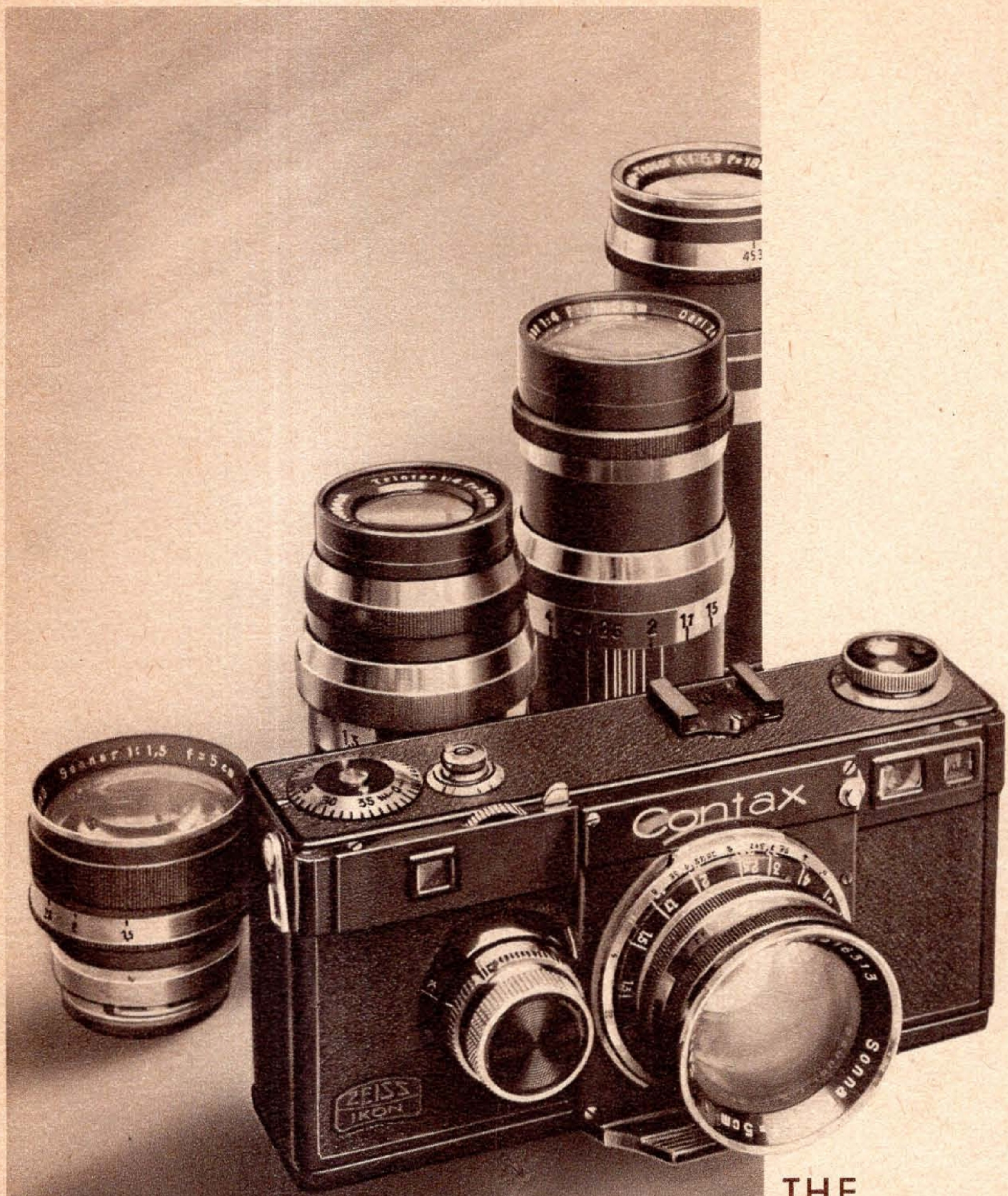


THE
CONNOISSEUR
AND THE

CONTAX



Photo by Franz Fiedler
Afternoon sun, September, $^1/_{50}$ sec. with $f/2$ Sonnar at $f/5.6$

I.

THE IDEAL MINIATURE CAMERA

Due to the perfection of the miniature camera, amateur photography during the past few years has developed along altogether fresh lines. The extraordinarily universal performance of a high-class modern miniature camera is chiefly due to the fact that even under difficult conditions as regards light, movement of the object etc., well exposed and very sharply defined negatives, capable of considerable enlargement, can be obtained.

In order to obtain these results, however, the use of a sufficiently fine-grained film is essential for the reproduction of very fine detail. Several makes of cine-negative film possess the required properties to a high degree, and for this reason the Contax has been designed for use with a high-class cine negative film of standard width (35 mm.).

Apart from the film question, however, the design of the camera itself must fulfil, in all respects, a number of conditions, if results of first-rate quality are to be obtained. Above all, the camera must be equipped with lenses of such optical correction that the optical definition enables full use to be made of the fine grain of the negative.

The necessary sharpness of the negatives is therefore

first of all obtained by the use of a suitable film and of high-quality optical equipment. To a considerable extent, however, sharpness is also dependent upon minutely accurate focussing, which entails a focussing mechanism of easy and rapid operation. It follows that the film must lie absolutely flat in the film gate, so as to ensure the same accuracy as with a plate and plate holder. All these highly important points must be carefully considered in the design of an efficient miniature camera.

The accuracy of the focussing mechanism for obtaining absolutely sharp focus

is of much greater importance with a miniature camera than is generally assumed.

It is an entire mistake to think that such a high degree of accuracy in focussing is not called for with a lens of short focus, as usually employed in a miniature camera, since the hyperfocal distance, or so-called "depth of focus", is always very considerable with such lenses. This idea is based upon the erroneous assumption that the sharpness of focus obtained over the range of depth of focus is equal and constant throughout. In reality, however, the so-called range of depth of focus lies between two extreme points, marking the limits of admissible unsharpness. Between the rear and front of this region of depth of focus, there is a zone of maximum sharpness representing the best attainable degree of sharpness in focussing, and it is this narrow zone which is of such great importance for miniature cameras. Such accurate focussing is, however, only attainable if all parts of the lens-focussing mechanism work with the greatest accuracy.

Wolfgang von Gronau,
Vorstandsmitglied der
Deutsche Verkehrsfliegerschule G.m.b.H.

Warnemünde den 23.12.32
Flughafen.

Messrs. Zeiss Ikon A.G.
DRESDEN.

Dear Sirs,

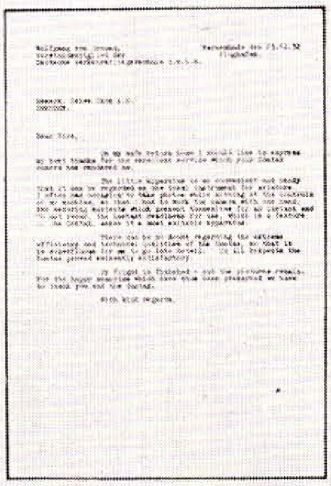
On my safe return home I should like to express my best thanks for the excellent service which your Contax camera has rendered me.

The little apparatus is so convenient and handy that it can be regarded as the ideal instrument for aviators. I often had occasion to take photos while sitting at the controls of my machine, so that I had to work the camera with one hand. For securing subjects which present themselves for an instant and do not recur, the instant readiness for use, which is a feature of the Contax, makes it a most suitable apparatus.

There can be no doubt regarding the extreme efficiency and technical qualities of the Contax, so that it is superfluous for me to go into detail. In all respects the Contax proved eminently satisfactory.

My flight is finished - but the pictures remain. For the happy memories which have thus been preserved we have to thank you and the Contax.

With kind regards,



Translation of a letter received from Wolfgang von Gronau, the world-famous airman and Director of the German School of Flying

But the performance of the shutter of a reliable miniature camera must also be in keeping with the technical conditions imposed by the demand for absolute sharpness of the negatives. A high-class miniature camera must therefore be fitted with a shutter subjecting the single points of the negative to such short exposure that, even with rapidly moving objects, no undesirable blurring is caused by the movement. This condition, however, can only be fulfilled by a focal-plane shutter. It is further necessary to limit the slight distortion, which can never be quite avoided with a focal-plane camera, and regarding which more is said below, to such a degree that, for all practical purposes, it is altogether eliminated. Lastly the focal-plane shutter must be of material to withstand all mechanical and climatic wear-and-tear encountered in actual practice.

It is, moreover, a well-known fact that large and relatively heavy cameras, as generally used in the past, could be held more easily and steadily for exposures made in the hand than small and light cameras. For obtaining perfectly sharp miniature pictures, it is essential to ensure perfectly steady holding of the camera. For this reason, a reliable miniature camera must be designed in such a manner that it can be held securely and steadily in the hand, in spite of its small size and small weight. The difficulty in holding a small optical instrument absolutely steady is apparent to everyone who has once held a pair of binoculars of large magnification and has observed how the beat of the pulse and mere act of breathing cause the image to move up and down continually. For this reason special care has been bestowed upon the shape and weight of the Contax, so as to eliminate all sources of trouble of this kind to the maximum degree.

Lastly, a modern miniature camera must be capable

of being employed for branches of photography other than the usual amateur practice, by the use of accessories which can be fitted to the camera in a few seconds. To give a few examples, an ideal camera of this description should be able to serve the purposes of the scientist requiring detailed large-scale photos, of the medical man desiring clinical photos, of the Press photographer for unobtrusive snaps either indoors in artificial light or for rapid exposures as needed in sports photography, for technical photography even of small mechanical parts, for the explorer for long-distance photography with a telephoto lens where focussing of the picture on the ground-glass screen may be desirable.

A miniature camera fulfilling all these and similar requirements and giving negatives of unsurpassed quality, whether taken by a professional portrait photographer, fastidious amateur, scientific specialist, engineer, or Pressman can be said to be a

really Universal Camera

in the true sense of the word.

The Zeiss Ikon A.-G., Dresden, the world-renowned concern comprising several of the oldest and best known German camera works, set itself the task of designing a universal miniature camera as described above. As the outcome of years of cooperation between experienced engineers, scientists, opticians and mechanicians, all the numerous technical difficulties involved were surmounted, and it became possible to place a camera on the market, representing camera perfection — the instrument "par excellence". The camera embodying the fruition of all this scientific research, modern manu-



Fig. 1
The Contax

facturing methods and traditional quality, reliability and highest possible photographic performance is the CONTAX.



THE THREE SPIRES

From aerial photo by Mittelholzer, August 1932
Taken with *f*/2.8 Tessar

II.

THE CONTAX AS A UNIVERSAL CAMERA

In all respects, the Contax fulfils the highest expectations and requirements of the modern photographer. The underlying principle of its design is that it is

the Camera for Every Occasion

The Contax completely replaces:

1. The old solid tourist folding camera with its long bellows extension and reliable focussing on the ground glass. These facilities are fully available with the Contax.

2. The modern small roll-film camera, with its constant readiness for action and large-aperture lens. In all respects, the Contax, which likewise takes a roll-film, is immensely the superior, in its technical perfection, of the ordinary roll-film camera. With the Contax, for example, double exposures are automatically prevented.

3. The press and sports camera. The focal-plane shutter of the Contax, permitting exposures as short as $^1/_{1000}$ sec., represents the most highly perfected design on the market. For all practical purposes it is indestructible. Even the most rapid movement is reproduced with great sharpness. Moreover the Contax is superior to the Press and sports camera by virtue of the small size and inconspicuous design which make it possible to take snapshots un-

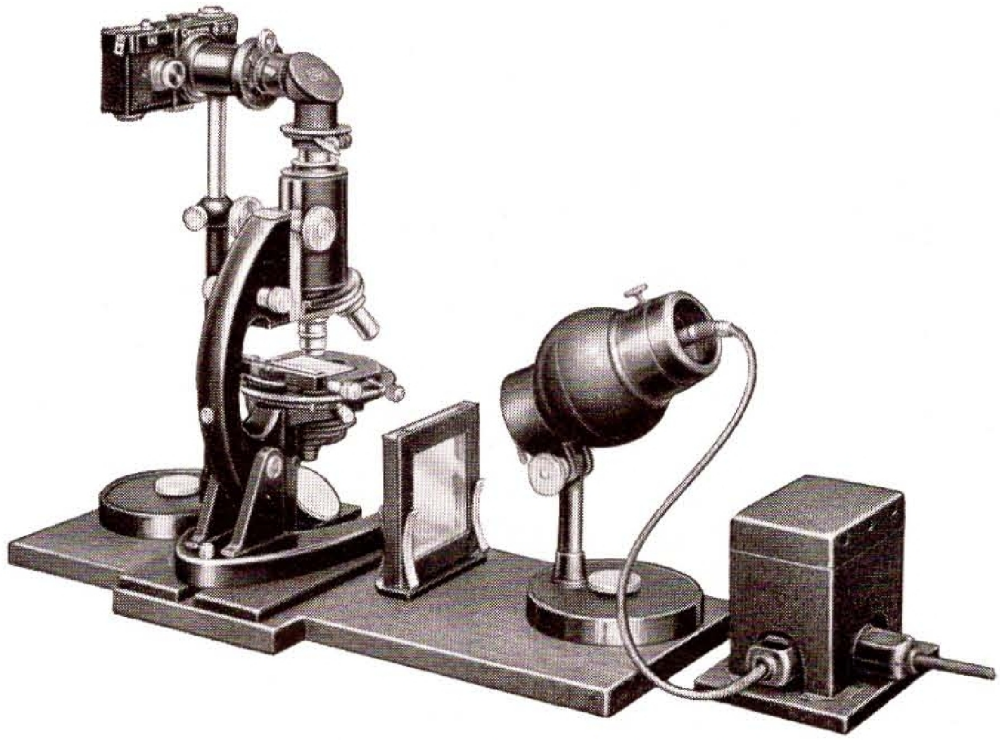
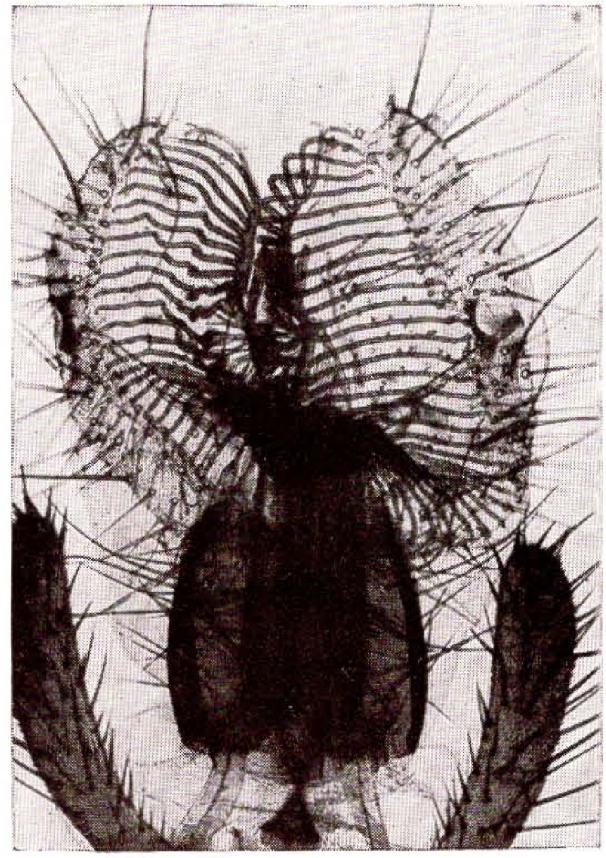


Fig. 2. Contax with Zeiss Ikon Equipment for Photo-micrography

observed. The fact that a series of 36 exposures can be made in rapid succession is of special importance. The remarkable sharpness enables enlargements to be made on a very considerable scale from the whole or parts of the negative.

4. The special camera of the scientist or engineer. The Contax can be used both for copying objects same size, as also for photo - micrography.



PROBOSCIS OF FLY
Photo-micrograph by Siedentopf



Photo by Rübelt, afternoon December sun, $^1/_{1000}$ sec., with *f*/2 Sonnar at *f*/5.6

The Contax, in conjunction with its multifarious accessories, which extend almost indefinitely the uses to which the camera can be put, represents an entire system of modern photography.

The Contax is the modern universal roll-film miniature camera of unsurpassed efficiency and all-round versatility.

This bold claim calls for proof.
The following pages are therefore devoted to describing

the entire design of the Contax in its main details,

so that the experienced photographer will be able to form his own opinion regarding the chief characteristics and features of this precision miniature camera.

III.

CONSTRUCTION OF THE CONTAX AND ITS CHIEF PARTS

1. Shape and body of the camera

As already mentioned in the introduction, the liability to blurring due to movement of the camera during the exposure is specially great with miniature cameras. Apart from unconscious movement on the part of the photographer, which the camera designer cannot of course provide against, steadiness when holding the camera is intimately connected with its general shape, weight and dimensions. Exact research regarding the best form permitting safe and steady holding of the camera in the hands of the photographer was carried out, and as a result of a series of experiments, it was found that the best results could be obtained by making the body of the camera nearly rectangular. This fact was of course made use of when designing the Contax.



Fig. 3. How to hold the Camera

Moreover the form of the Contax is a help in avoiding a tilted position when holding the camera, since the rectangular outline serves as a guide in keeping it exactly level. Incidentally, the form corresponds with the modern general artistic preference for smooth surfaces cutting each other at right angles.

The Contax is made with an all-metal body consisting of a light-metal casting. As every expert will confirm, cast camera bodies possess great rigidity and are not subject to deformation of any description, thus rendering them superior to all other types, as for instance drawn or stamped metal bodies.

2. Accessibility

Every camera should be designed so as to allow of thorough cleaning of the interior from time to time. This is specially necessary in the case of cameras using roll- or cine-film. Apart from the accumulation of dust, small particles of film or perforation chips tend to collect in the camera, where they can give rise to serious trouble. Above all, the bearing surface around the picture aperture, as also the sliding track of the film, should be frequently cleaned, and any particles of emulsion removed.

This easy accessibility, which is regarded as a matter of course in the design of all cine cameras and cine-projectors, is also a feature of the Contax design. The back of the camera can be removed, thus enabling the interior to be cleaned. Incidentally the removable back greatly facilitates the insertion of the film in the camera.

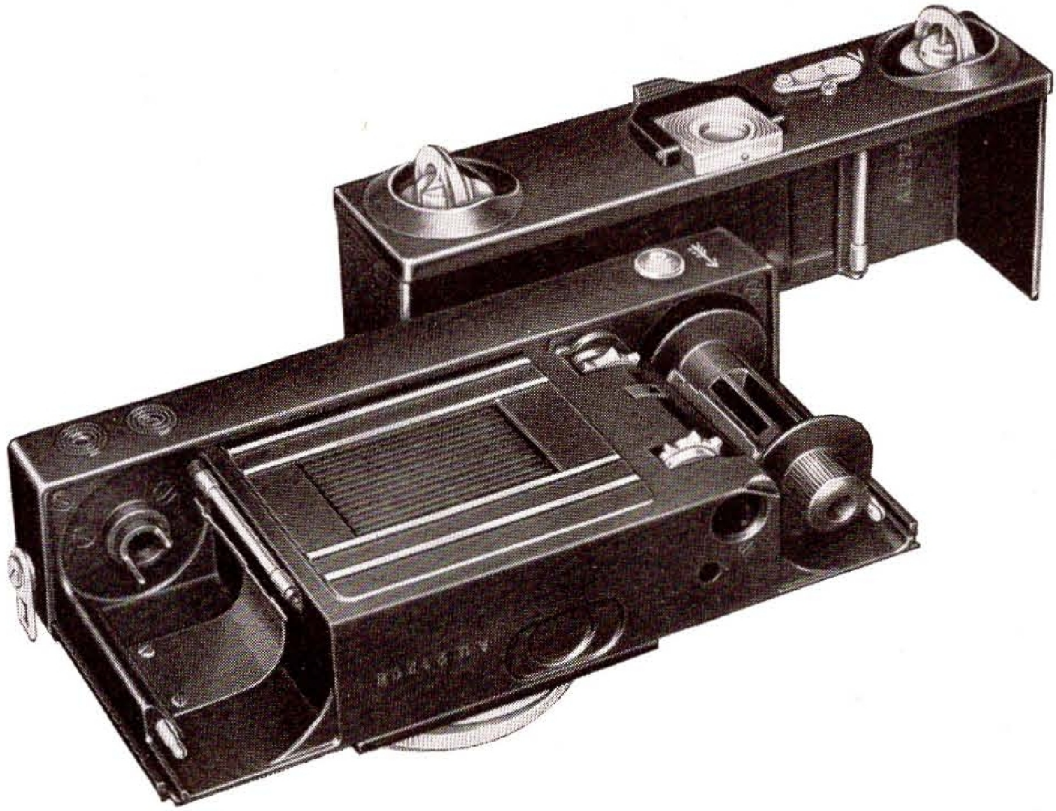


Fig. 4. Contax opened

The detachable back is made of metal of great hardness. It is absolutely light-tight and is fitted with a spring pressure plate to ensure the film being kept perfectly flat in the picture aperture.

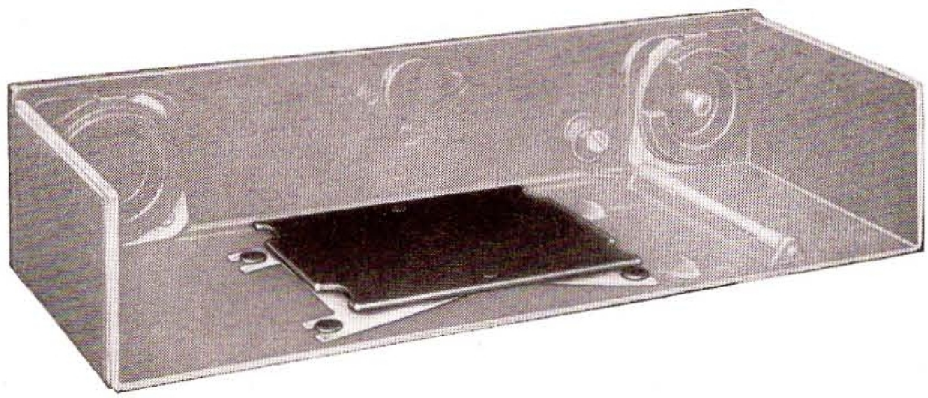


Fig. 5. Back cover of Contax, showing pressure plate

3. Picture Aperture and Film Guide

As mentioned above, the efficiency of a miniature camera depends to a large extent upon the film lying absolutely flat in the picture aperture, so that the flatness of the sensitive surface is not inferior to that of the perfectly rigid dry plate. This is the case with the Contax. Above and below the picture aperture, and parallel to its long sides, are two embossed, narrow metal guides. The two inner guides are arranged below the two outer ones to the extent of the average film thickness, the film being drawn along the outer guides from left to right. The spring pressure plate bears against the two outer guides, thus pressing the film gently against the inner guides situated slightly below the outer ones. For practical purposes, it can therefore be said that the film is drawn through an extremely flat channel, bearing only against two narrow guides, the height of which corresponds to the average film thickness. In this manner, the emulsion side of the film is afforded ample protection, while absolute flatness and perfect alignment of the film in the picture aperture are ensured (see diagram).

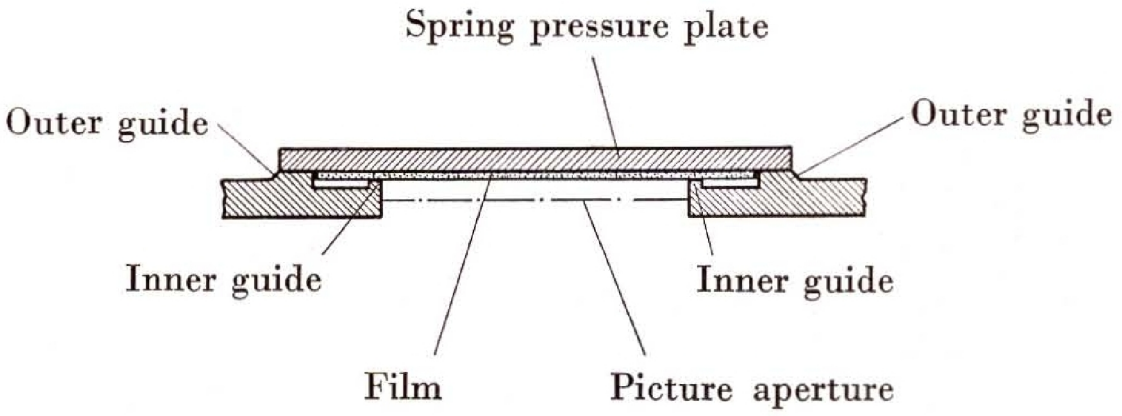


Fig. 6. Sectional diagram of the film channel

The surfaces of the film guides of the Contax are ground with the greatest accuracy to a minute fraction of a millimetre, so that they are absolutely plane and exactly at right angles to the optical axis. In this manner, the distance between the film and the various lenses used with the Contax is always determined with the greatest accuracy.

4. Negative Film, Daylight-loading Spools, Film Cassettes

The Contax is designed to take standard perforated cine-film of 35 mm. width in lengths of about $5^1/_4$ feet (1.60 metres). Each film spool gives 36 pictures of 24×36 mm. size (about $^{15}/_{16}\times 1^3/_8$ ins.). An automatic film counter shows the number of exposures made.

In the Contax the long cherished ideal of the roll-film camera, embodying all the features and advantages of simplicity without the disadvantages, has been realised. Such mistakes as double exposure have been completely eliminated by means of the automatic film feed.

For ordinary work, the Contax Daylight-loading Spool should be employed. The commencement and end of the film in these spools are provided with a long strip of perforated red paper. Spools can be placed in the camera and removed in daylight as with the ordinary roll-film camera, the film being wound from



Fig. 7. Contax Spool

the full spool on to the empty one and being securely protected against light by the end paper trailer. Rewinding of the film is therefore not necessary. These "*Contax Spools*", which have given excellent results in actual practice, are supplied by various leading film makers. At the present time the following brands are on the market: Contax spools with Kodak Super-sensitive (SS) Film (26° Sch.), Mimosa Extrema Film (23° Sch.), Perutz-Persenso Fine-grain Film (23° Sch.) and Zeiss Ikon Contax Pernox Film (24° Sch.). Agfa Cartridges, as well as the other well-known daylight packages, can also be employed.



Fig. 8 a
Loaded Contax cassette, open

Where the photographer desires to use longer or shorter lengths of film, cut from large rolls, small cylindrical cassettes may be employed. In this case the film is cut from the long roll in the dark-room and loaded into the cassette.



Fig. 8 b
Cassette core

The film cassettes of the Contax are so designed that their slits are opened to the full automatically, allowing the film to pass freely as soon as the catch of the camera back is closed after loading the Contax. In this manner, the film does not come into contact with the cassette slits when the film is moved on and all scratches are avoided. This design also has the advantage of closing the cassette slit and rendering the cassette absolutely light-tight as soon as the catch of the Contax back is released for opening the camera. The film can therefore

never be damaged in the Contax and is moreover always protected against light penetrating into the cassette, these features being the subject of a German patent.

Where a dark-room is always available, as it is in studio establishments and scientific laboratories, cassettes may

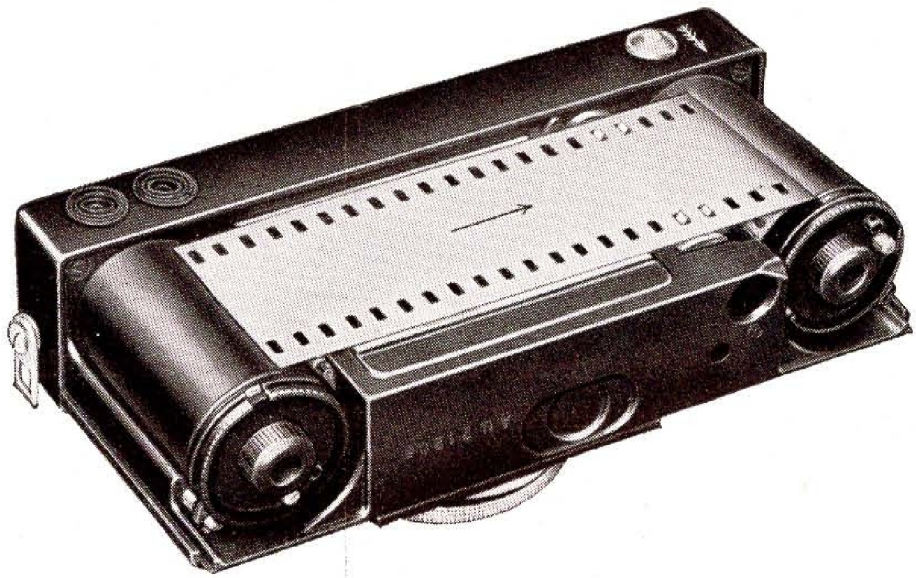


Fig. 9. Contrary to the descriptive text, the illustration shows the camera with the back removed and the cassette slit open, in order to show the passage of the film through the cassette slits. In actual practice the slit will always be closed when the back is removed.

be entirely dispensed with, the film being simply wound from one spool core to another.

In circumstances where a second cassette is not available, it is possible to insert an ordinary metal spool in the camera in the dark-room and to allow the film to run from this spool into a film cassette as described above. This process can also be reversed where required. In the latter case, however, the film must be wound into

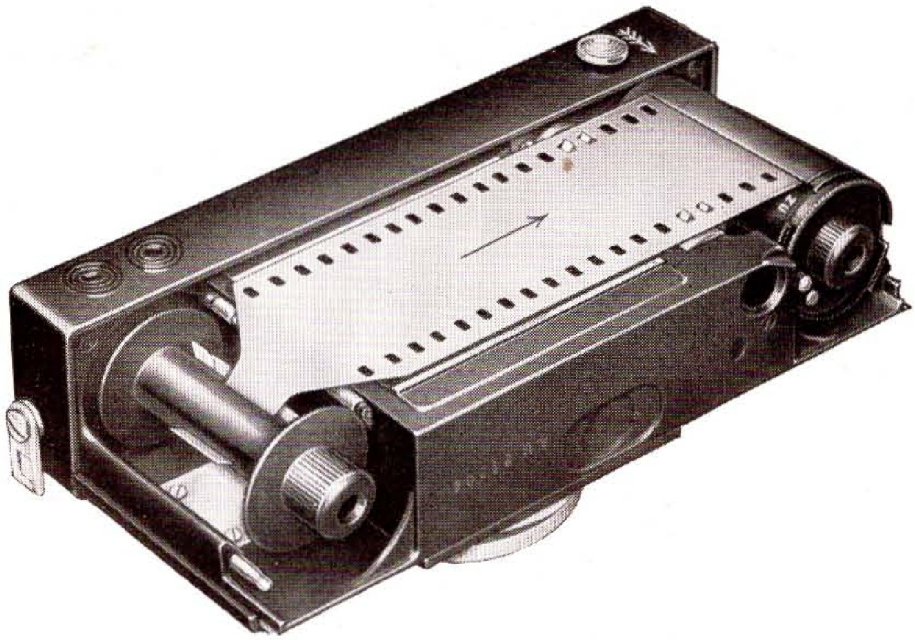


Fig. 10. This shows film being wound from the Contax spool into the film cassette

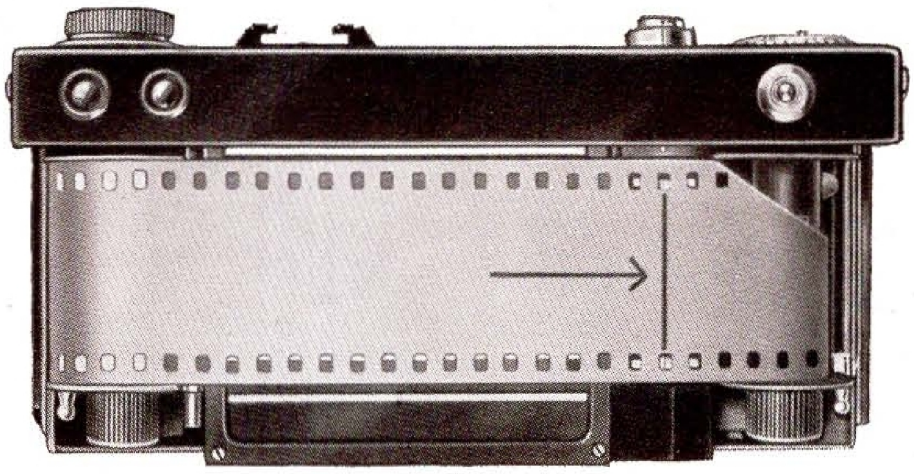


Fig. 11. This illustration shows the film being wound from one Contax spool to another

the cassette after exposure, for which purpose the Contax is provided with a re-winding mechanism. The re-winding is necessary when the well-known daylight-loading packets of cine film or the Agfa cartridges are used. Attention is again drawn to the fact that the employment of these film cassettes is by no means necessary and need only be resorted to where special conditions make their use advisable. The practical Contax daylight spools which require no cassette, represent

the most convenient, simple and reliable

form of film material for use with the Contax. By means of the daylight-loading spool, loading and removal of the film can be effected in exactly the same simple manner as with the ordinary roll-film camera.

5. Interchangeability of Lenses

As the size of the Contax negatives is small, namely $^{15}/_{16} \times 1^{3}/_{8}$ ins. (24×36 mm.), normal exposures will be made with lenses of short focal length, possessing a sufficiently wide angle of view. Lenses of short focal length will show the subject on a correspondingly reduced scale.

It may often happen, however, that large distant objects are to be taken with the Contax and with as much detail as possible. There are limits to the subsequent enlargement of the negative, inasmuch as the details of the enlargement tend to lose their sharpness, even where a very fine-grained film emulsion is employed. For this reason photographs of very distant objects should be taken on as large a scale as possible in the first

instance. This can be done by the use of lenses of relatively great focal length, i. e. so-called "telephoto lenses".

Apart from the necessity of being able to vary the scale of reproduction, a really universal camera must make



Fig. 12. Contax with long-focus lens

the photographer absolutely independent of the lighting conditions, whether in daylight or artificial light. A modern photographer will frequently wish to take snapshots at social functions, in the ball-room, theatre, music-hall, snapshots in streets, at night and on numerous similar occasions. For this purpose

lenses of extreme rapidity

will be required.

Such lenses must naturally be of the most perfect optical



Fig. 13. Contax with ultra-rapid lens

correction, so as to give clear and sharp definition, even in the extreme corners of the picture.

Even the best lenses, however, would be useless, if means were not provided, permitting the rapid and easy changing of the various objectives, which must be designed in such a manner that they can be fitted to or removed from the camera by a single turn of the hand. Moreover, an essential condition is absolute constancy and accuracy of the distance between lens and film. For this reason the lenses must be equipped with mounts, permitting convenient and rapid interchangeability and giving absolute accuracy of focus. The special bayonet mounts with which all Contax lenses are fitted enable all these conditions to be fulfilled. The design of the bayonet mount is based upon that employed

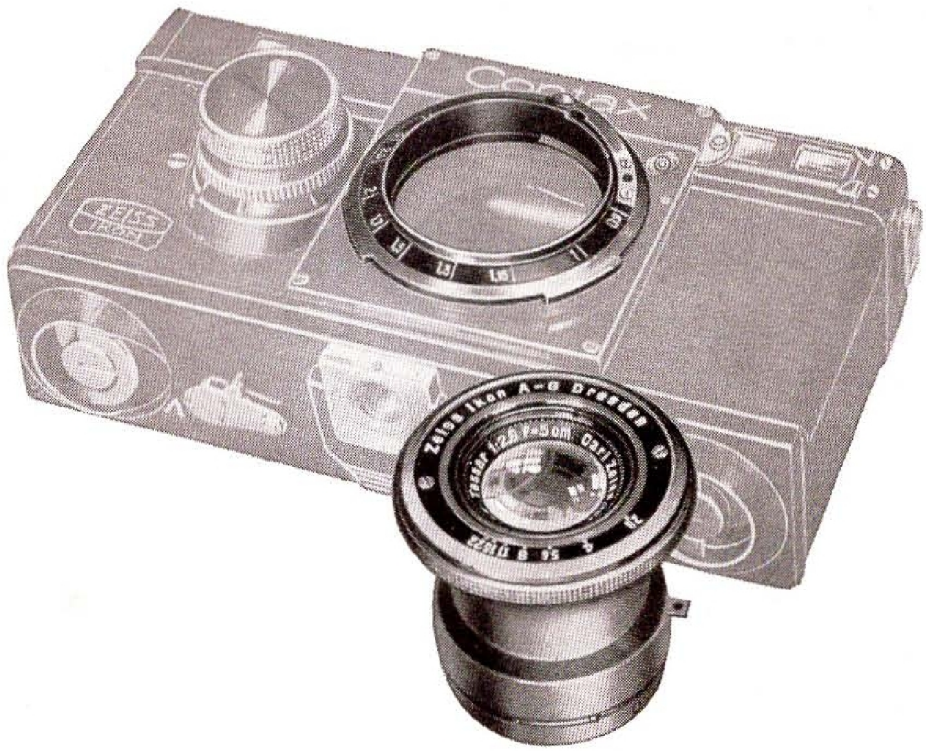


Fig. 14. Contax showing interchangeability of lenses

successfully for years in cine cameras as used in the film industry. As the outcome of the practical experience gained in this industry, bayonet mounts affording both rapid change and extreme accuracy as regards the distance between lens and focal plane, can be fitted to the Contax. Every Contax lens is securely and rigidly fixed to the camera and yet can be changed in the space of a few seconds; at the same time absolute accuracy of focus is ensured.

6. The lenses of the Contax

The standard optical equipment of the Contax is the excellent

Miniature Tessar,

made by Carl Zeiss, Jena. This lens has a focal length of 2 ins. and can be supplied of aperture either *f*/3.5 or *f*/2.8.

Both these Tessars represent an optical construction, calculated specially for the Contax picture size and



Fig. 15
The Contax-Tessar Lenses

optically corrected to a high degree. They are fitted to the camera by means of a countersunk bayonet mount.
The quality of the Zeiss Tessars is so well-known all over the world that any comments regarding their optical performance and advantages are superfluous.

A further Carl Zeiss lens designed specially for the Contax is the new rapid

Sonnar

The standard Sonnar also has a focal length of 2 ins.



Fig. 16
The Contax Sonnar Lenses

The Sonnar represents a masterpiece of German optical skill and can be supplied in four types:

a rapid universal lens *f*/2,
focal length, 2 ins.

a super-rapid lens *f*/1.5,
focal length, 2 ins.

a rapid long-focus lens *f*/2,
focal length, $3^3/_8$ ins. (8.5 cm.)

a long-focus lens *f*/4,
focal length, $5^3/_8$ ins. (13.5 cm.)

The Sonnar lenses will probably be new to most photographers. A detailed description is in course of preparation.

The Sonnar lens is characterised by three separate air-spaced elements, the first and last of which act as con-

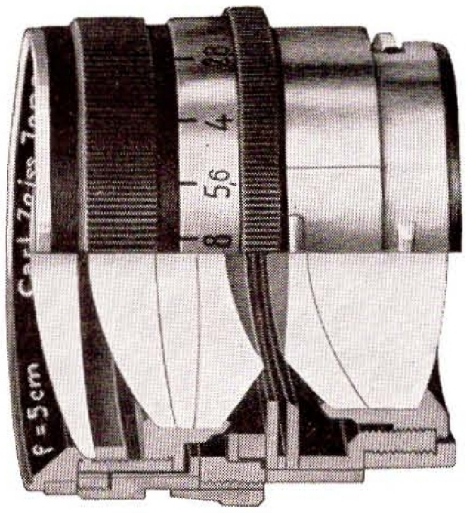


Fig. 17. Section through the *f*/2 Sonnar

verging lenses whilst the central element is in form of a meniscus, curved towards the object. This fundamental construction of the Sonnar which embodies six glass-air surfaces is maintained in all cases, whether 4, 6 or 7 single lenses are employed, according to the desired rapidity or focal length. A characteristic feature of the Sonnar is the short camera extension required, i. e. the small distance between front lens and focal plane of the film. In the case of the universal *f*/2 Sonnar, for example, the distance between the film and the front lens is only about 1.15 times the focal length when the camera is set to infinity. This fact is of great advantage, inasmuch as

the Sonnars project to only a slight extent from the camera front.

The *f*/2 Sonnar of $3^3/_8$ ins. (8.5 cm.) focal length and *f*/4 of $5^3/_8$ ins. (13.5 cm.) focal length are long-focus lenses covering a relatively very small image field. They have been specially designed for the Contax, and their optical correction is based exclusively upon the Contax picture size of 24×36 mm. This has enabled an extremely high degree of optical definition to be obtained over the relatively very small angle of view.

The characteristics of the Sonnars are such that this lens represents an ideal design for the above purpose. The short extension which is a typical feature of the Sonnar class of lenses is specially marked in the case of the long-focus Sonnar of 13.5 cm. ($5^3/_8$ ins.) focal length where the distance between film and front lens is only about 0.9 times the focal length at the infinity setting.

All other lenses supplied with the Contax, which are also made in bayonet mounts, are well-known models made by Carl Zeiss, Jena. They, therefore, require no further introduction. The lenses in question are

the Tessar, Biotar, Triotar and Tele-Tessar.

Of the various Contax lenses enumerated below, special attention is drawn to the typical wide-angle lens, the *f*/8 Zeiss Tessar of 2.8 cm. ($1^1/_8$ ins.) focal length, where the focal length is considerably shorter than the length of the negative.

The following lenses, made by Carl Zeiss, Jena, are available for the Contax in bayonet mounts:

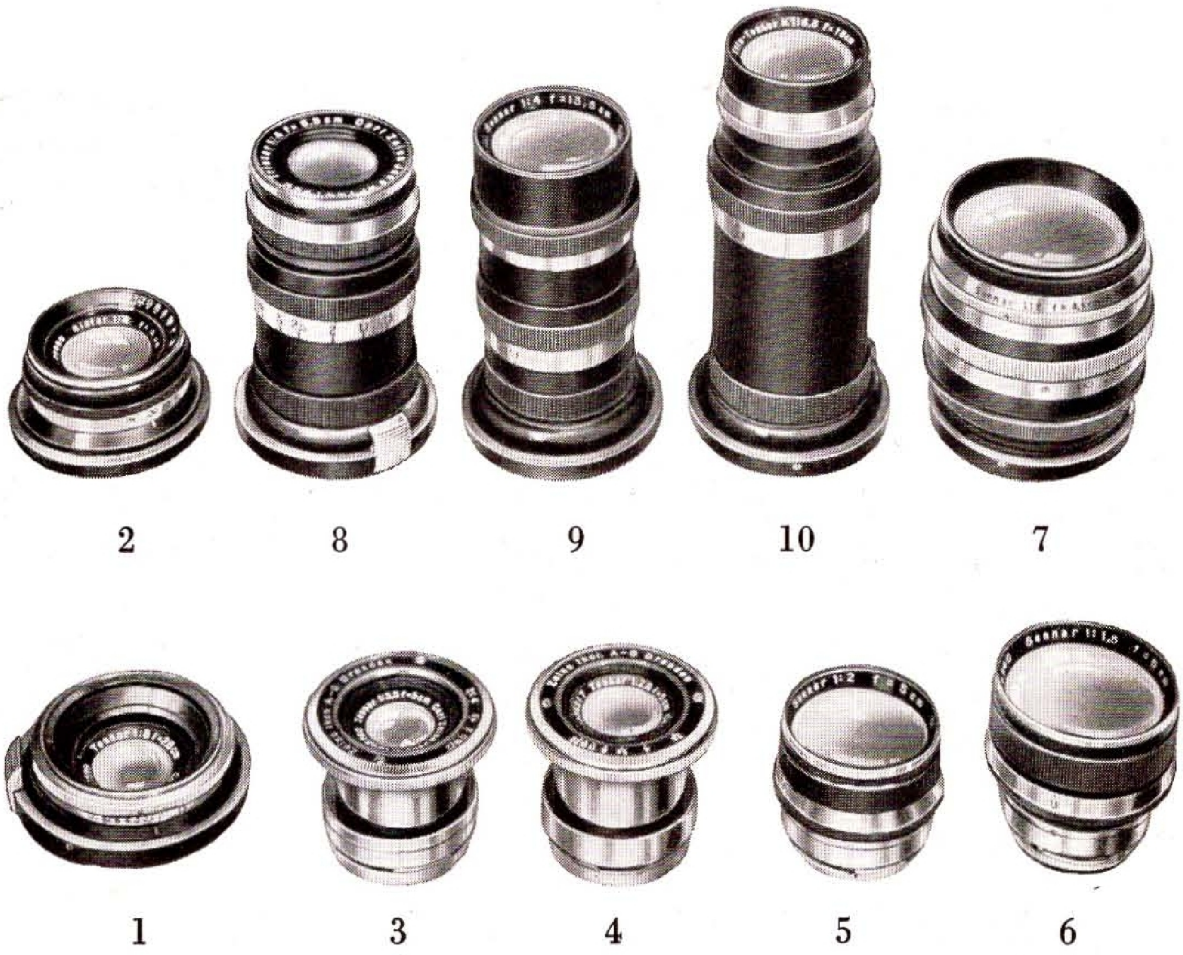


Fig. 18. Contax Lenses

				Angle of View
1. Tessar*	$f/8$	focal length = 2.8 cm	$1^1/_8''$	75°
2. Biotar	$f/2$	focal length = 4 cm	$1^5/_8''$	55°
3. Tessar	$f/3.5$	focal length = 5 cm	$2''$	45°
4. Tessar	$f/2.8$	focal length = 5 cm	$2''$	45°
5. Sonnar	$f/2$	focal length = 5 cm	$2''$	45°
6. Sonnar	$f/1.5$	focal length = 5 cm	$2''$	45°
7. Sonnar	$f/2$	focal length = 8.5 cm	$3^3/_8''$	28°
8. Triotar	$f/4$	focal length = 8.5 cm	$3^3/_8''$	28°
9. Sonnar	$f/4$	focal length = 13.5 cm	$5^3/_8''$	18,4°
10. Tele-Tessar K	$f/6.3$	focal length = 18 cm	$7^1/_8''$	13,6°

* The Tessar of $1^1/_8$ ins. (2.8 cm.) focal length is not coupled automatically with the range finder of the Contax.

The above-mentioned lenses are standard models, made in series for the Contax. For special purposes, however, as, for example, scientific photography for expeditions etc. special lenses can be supplied for the Contax, such as Tessars of 30 to 50 cm. focal length (12 to 20 ins.).

With the standard Contax lenses the well-known Proxar lenses, made by Carl Zeiss, Jena, can be employed to reduce the focal length, thus enabling a considerably larger scale of reproduction to be obtained at shorter distances. These lenses are especially valuable for close-up photography.

Also, for all Contax lenses, yellow filters of various densities, graduated filters and sky-shades can be supplied.

7. The Contax View-Finders

The view-finder forming part of the Contax shows the objects to be taken on a reduced scale. Optically it represents a reversed Galilean telescope with a reduction ratio of about 1:2. The image obtained is very bright and brilliant, with clear definition right up to the corners. It corresponds to the angle of view of a lens of 2 ins. focal length. A detailed description of the view-finder is superfluous, as this type of instrument will be well-known to all photographers.

When using long-focus lenses, a small metal mask with a smaller opening corresponding to the amount of image formed by the lens can be employed. Normally every Contax is supplied with a sliding mask of this kind, designed for lenses of 8.5 cm. focal length. For Contax lenses of other focal lengths, the corresponding masks are always supplied with the lens.

It should be mentioned that the amount of subject seen in the range-finder of the Contax corresponds more or less exactly with that of a long-focus lens of 13.5 cm. focal length.

An entirely new type of view-finder is the Contax «Albada» view-finder as shown in fig. 19. In view of the novel design, a few words regarding the principle and working of this view-finder will not be out of place.

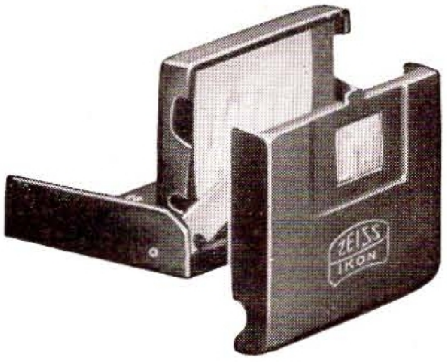


Fig. 19
Contax «Albada» View-Finder

A special feature is the fact that the image is seen through this view-finder in actual size and not on a smaller scale. To all with experience of sports photography and photography of rapidly moving objects, the difficulty of estimating the distance of objects from the camera, when optical view-finders giving a reduced-scale image are used, will be well-known. With such view-finders, where the image is seen of only half size, the impression is obtained that the distance from the object to the camera is double the actual distance. The reduced scale also makes it difficult to judge space correctly. For example, when employing a view-finder giving a reduced image, it is by no means easy to determine exactly when a motor cycle travelling at full speed passes a certain point on which the camera is focussed. It is a well-known fact that the spatial impression, with the corresponding correct judgment of distance, can only be obtained with both eyes opened. Using both eyes, it is of course necessary for the view-finder to give a natural size image so that the image seen by the one eye through the view-finder corresponds to that seen through the other eye, thus giving the desired plastic effect. Apart from fulfilling this very important condition, the «Albada» view-finder of the Contax also has a further great

advantage. One of the serious disadvantages of many optical view-finders, for example the well-known brilliant view-finder, is the fact that the image is reversed as regards right and left, whereby confusion can easily be caused, especially when taking rapidly moving objects. The Contax «Albada» view-finder, however, has no reversing effect; the view is seen clearly framed and also unreversed.

The manner in which the field of view is framed is also of a novel character. By means of a semi-silvered lens, a white frame line is projected into the eye, so that one gains the impression that a real boundary line actually exists in the scene or view which is being taken. This is the only method which enables both the object and the boundary line to be viewed simultaneously with equal sharpness.

The view-finder as described above can be used for a variety of purposes. It can also be employed as a uni-

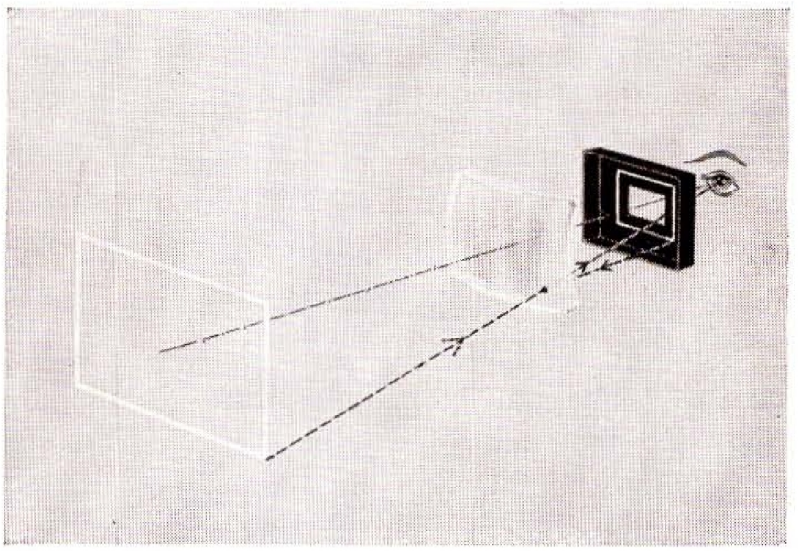


Fig. 20
Diagrammatic sketch of «Albada» Finder

versal view-finder for the various focal lengths of the standard Contax lenses. In addition to the ordinary standard view-finder model for lenses of 5 cm. focal length, it can be supplied as a double-field

view-finder either for 5 and 8.5 cm. or 5 and 13.5 cm. focal lengths.

For special purposes the Contax can also be employed with a small telescopic view-finder which can either



Fig. 21
Contax Vertical Telescopic View-Finder

be used vertically or as an angle view-finder. For many kinds of photography, e. g. children and snapshots of animals, the required perspective may make it necessary to hold the camera as low as possible, in which case the use of the vertical view-finder as shown in fig. 21 is recommended.

It shows the object to be taken on a reduced scale. The field of view is clearly shown by the margins. Optically it can be described as a small telescope which, by use of prisms, gives a reduced non-reversed image. When used as an angle view-finder, it will also give a similar but vertical image.

Further optical view-finders for the Contax are at present in course of preparation. A special catalogue, dealing with other models, will be issued in due course.

8. Focussing

In the preceeding pages mention has been made of the care taken to ensure the highest possible degree of

sharpness in the Contax negatives by the use of lenses with special optical correction, careful adjustment of the lenses in their mounts and accurate design and construction of the film guide.

All this care, however, would be in vain without an

absolutely accurate focussing mechanism,

permitting the lenses to be focussed on the respective distances. To attain this end, new methods had to be employed. Hitherto focussing has generally been based upon a more or less accurate estimation of the distance between camera and object and by setting the distance scale of the camera accordingly. This primitive method is neither sufficiently accurate nor reliable for miniature pictures which are subsequently to be enlarged. Nevertheless, miniature camera designers have maintained this procedure on the assumption that the relatively large hyperfocal distance (depth of focus) of the short-focus lenses employed permitted a certain limit of error.

In this connection, at the risk of repetition, a few words regarding the term "hyperfocal distance" may once again be said. Within the region of the depth of focus which depends upon the aperture and focal length of the lens, there is by no means the same sharpness throughout. The maximum sharpness of focus always lies at a certain definite plane within the entire range of focus. If, however, the absolute maximum of sharpness of focus is required, it is absolutely necessary to ensure the lens being focussed on the above-mentioned plane.

While there are many photographers who maintain that they can judge distances with a high degree of accuracy, this method is very unreliable, especially in strange surroundings, and will usually lead to errors where great



Photo by Franz Fiedler
Midday, January, 1 sec. by daylight with $f/4$ $5^3/_8$ inch. Sonnar at $f/8$

accuracy of focussing is necessary, e. g. at short distances. Moreover, lenses of very large aperture or great focal length possess small depth of focus, so that more accurate methods of focussing are essential.

The ideal method of avoiding errors of focus can only be obtained by automatically coupling the focussing mechanism of the lens with an accurate range-finder, as embodied in the Contax design. The Contax range-finder permits any distance to be determined with absolute accuracy, and moreover ensures

automatic sharp focussing of the lens

on the respective distance.

9. The Contax Range-Finder

The employment of an optical range-finder automatically coupled with the focussing mechanism of the lens ensures the utmost precision in obtaining sharp focus.

The degree of accuracy of an optical range-finder depends principally upon the length of the so-called optical base. For military purposes, range-finders with a base of 30 ft. and more are used in order to obtain great accuracy over long ranges. For photography, considerably shorter distances have to be determined, but the ideal range-finder must also be designed with as long an optical base as possible for photographic purposes.

The Contax is equipped with a range-finder of approx. 4 ins. base length.

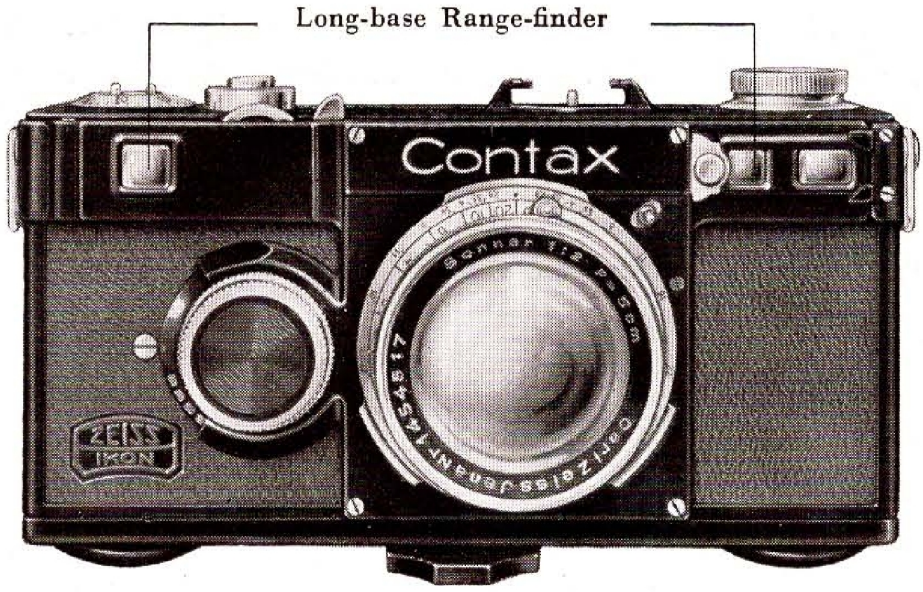


Fig. 22. Contax Long-base Range-finder

With an instrument of this description, the accuracy is twice that with a range-finder having a 2-ins. base. The high degree of accuracy of the Contax range-finder represents an essential feature of a high-class miniature camera. For all standard Contax lenses, of both large aperture and great focal length, the range-finder works equally accurately.

Special attention is drawn to the fact that the range-finder of the Contax is embodied in the construction, being located in the interior of the camera body. It extends practically along the entire length of the body and is so built in that it is securely protected against damage.

A further important advantage of the Contax range-finder is the fact that it gives an extremely bright and brilliant image. As is probably known, an optical range-finder gives two separate images of the object or scene viewed. By means of the mechanism

provided, these images are moved relatively to each other until they are superimposed and correspond with each other. If the two images, namely the large main image and the small central image, were of the same colour, they would be very difficult to distinguish, and moreover, it would be difficult to distinguish with certainty when two images of exactly the same colour are superimposed, for which reason the two images are given different colours.

Hitherto, this has usually been done by putting a tinted glass in front of one of the two images, generally the larger main image. In this manner the brighter central image stood out from its surroundings more clearly and could easily be distinguished. The use of a tinted glass has, however, the disadvantage of causing considerable loss of light through absorption. This loss amounts to at least 50% and therefore represents a disadvantage greatly decreasing the efficiency of the range-finder.

The two conditions which a range-finder must fulfil, namely easy and clear distinction of the two images and exact superimposition, have been obtained in the case of the Contax in an ingenious manner by the employment of a semi-transparent gilded mirror which possesses the property of giving a green colour to the light passing through the mirror, whereas the reflected light is coloured red. This phenomenon is based upon the fact that the colour of light passing through a very thin metallic layer is complementary to the colour of the light reflected by the layer. The colours into which white light is split up by a semi-transparent gold coating (mirror) are red and green which, as is well-known, are complementary colours, and, when mixed, form white again. Therefore, owing to the fact that the dividing mirror of the Contax range-finder is provided

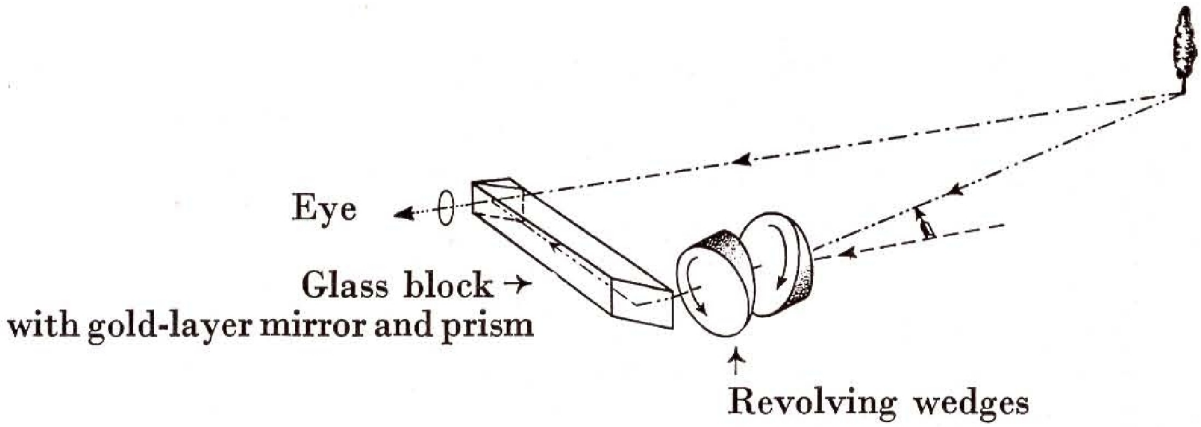


Fig. 23. Diagram of the Range-finder

with an extremely thin layer of gold, the further advantage is obtained, that the objects in

the image will be seen in nearly natural colours,

in the central field, the moment the two different coloured images are superimposed, this being due to the re-union of the two complementary colours.

This fact is specially important, as it guarantees an extremely high degree of accuracy in focussing.

The built-in gold mirror therefore gives the image the necessary colours without the slightest loss by absorption which would ensue if a tinted glass were used. By splitting up the light received from the object or scene at which the range-finder is pointed into green and red light, the two bright images can be clearly discerned. The advantages of the gold mirror are of special importance when taking photographs in artificial light which

always has a certain yellow tint. With a range-finder employing a yellow tinted glass, difficulties would be experienced when working in artificial light. By means of the gold mirror, however, which divides every colour into two complementaries, the Contax range-finder will give exact results independently of the prevailing illumination. The gold mirror is extremely durable and not subject to deterioration.

The accuracy of the Contax range-finder is so considerable that, for example, when taking portraits at a distance of about $4^1/_2$ ft. (when using a long-focus lens), it is possible to determine the difference in distance between ears, eyes and nose. If the angle of view of the range-finder were larger, so that the entire head could be seen in the double image, this would be liable to cause confusion. If, for example, the range-finder were set to the eyes of the person to be photographed, the nose and ear would be seen double, whereas, vice versa the setting of the range-finder, say, to the nose would cause double images of the eyes and ears to be seen. In order to prevent such confusion, caused by the high degree of accuracy which enables even small differences in distance to be discerned, the field of view of the red image has been reduced in size, so that only the

part of the entire picture which is to be reproduced with maximum sharpness

is visible.

Such precautions are only necessary with range-finders recording with great accuracy.

In spite of the reduction in size of the central field, made necessary, as explained above, by the accuracy of the range-finder, it is extremely easy to find the double image at a glance. If the range-finder is set to infinity, and it is desired to photograph an object close to the camera, it is only necessary to give the camera a slight swing to the left. The red double image will immediately be visible in the range-finder. The instructions for use of the Contax give a detailed and exact description how to operate the range-finder in the best possible manner, so that further details here are unnecessary.

For the photographer, a built-in exact range-finder is itself an almost ideal feature of the camera. The advantages are, however, greatly increased by the

automatic coupling of the range-finder to the focussing mount of the lens.

This means that at the instant that the two images in the range-finder correspond with each other, the

lens will be focussed with the most extreme accuracy

on the right distance. It is therefore not even necessary to read off the distance shown by the range-finder. The idea of coupling a range-finder with the lens is by no means new; there are patents as old as 30 years that

deal with designs of this kind. Their practical use, however, has been hampered by the difficult mechanical conditions which had to be fulfilled.

The ingenious design of the Contax has enabled all difficulties, both mechanical and optical, to be overcome, with the result that it has been practicable to fit the Contax with an automatic focussing device coupled directly to the range-finder.

10. The Automatic Focussing Device of the Contax

In designing the focussing mechanism of the Contax two most important points had to be considered: The highest possible accuracy of the mechanical parts and their insensitivity to external shocks of all kinds. The latter is especially important, since if shock or climatic influences were able to affect the coupling between lens and meter correct focus could not be obtained.

The following special construction was therefore decided on. The "base" of the meter consists of a glass block, carrying at one end a silvered mirror, and at the other a partly transparent gold one. These two mirrors are fixed rigidly at all times, and the alteration of the angle of the meter is done by revolving two circular wedges in front of the silvered mirror. This construction is very exact optically, and a very small difference in the object distance necessitates a considerable movement of the circular wedges. The coupling of these wedges to the lens mount must naturally also be equally accurate, and

Photo by Keidel
May, daylight
$^1/_{200}$ sec. with $f/3.5$ Tessar
at $f/5.6$
Yellow filter, medium

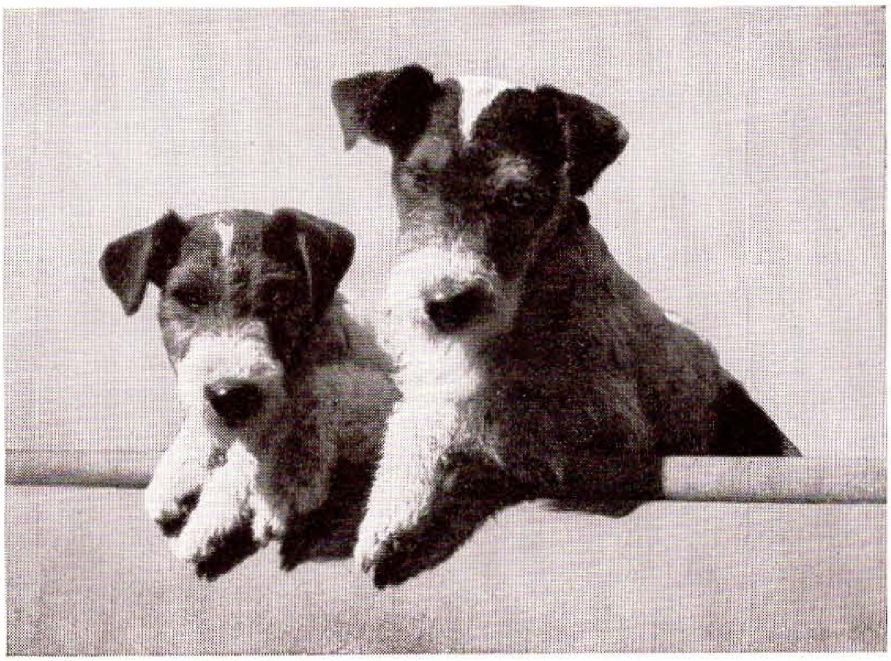




Photo by Mietzl
Dull weather, January
4 ft. from window
$^1/_{25}$ sec. with $f/2$ Sonnar

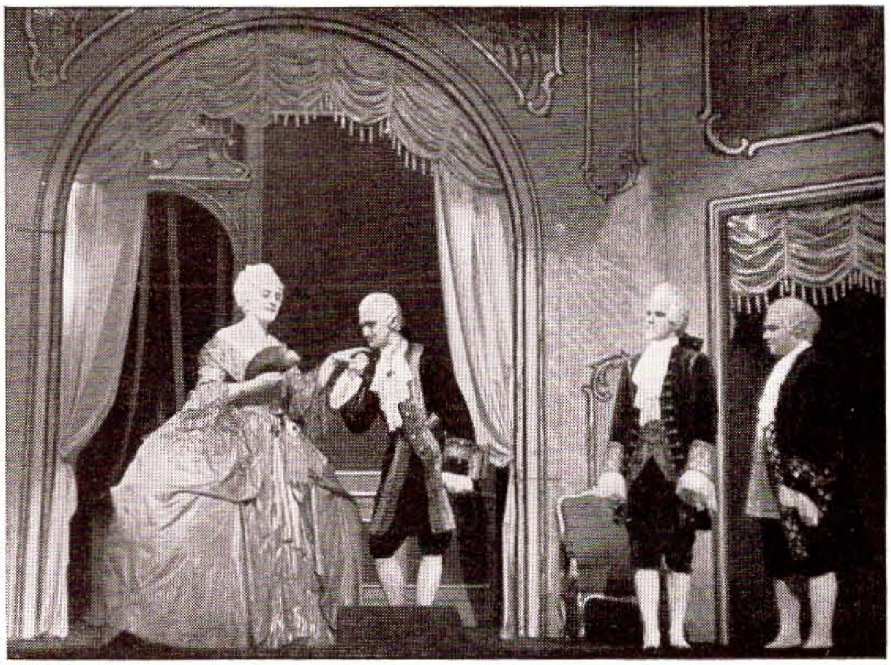


Photo by Heyne
$^1/_{25}$ sec. with $f/2$ Sonnar



Photo by H. Kammerer
Contax, Sonnar *f*/1,5, 1000 Wattlamp, at 10 ft, $^1/_{25}$ sec.

in the Contax the movement of the lens for focussing revolves the wedges by means of a gear and toothed rack.

In this manner, every possible lens position corresponds to a certain position of the wedges, which in its turn, by virtue of optical laws, corresponds to a certain distance of the subject.

Focussing

is effected by first moving the lens by means of a small disc. The connecting lever transmits the motion of the lens to the mirror of the range-finder, and a corresponding motion of the double image will be seen through the sight of the range-finder.

The lens is moved in its mount by turning the disc until the two images seen in the range-finder coincide exactly. Assuming this to be the case when the camera is pointed at an object at a distance of 15 feet, the lens will be focussed sharply on this distance with the greatest accuracy. Reliable and accurate working of the delicate mechanism can only be ensured by securely protecting all parts against damage. For this reason, all moving parts are located in the interior of the camera, any danger of damage being thus avoided.

In this connection it is important to mention that the Contax lenses can be changed without altering the relative positions of the focussing mechanism. Even after removal of the lens, the position of the wedges in the interior of the Contax remains unchanged.

Hence it is always possible to use the range-finder even when the lens has been removed from the camera, or, what is more important, to measure distances even

when a special lens, not coupled directly with the range-finder, is used in the Contax. In such cases, the distance scale of the special lens is set to the distance determined by the range-finder.

11. The Contax All-metal Focal-plane Shutter

In addition to the lens, film guide and reliable focussing mechanism, the shutter of a camera is of paramount importance.

The Contax is fitted with a focal-plane shutter. For a truly universal camera such as the Contax, no other type of shutter could be employed; only a focal-plane shutter allows of the shortest possible exposures and the best possible use of the light entering through the camera lens as the shutter moves directly in front of the film.

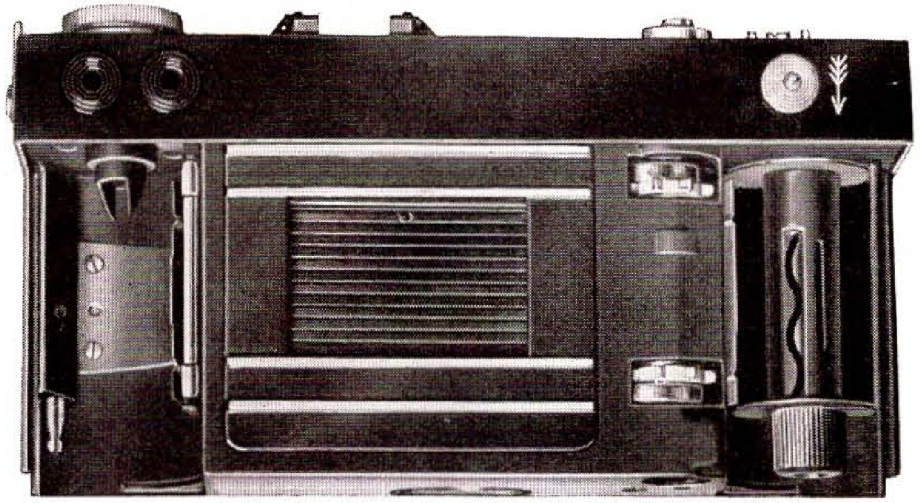


Fig. 24. Contax Focal-plane Shutter, closed

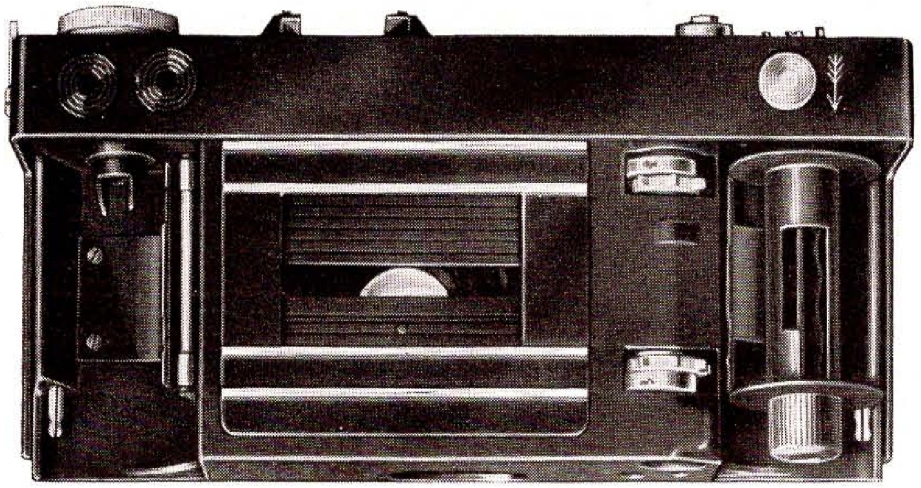


Fig. 25. Contax Focal-plane Shutter, opened

The Zeiss Ikon A.-G., in which old-established and well-known camera works, such as Contessa-Nettel, Ernemann, C. P. Goerz and Ica are amalgamated, can claim to be the world's oldest and most experienced makers of special focal-plane shutters.

The first focal-plane shutter ever made, invented in 1882 by Ottomar Anschütz, was made by C. P. Goerz, now part of the Zeiss Ikon A.-G. The Zeiss Ikon Miroflex and Nettel cameras, with focal-plane shutters, enjoy international repute. There can, therefore, be no doubt regarding the long years of highly specialised experience of the Zeiss Ikon A.-G. in connection with the difficult design and construction of focal-plane shutters.

Needless to say, the focal-plane shutter with which the Contax has been equipped is fully in keeping with the high quality and precision of every part of the camera in other respects and represents the last word in shutter design.

For obvious reasons the focal-plane shutter of the Contax is

coupled automatically with the film feed mechanism.

The winding of the shutter automatically causes the film to move on to the extent of one picture. An absolute guarantee against double exposure is therefore ensured*.

Of special interest in connection with the focal-plane shutter is the material of which the blind is made. The employment of rubber cloth has been purposely avoided, as experience has shown that this material is subject to rapid deterioration under adverse climatic conditions. Even in the course of 30 years of careful experiments, it has not been possible to find a rubber cloth which could be said to be perfectly reliable, and efficient after a few years' use; every rubber cloth tends to break and crack in the course of time.

In order to overcome these disadvantages connected with rubber cloth, the Zeiss Ikon A.-G. had some years ago commenced the design and construction of focal-plane shutters with all-metal blinds. How far these efforts date back is shown by the numerous patents of the Zeiss Ikon A.-G. dealing with this construction.

The Contax focal-plane shutter is thus the result of long years of scientific and technical research, both as regards the general design and the material employed. The two flexible and exceedingly light all-metal blinds are in every way equal to the rubber cloth as regards lightness and flexibility, and are considerably superior by virtue of their unlimited durability and resistance to high and low temperature, damp and mechanical wear and tear.

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* If required, however, it is also possible to subject the film to any number of consecutive exposures.

The focal-plane shutter of the Contax can, moreover, be set to the required time of exposure either before or after winding. Hence it is of universal adjustability and at the same time is a preventive of wrong exposures, since the device by which the speed is set remains always in the same position on the speed scale.

The external form of the shutter likewise calls for special mention. During the operation of the shutter, that is to

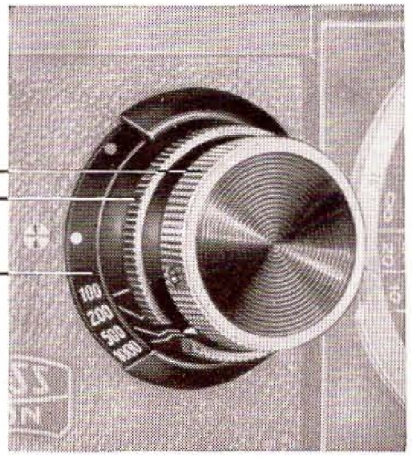

Fig. 26. Shutter winding key

say whilst the slit traverses and exposes the sensitive surface, there is no movement of any external part on the body of the Contax. For this reason it is quite impossible, by accidentally touching a moving external part, to brake the shutter whilst in operation and so unconsciously cause a wrong exposure.

Unfortunately the effects of such errors in exposure are not usually detected until the negative has been developed, when, most usually, there is no further opportunity to repeat the exposure which has been spoilt.

Inasmuch as the type of exposure given by a focal-plane shutter is essentially different from that when using a diaphragm or lens shutter, a few words may be said concerning the phenomena which take place when photographing subjects with focal-plane shutters.

As is well-known, with rapid exposures, the width of the slit is considerably smaller than the dimension of the negative traversed by the slit. Inasmuch as the slit of the focal-plane shutter passes over the sensitive surface with great speed when photographing a subject, the shutter has the property (in consequence of the narrow width of the slit) of exposing the various points in the image of the object not simultaneously but in succession. It will, of course, be understood that this is the case with any focal-plane shutter of whatever construction.

The diaphragm shutter, on the other hand, exposes all parts of the image at the same instant. In the case of still objects these different modes of action of the two shutters are without effect on the correct representation of the subject photographed, for a completely correct undistorted image is impressed on the sensitive surface in both cases. But in using a focal-plane shutter for an object in very rapid movement, the image of the latter alters its position on the sensitive surface within the time which elapses before all the points of the object have been photographed in succession.

Consequently the result with, as has been said, any focal-plane shutter, is a slight distortion of the "drawing" in the case of objects in very rapid movement.

The magnitude of the distortion which arises in this manner should not, however, be regarded as excessive. It is noticeable, for example, in photographs of racing motor cars, photographed at high speed and fairly close to the camera. In such cases, if the course traversed by the blind of the shutter is at right angles to the direction of movement of the vehicle, the wheels of the latter are shown drawn out forwards to an inclined elliptical shape. This same kind of distortion is employed deliber-

ately by many draughtsmen and painters as a means of conveying the impression of the most rapid movement of such vehicles. Persons looking at drawings of this kind are quite accustomed to accepting this form of representation as signifying extreme rapidity of movement. So it comes about that this device of distortion, which can be said to be derived from what occurs in photography, is adopted by draughtsmen and is accepted by the majority of people, when they see it, as perfectly "right".

It will be plain that similar elliptical distortion of wheels is obtained even when, in taking the photograph, the direction of movement of the slit corresponds with that of the object or is exactly opposite to it.

It is beyond the scope of these notes to enter upon a discussion of the magnitude and kind of the distortion which may occur under the various conditions under which subjects may be photographed.

It must suffice to say that for a given set of conditions (scale of reproduction, speed of the object and direction of movement relatively to the optical axis of the lens) the distortion becomes less the shorter the time required for the slit to traverse the entire sensitive surface. For this reason almost all focal-plane shutters are made so that the slit moves over the shorter side of the plate or film, so as to keep the time of exposure for the whole negative as short as possible. Needless to say, in the case of the Contax shutter, the slit is arranged to move over the shorter side of the picture space, for the reason already given.

When photographing moving objects the exposure may be shortened without altering the width of the slit by, so to speak, "opposing" the camera to the subject,

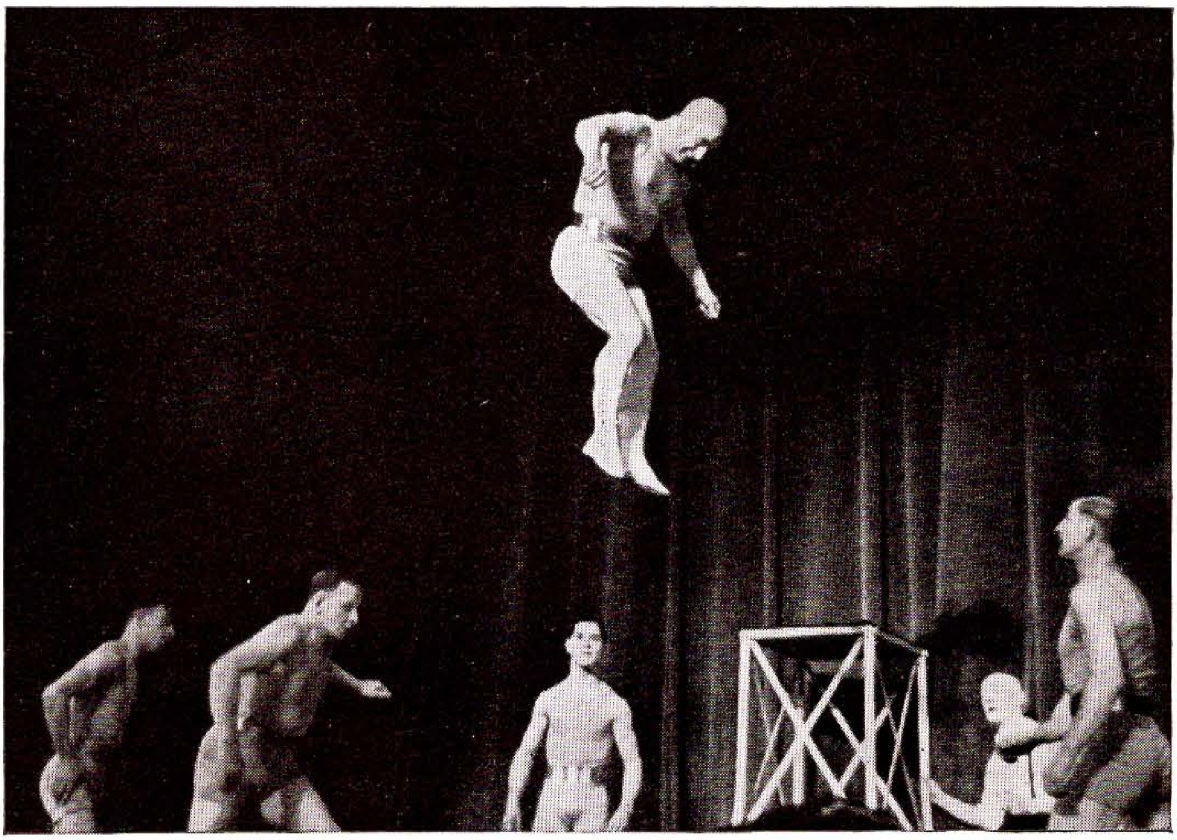

Photo by Dr. Kross
$^1/_{200}$ sec. by floodlight with *f*/1.5 Sonnar

that is to say holding the camera when making the exposure so that the course traversed by the slit is the same as the direction in which the object is moving.

The exposure is somewhat shorter, since the image of the object then moves on the sensitive surface in the direction opposite to that of the movement of the slit. But no very great advantage can be expected from this "opposing" method; the shortening of exposure actually obtained in this way amounts to only a few per cent. Reduction of the time of exposure to, say, one-half of that to which the shutter is set, e. g. from $^1/_{500}$ sec. to $^1/_{1000}$ sec. cannot be attained by this means. In cases where it is necessary to make an instantaneous exposure as short as possible, so as to avoid blurring from movement of the image, the only really effective means consists in

setting the speed of the shutter considerably higher, that is to say to $^1/_{1000}$ sec. instead of $^1/_{500}$ sec.

With the Contax shutter there is the advantage that

exposures may be as short as $^1/_{1000}$ sec.

As the outcome of an important feature of the construction — the two blinds of the shutter are coupled together — it is possible to set, with extreme accuracy, such narrow slits as are required for the very shortest exposures and at the same time to be certain that the width of the slit so set does not alter during the operation of the shutter.

Then again in the latest model of the Contax shutter, exposures, in addition to those made by "time", can be given with the camera held in the hand down to $^1/_5$ or even $^1/_2$ second.*

A further great convenience in the operation of the shutter is the division of the times of exposure into four groups.

$^1/_{1000}$, $^1/_{500}$, $^1/_{200}$, $^1/_{100}$: "Sports Group" for subjects in extremely rapid movement.

$^1/_{100}$, $^1/_{50}$, $^1/_{25}$: "Normal Group", for all average subjects, pictures in theatres, etc.

$^1/_{10}$, $^1/_5$: "Night Pictures Group", for subjects by more moderate artificial light or by poor daylight or with very small lens-aperture.

$^1/_2$, Z: "Time Group".

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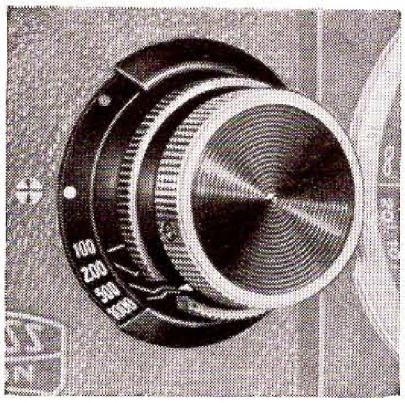
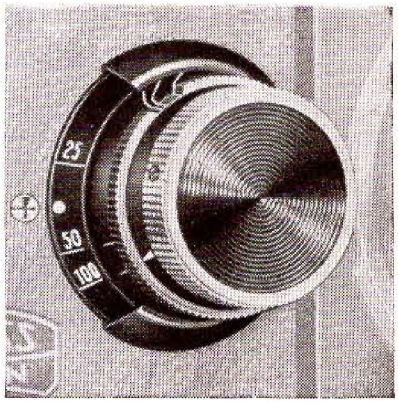
* In the case of the original models instantaneous exposures from $^1/_{10}$th $^1/_2$ sec. were not provided. On request, and at reasonable cost the new shutter can be fitted to cameras previously supplied.

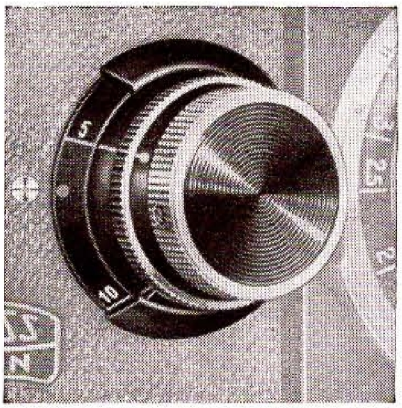
Group I



Group II



Group III



Group IV

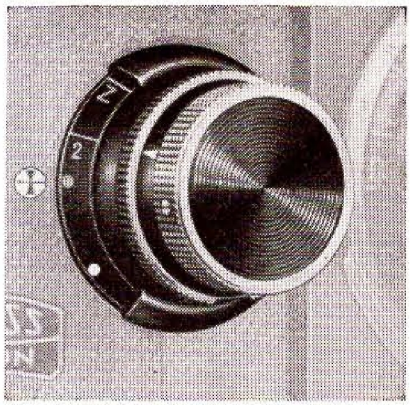


Fig. 27. The Four-Group Shutter

A feature of the shutter at all speed settings is the extremely smooth and quiet running of the blind. Exposures of $^1/_{50}$ or $^1/_{25}$ sec., with the camera held in the hand, exhibit a degree of sharpness not hitherto attained with focal-plane shutters for miniature cameras. The experienced photographer may even employ exposures of $^1/_{10}$ or $^1/_5$ sec. quite readily with the camera held in the hand.

Group IV of the shutter speeds calls for a tripod or some other firm support for the camera, and here also it will be found of special advantage that the shutter runs without the slightest jar so that the camera does not experience any vibration whatever during the exposure.

In short the Four-Group Shutter makes available to the Contax, and its interchangeable lenses, branches of work and kinds of subjects which hitherto have never been brought within the scope of the user of a miniature camera to such a wide degree and with such freedom from practical limitations.

12. Some Hints on Photography with the Contax

In order to make the best use of the numerous technical advantages of the Contax and of the system of taking very small negatives, the amateur should adapt himself to the methods applying to this latter system, which in many respects differ entirely from the fundamental rules of photography as hitherto practised.

The photographer of the old school began by focussing the subject on the ground glass screen. He then adjusted the shutter and lastly the diaphragm, giving preference to a small diaphragm, as by this means his long-focus lens gave the best depth of focus. Of course, the use of a small aperture made it necessary to give correspondingly long exposures.

But with the Contax it is different

Negatives of needle-like sharpness

are expected from a high-grade miniature camera. The Contax fulfils the highest expectations as regards technical performance and efficiency without resorting to the obsolete methods of stopping down the lens and increasing the exposure accordingly. This former method

would be entirely in opposition to the principles upon which the Contax has been designed, and the possibilities afforded by the numerous technical advantages would be greatly limited.

Thanks to these principles, all the preliminary conditions for the attainment of wonderfully sharp negatives have been fulfilled. But the Contax user must adapt himself to the methods of working prescribed by the camera designer, if he would obtain results of the full perfection which is possible. It is a well-known fact that many users of a miniature camera are disappointed with the results obtained, when their miniature snaps are enlarged. In such cases the blame is often, quite wrongly, laid at the door of the camera. In nearly all cases the reason for the unsharpness is a slight movement of the camera during exposure.

This result is very surprising to many photographers, inasmuch as most amateurs, especially those of experience, have obtained apparently perfectly sharp negatives with their $4^1/_4 \times 3^1/_4$ or $3^1/_2 \times 2^1/_2$ ins. cameras when giving exposures of $^1/_{50}$ or even $^1/_{25}$ sec. with the camera held on the hand. If, however, these negatives were to be enlarged to the same scale as is usual with miniature snapshots, it would probably be found that the sharpness of enlargements from negatives taken with a larger camera would not be by any means perfect, also because of slight camera movement.

It should be borne in mind that many miniature cameras are of such small size and small weight that they are difficult to hold as firmly and steadily as a larger camera. On the other hand, it is of extreme importance that the camera be held absolutely steady during exposure if a needle-like sharpness of the negative is to be obtained. For this reason, when using miniature



Photo by Heinz
Midday, August, $^1/_{1000}$ sec. with *f*/2.8 Tessar at full aperture

cameras, the exposure should be as short as possible, and, accordingly, the use of as large a diaphragm as possible is necessary. In this manner, when giving short exposures, it is possible to obtain considerably sharper negatives in spite of the larger aperture than when giving longer exposures and using a small aperture.

The modern photographer using the Contax should therefore make it a rule to employ a large or, at any rate, a medium diaphragm aperture and

to give, if possible, a short exposure.

Certainty of absolute sharpness of the negative is therefore not obtained by stopping down the lens, but by the

more effective and certain method of focussing the lens with absolute accuracy on the object to be taken by means of the range-finder coupled automatically with the lens focussing mount.

In this connection attention is drawn to the fact that the Contax lenses give clear and sharp definition over the entire picture, even at maximum aperture. Moreover, the employment of short-focus lenses ensures a sufficient depth of focus, even when the lenses are only stopped down to a slight extent.

A further very important feature of the Contax is the fact that focussing can be done up to the instant of releasing the shutter. This has been made possible by the following construction:

> *The release button of the shutter is placed next to the setting disc of the range-finder and focussing mechanism.*

The great practical value of this arrangement, which is the subject of a German patent, lies in the fact that it is possible to operate the range-finder with the second finger of the right hand, whilst the first finger of the same hand rests upon the release button of the shutter. It is therefore possible to operate the shutter release the moment the two images seen in the ranger-finder coincide.

In addition to the advantages derived from the convenience and speed with which the release of the shutter follows the focussing, the placing of the two operating elements next to each other has been adopted because of the importance of holding the camera absolutely steady during exposure. The arrangement of the shutter

release knob and the focussing device enables the Contax to be held securely with both hands, whilst only one or two fingers of the right hand are required for operating the camera. The rectangular shape of the Contax body also assists in holding the camera firmly.

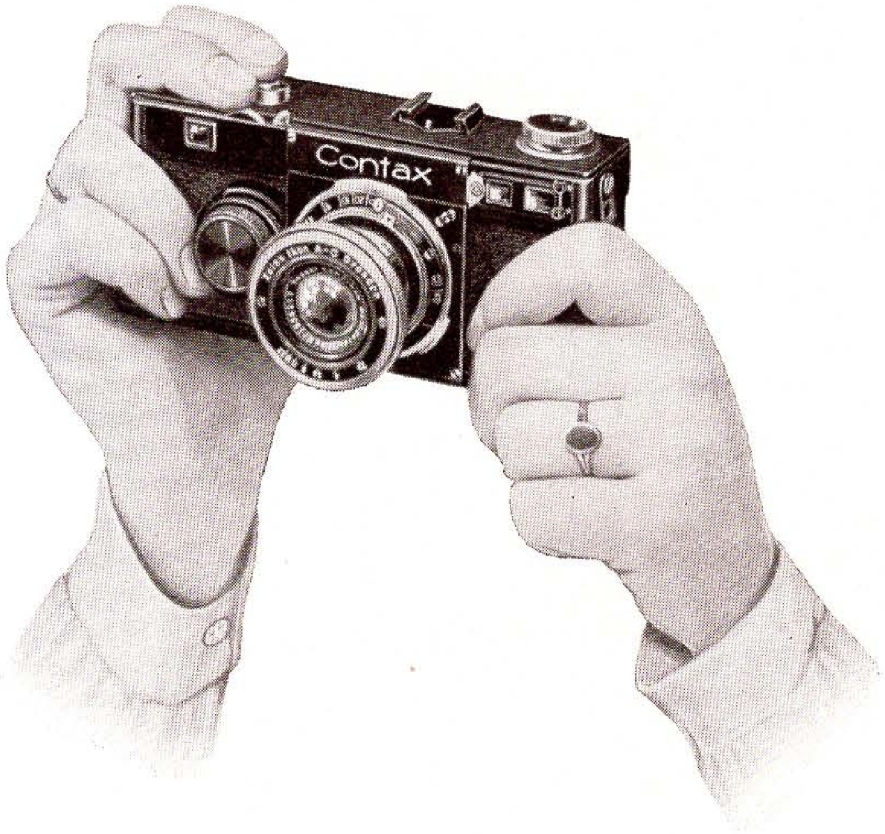


Fig. 28
Position of Fingers Operating Focussing and Shutter-release Mechanism

The Contax represents an entirely new design of camera. The very simple construction is quickly understood, whereupon the numerous technical advantages will be found to allow of obtaining unexcelled results under all conditions.



THE WELL KNOWN AIRMAN G. ACHGELIS
Photo by Franz Fiedler
Taken with $f/2.8$ Tessar at $f/8$, sunshine in summer, $^1/_{50}$ sec.

IV.

CONTAX ACCESSORIES

The Contax camera represents the foundation upon which an entire system of photography can be built up. For this purpose, accessory and auxiliary apparatus can be supplied, enabling the camera to be used for a multitude of scientific and technical purposes.

Among these Contax accessories are devices for making photographic copies, for large-scale photography, photomicrography etc. The accessories also include the Contax ground-glass screen adapter, which can be used as a substitute for focussing, special projection and enlarging apparatus and other fittings, such as the Contax sports view-finder, Contax angle view-finder, developing apparatus, device for testing Contax negatives etc. A special catalogue deals with all these accessories.



Tilting attachment



Ground glass screen adapter



Negative storage box



Developing apparatus

Contax and Accessories

Camera, complete, with wire release, film-core, lens cap and black carrying strap.

No. 540/24 L Contax with Zeiss Tessar *f*/3.5 focal length 5 cm. (2″) .....

No. 540/24 P Contax with Zeiss Tessar *f*/2.8 focal length 5 cm. (2″) .....

No. 540/24 N Contax with Zeiss Sonnar *f*/2 focal length 5 cm. (2″) .....

No. 540/24 J Contax with Zeiss Sonnar *f*/1.5 focal length 5 cm. (2″) .....

Lenses supplied separately

Zeiss Tessar	*f*/3.5	focal length 5 cm. (2″) diameter 27 mm. ($1^1/_{16}$″) .....
Zeiss Tessar	*f*/2.8	focal length 5 cm. (2″) diameter 27 mm. ($1^1/_{16}$″) .....
Zeiss Sonnar	*f*/2	focal length 5 cm. (2″) diameter 42 mm. ($1^5/_8$″) .....
Zeiss Sonnar	*f*/1.5	focal length 5 cm. (2″) diameter 42 mm. ($1^5/_8$″) .....
Zeiss Biotar	*f*/2	focal length 4 cm. ($1^9/_{16}$″) diameter 42 mm. ($1^5/_8$″) .....
Zeiss Tessar	*f*/8	focal length 2.8 cm. ($1^1/_8$″)* diameter 42 mm. ($1^5/_8$″) .....
Zeiss Triotar	*f*/4	focal length 8.5 cm. ($3^3/_8$″) diameter 37 mm. ($1^7/_{16}$″) .....
Zeiss Sonnar	*f*/2	focal length 8.5 cm. ($3^3/_8$″) diameter 51 mm. (2″) .....
Zeiss Sonnar	*f*/4	focal length 13.5 cm. ($5^3/_8$″) diameter 42 mm. ($1^5/_8$″) .....
Zeiss Tele-Tessar K	*f*/6.3	focal length 18 cm. ($7^1/_8$″) diameter 42 mm. ($1^5/_8$″) .....

* Not coupled with the range-finder. Details regarding special lenses on request.

Supplementary lenses, Yellow filters, Sky-shades

Filters, supplementary lenses and sky-shades can be mounted on the camera in succession and used together. The large filter of 42 mm. ($1^5/_8$″) diameter can also be employed for other lenses. With lenses of 27 mm. ($1^1/_{16}$″) diameter, the filter is mounted on the diaphragm ring; for lenses of 37 mm. ($1^7/_{16}$″) diameter an intermediate ring No. 1314/17 must be used.

For lenses, diameter....	27 mm ($1^1/_{16}$″)	37 mm ($1^7/_{16}$″)	42 mm ($1^5/_8$″)	51 mm (2″
Proxar lens for close-ups up to $19^3/_4$″ (50 cm.)	No. 1×27	No. —	No. 1×42	No. —
Proxar lens for close-ups up to 13″ (33 cm.)	2×27	—	2×42	—
Yellow filter (light, medium, dark) ..	1305/1	1305/6	1305/7	1305/8
Graduated yellow filter	1314/7	1314/7	1314/7	—
Intermediate ring	—	—	1314/17	—
Sky-shade	1281/4	1281/8	1281/9	—

Contax-Finders

No. 436/4 Universal finder for $1^1/_8''$ to $5^3/_8''$ focal lengths
No. 436/1 Finder for 2″ to $7^1/_8''$ focal lengths.....
No. 432/3 Special finder for $1^1/_8''$ $f/8$ Zeiss Tessar ...
No. 432/4 Special finder for $1^9/_{16}''$ $f/2$ Zeiss Biotar ...
No. 436/11 Special finder for $7^1/_8''$ $f/6.3$ Zeiss Tele-Tessar
No. 433/24 «Albada»-finder for 2″ focal length.....
No. 433/25 «Albada»-finder for 2″ and $3^3/_8''$ focal lengths
No. 433/26 «Albada»-finder for 2″ and $5^3/_8''$ focal lengths
No. 436/2 Vertical Telescope finder.....
No. 436/5 Prism view-finder .....
No. 436/3 Oblique viewer .....
No. 540/12 Sight correcting lens holder.....

Contax Films

Zeiss Ikon Contax Pernox Film, 24° Scheiner. All Contax films are supplied with a coating, giving complete freedom from halation. The film is numbered consecutively along the edge.

No. 541/2 Contax spool for 36 exposures, for day light loading .....
No. 541/5 Contax spool for 36 exposures, both ends cut ready for use, wound on cardboard core, for dark-room loading .....
No. 541/8 Contax-film in 5-metre lengths, packed in metal tins .....
Also supplied in length of 15, 25 and 30 metres

Leather Cases

No. 1777/5 Soft leather purses with "Zip" fastener, for Contax with Tessar $f/3.5$ or $f/2.8$ .....
No. 1777/10 Soft leather purses with "Zip" fastener, for Contax with Sonnar $f/2$ or $f/1.5$ .....
No. 1777/2 Brown ever-ready case for Contax with Tessar .....
No. 1777/8 Brown ever-ready case for Contax with Sonnar .....
No. 1777/3 Universal case to hold camera, long focus or Tele objective, filter, supplementary lenses, sky shade, spare cassette, and film
No. 1777/6 Case for long focus lens, Triotar $3^3/_8''$ focus or Sonnar $5^1/_4''$ focus, filter and sky shade.
In ordering please state the objective.....
Special cases for Contax and various accessories on request
No. 1777/7 Case for long focus lens Sonnar $f/2$ $3^3/_8''$ focus
No. 1777/1 Rectangular camera case for Contax with Sonnar $f/2$ or $f/1.5$ .....

Various Accessories

No. 540/1	Contax film cassette
No. 540/5	Cassette core
No. 888/1	Spirit level with fitting
No. 1394/6	"Autex" automatic self-release with fitting
No. 1312/23	Special wire-release for time exposures
No. 1628/10	Ball-and-socket joint, for copying, with fitting
No. 1628/11	Tripod intermediate piece, for Contax with leather case
No. 1630/2	Tilting attachment for camera
No. 540/11	Ground-glass screen
No. 5520/6	Ground-glass screen adapter for focussing when using the copying apparatus on page 63

Various Auxiliary Apparatus

No. 541/16	Stencil for cutting Contax films
No. 5425/1	Contax daylight developing apparatus, complete. Developer required about 350 ccm. (about 10 ozs.)
No. 5425/2	Dish, separate
No. 5425/3	Cover, separate
No. 5425/4	Spiral plate, separate
No. 5425/5	Cover plate, separate
No. 3649	Developer for tank No. 5425/1 ($1^3/_4$ ozs.)
No. 2643/24	"Liliput II" Printing frame for single pictures
No. 3097	Negative storage box for 43 film-rolls with index of light-coloured matt wood
No. 3097/1	ditto of stout cardboard
No. 3114/4	Envelope album, containing 120 envelopes for negative or positive Contax strips, each of 6 pictures, with index

Enlarging Apparatus

No. 1411/6	"Helinox" enlarger-printer for enlargements up to $3^1/_2 \times 2^1/_2''$, without lamp
No. 1411/7	ditto for postcards enlargements (9×14 cm.), without lamp
	Special lamps 40 watts 110 or 220 volts
No. 1455	"Magniphot" enlarger, without lamp, without lens; for enlargements the Contax lenses are employed
No. 1454/22	1 pair of plate glass sheets for enlarging wet film strips
	Special lamps 75 watts 110 or 220 volts

Metal folding masking frames for holding the enlarging paper; for pictures with white margins

Size	$3^1/_2 \times 2^1/_2''$	$^1/_4$ pl.	$4^3/_4 \times 3^1/_2''$	$5^1/_2 \times 3^1/_2''$	$6 \times 4''$
No.	2674/3	/5	/7	/8	/9
Size	$6 \times 4^1/_4''$	$^1/_2$ pl.	$7^1/_8 \times 5^1/_8''$	$9^1/_2 \times 7^1/_8''$	$12 \times 9^1/_2''$
No.	2674/26	/27	/11	/20	/21

No. 2674/31 Special folding frame for enlarging Contax pictures to $4^3/_4 \times 3^1/_2''$ .....

No. 1431 "Diabox 0" projection apparatus for lantern slides $2^3/_8 \times 2^3/_8''$ (6×6 cm.) with carrier, 3 frames for lantern slides and $6^1/_2$ ft. flex, without lamp .....

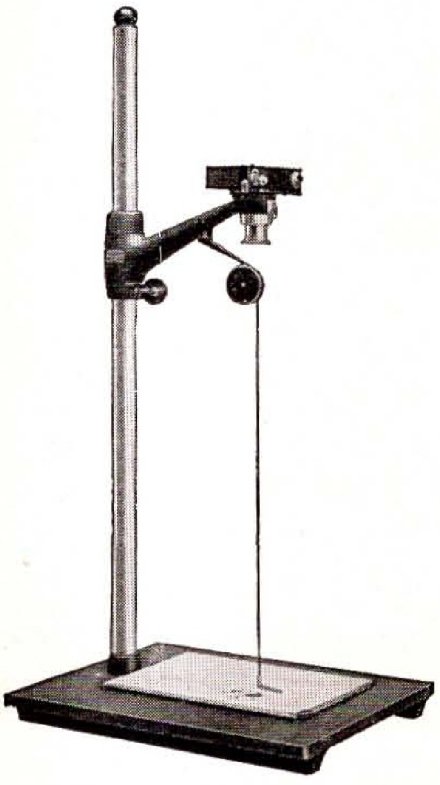
Auxiliary devices for making and storing lantern slides 2×2'' (5×5 cm) and $2^3/_8 \times 2^3/_8''$ (6×6 cm) are described in the booklet "Accessories for Contax photography".

Apparatus for Copying

No. 1454/25 Copying bracket, for use in conjunction with column and base-board of the Magniphot. For use down to half scale (linear) ...

No. 5520/1 Special copying apparatus for reduction to small extent and reproduction of solid objects on scales from $^1/_4$ (linear) to same size

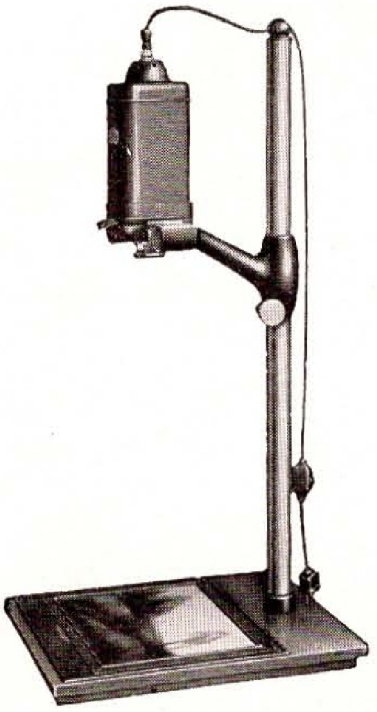
Ask for the detailed booklets "The ten lenses of the Contax" and "Accessories for Contax photography".



Copying bracket



Special copying apparatus



Magniphot enlarger

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