to use in his moving picture camera. His work was interrupted by the war, and it was not until the fall of 1924 that the first Leica was ready to be shown at a trade fair. The new camera showed no mechanical advance over the Simplex, Tourist, or Minnigraph—but it became an enormously successful piece of equipment.

Oskar Barnack's brilliance as a designer is evident when the Model A Leica of 1924 and the latest Model IIIf are compared. In twenty-nine years E. Leitz has found no reason to change the basic design. It is hardly necessary to describe the first commercial model beyond pointing out that it lacked only a coupled rangefinder, slow shutter speeds, interchangeable lenses, and flash synchronization. Take any model Leica in your hand. It is easy to grasp. You can bring it to your eye with little effort. The Tourist and the Simplex—if you can find one outside of a museum—are, in comparison, awkward and bulky. Barnack avoided the absurdity of hundreds of exposures on one loading of film. His daylight-loading magazine contained little more than five feet of film—enough for 36 exposures. The lens of his first model was an f/3.5, 50mm Elmar, permanently built into the camera, and focused by scale. To measure the distance to the point of focus, a supplementary rangefinder was supplied. Peeping through this instrument, the photographer saw two images. On twisting a dial until the images became one, the distance to which the lens should be set could be read on a scale.

Almost by chance a Leica fell into the hands of a German professional photographer named Paul Wolff. He won it in 1926 as a prize at a photographic competition. He was not unfamiliar with the *(Continued on page 106)*

COURTESY E. LEITZ, INC., NEW YORK



The first Leica camera was the experimental model, *left*, invented in 1914 by Oskar Barnack of Germany. After the pilot model, *right*, was exhibited in the fall of 1924, the Leica A was put on the market.

COURTESY ERNST LEITZ G.M.B.H., WETZLAR, GERMANY

In 1920, when inventor Barnack photographed this flood in Wetzlar, Germany, he made one of the first Leica news photos. Camera used was the experimental model shown on opposite page.

This picture of a German mobilization poster, 1914, is one of Barnack's earliest shots with his newly invented Leica. It had an f/3.5, non-interchangeable lens. Focusing was done by scale.

COURTESY ERNST LEITZ G.M.B.H., WETZLAR, GERMANY

COURTESY PENN CAMERA EXCHANGE, NEW YORK

The Contax I appeared in 1932. Camera *above* is 1933 version with speeds from ½ sec.; f/2 Sonnar.

HISTORY OF THE 35MM

(*Continued from page 76*)

camera. Barnack had shown him, back in 1921, the crude sheet-metal experimental model. It seemed insignificant.

At first the new Leica lay unused on his desk. Almost reluctantly he tried it out, and found to his delight that it suited him exactly. He began to experiment with the tiny camera, which seemed almost like a toy beside his 18 x 24cm camera—the Continental equivalent of our 8 x 10. He found that he could enlarge the tiny negatives to 16 x 24 inches.

Oskar Barnack, inventor of the Leica.

Wolff's big prints were exhibited first throughout Germany and then abroad. They, more than any other kind of advertising, convinced the world that the Leica was a practical camera. The exhibitions were followed by books.

Today, the photographs of Paul Wolff, who died in 1951, do not seem extraordinary. He never took a picture unless the subject was "picturesque." Pictorial clichés abound in his work: sun-tanned German Fraüleins toss balls on the beach; blond youths ride horseback on the sands. But put aside æsthetic judgment, put yourself back twenty years, and you will marvel at the technical quality of the photographs.

The fine-grain problem

Even a small print from a 35mm negative is an enlargement of many diameters. To blow up five, ten, twenty times was the exception before the 35mm became popular, and there was no need of considering extremely fine grain. Moderate fine-grain developers had been formulated for processing motion-picture film, but these did not give satisfactory results with the film available.

The first film made especially for the 35mm camera was Perutz Special Leica Ortho Cine Film. It was advertised in 1929 as having "an exceptional fineness of grain, which makes it possible to enlarge the small Leica negatives to 20 x 14 inches." In 1933 Kodak Panatomic film was announced to "give 12 to 15 times enlargements with no difficulty." The speed was low; in 1938 both Agfa-Ansco and Kodak brought out films of greater speed with minor increase in grain.

But the boom of fine-grain film came relatively late in the history of the 35mm camera. The lack of this product, and the unwillingness of photofinishers to master the technique of fine-grain development, appear to have inhibited the growth of the Ansco Memo camera—the first American 35mm camera to gain general acceptance.

The Memo—introduced in 1925—was a box camera which took 50 negatives each ¾ x 1 inch on 35mm film.

Ansco made only very modest claims for the Memo—they recommended enlarging only to 2¼ x 3¼ inches and stated that it was "not designed to displace the larger cameras but rather to supplement them."

The Ansco Memo box camera of 1925.

Large aperture lenses

At the very time that the first successful 35mm cameras were becoming popular, large-aperture lenses were first made generally available. In 1925 the Ermanox camera with an f/1.8 Ernostar lens of 3⅜-inch focal length was announced; it was with this camera, which took plates 2⅝ x 1¾ inches, that Dr. Erich Salomon took the first of his series of available-light photographs of celebrities which, because of their informality, so impressed a London editor that he called them "candid portraits." The name stuck—despite the fact that ever since the days of David Octavius Hill photographs of people had been taken which, in their disarming frankness, were as "candid" as anything made with a large-aperture lens at short exposures under artificial light. Not until 1927 were the fast lenses fitted to the Leica, and that wasn't by Leitz. Hugo Meyer advertised a "multi-exposure focal-plane camera"—from their photograph clearly a Leica—with an f/1.5 lens fitted to it.

(*Continued on page 108*)

HISTORY OF THE 35MM

(*Continued from page 107*)

In 1929 the same firm offered three f/1.5 Plasmat lenses for the Leica, of 3½, 4¾, and 6-inch focal length, and offered to modify the Model A camera to accept them. "Finders and lenses can be easily removed and the camera carried as a pocket camera with the [Leitz] f/3.5 lens only in position."

In the following year Barnack made the first alteration to his camera, and the firm announced "The new model of the famous Leitz Leica camera now available with interchangeable lenses." A choice of four focal lengths was offered: a 35mm wide angle; an f/2.5, 50mm; a 90mm and a 135mm.

The coupled rangefinder

Thus there remained only the addition of a coupled rangefinder to bring the 35mm camera to its present form. Back in 1916 Kodak had fitted a rangefinder to the 3-A Special Autographic folding camera; it was fitted on the sliding bed of the camera, just beneath the lens board. To focus, one simply moved the lens until the split image seen on a ground glass became whole. In the February, 1932, issue of the trade magazine *Photographische Industrie*, Model II Leica was described. It was almost identical to Model A. Beside the view finder was a second peepsight. Through it two magnified images of part of the scene could be viewed. By moving the lens, they could be made to coincide. At this point, the lens was in exact focus.

In the March issue of the same magazine another 35mm camera was described: the Contax, introduced by Zeiss in Leipzig, Germany.

This camera was, in many ways, similar to the Leica II. It was loaded with short lengths of 35mm film, it had interchangeable lenses, in a wide range of focal lengths from 1 3/16 to 7 inches, the focal plane shutter was cocked by the mechanism that wound on fresh film, and the lens mount was coupled with a rangefinder. Certain details were different, and photographers still will argue about the advantages of a focal-plane shutter made of metal instead of fabric, of a bayonet catch lens mount instead of the conventional threaded one, of focusing by a knob instead of by turning the lens itself. To all intents the two cameras were identical. Both were—and still are!—precision instruments, which will yield remarkable results if they are respected.

Their simultaneous appearance twenty-one years ago marks the beginning of modern miniature-camera photography. For a few short years the cameras enjoyed a great wave of popularity. Photographers everywhere found the technical problems of maintaining fine grain without loss of speed, and the making of huge enlargements, an absorbing pursuit. The "candid camera" craze swept the world in the 1930's.

What happened next?

During these years a host of 35mm cameras appeared. Manufacturers made extravagant claims that the 35mm camera was the universal camera. There was nothing—they said—which it could not do. It was the camera of the future.

Then, just as more of these new cameras were being introduced, the 35mm camera lost favor. Magazine editors started to demand more fully-detailed pictures than were obtained by the miniature camera. Synchronizers were designed for setting off several flashbulbs at the instant the lens was opened, and "synchroflash photography," as it was called, replaced shooting by available light. When World War II began, only a handful of 35mm photographs appeared in the national magazines.

It is hardly an exaggeration to state that the 35mm camera was kept alive by the amateur. The introduction of Kodachrome film gave the camera special popularity, and its economical film requirements gave it an advantage over other cameras when wartime shortages placed a premium on film.

The post-war situation

Not until the war was over did the situation really begin to change. German patents became public property, and manufacturers in every country made almost exact imitations of the principal types of cameras. To the surprise of the world, Japan—never seriously considered as the producer of quality goods—began to manufacture precision cameras and lenses that proved to be excellent. When natural-light photography came into style again with magazine photographers, the 35mm camera acquired far greater popularity than it had possessed in earlier years prior to World War II.

Now there are more 35mm cameras than ever before. A greater percentage of them feature coupled rangefinders. And a record number of interchangeable lenses are available for a large number of cameras (*see story on page 48*).

Since the invention of the Leica 39 years ago, photographers have learned that the 35mm camera is a specialized tool with its own picture-making techniques. Equipped with rangefinder, interchangeable lenses, and other accessories, it is capable of everything from photo-journalism to medical close-up photography.—THE END.