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When inserting the holder a certain amount of care must be exercised to prevent the film from getting scratched. In the first place, only films with an emulsion protecting surface may be used, i. e. films which have a special protective layer over the emulsion. This is the case with most films on the

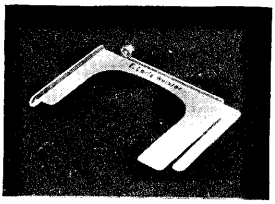

Fig. 36

market, but not, for instance, with diapositive film and infra-red film. The emulsion should further be protected by inserting a piece of blank film together with the holder, holding it before the emulsion. When the holder is firmly inserted, the piece of blank film is slowly withdrawn.

The holder may only be removed from the Leica in the darkroom. First raise the holder a little by means of its small knob, insert a piece of blank film in front of the emulsion and then withdraw the holder.

To hold firmly the pieces of film which are used in this device, our film holder "Fialt" may be used with advantage.

K. The Interchangeable Leica Lenses

Every Leica camera is now fitted with a **lens-changing flange** which makes it possible to interchange lenses of various focal lengths without any difficulty, as the camera as well as the lenses are all standardised. The lenses are simply screwed moderately tight into the changing-flange. In order to ensure accuracy for all time we employ a changing screw flange and not a rapid or bayonet thread. When changing lenses the open camera should not be exposed to bright light but held with the aperture towards the body until the lens is screwed in.

All Leica lenses are high class **Leitz anastigmats** and their optical data are chosen so as to suit various purposes. There is therefore hardly a branch of photography to which the Leica camera cannot be applied with success.

Fig. 37

The following Leica lenses are supplied:

"Leitz-Elmar" F/3.5, 5 cm. focus (standard lens),
"Leitz-Elmar" F/3.5, 3.5 cm. focus (wide-angle lens),
"Leitz-Elmar" F/4.5, 3.5 cm. focus (snapshot lens, without coupling),
"Leitz-Elmar" F/4, 9 cm. focus (portrait and distance lens),
"Leitz-Elmar" F/6.3, 10.5 cm. focus (light distance lens),
"Leitz-Elmar" F/4.5, 13.5 cm. focus (distance lens),
"Leitz-Hektor" F/2.5, 5 cm. focus (rapid universal lens),
"Leitz-Hektor" F/1.9, 7.3 cm. focus (ultra-rapid lens of long focal length),

"Leitz-Hektor" F/4.5, 13.5 cm. focus (distance lens having great resolving power),
"Leitz-Hektor" F/6.3, 2.8 cm. focus (extra wide-angle lens),
"Leitz-Summar" F/2, 5 cm. focus (ultra-rapid universal lens),
"Leitz-Telyt" F/4.5, 20 cm. focus (tele lens with reflex focusing),
"Leitz-Thambar" F/2.2, 9 cm. focus (soft focus portrait lens of great rapidity).

The Standard Lens "Leitz-Elmar" F/3.5, 5 cm. focus. Owing to the favourable choice of focal length and relative aperture, this lens is the most suitable universal lens for small size negative photography, and cannot be displaced by any of the following special lenses, for it has a particularly well graded depth of focus, resulting in a remarkably realistic effect in respect of space. It will therefore always remain the most ideal lens for the majority of amateur photographers.

The tubular socket of the "Leitz-Elmar" 5 cm. lens is pulled out for photographing and locked in a bayonet catch by turning it to the right (clockwise). When the camera is not in use the lens socket is turned to the left and pushed into the camera body.

The "Leitz-Elmar" lens F/3.5, 3.5 cm. focus is intended primarily for architectural photographs. With these it often happens that the practicable distance between the camera and the building is not sufficient to show the latter in its entirety upon the negative. Since the 3.5 cm. lens embraces an angle of nearly 65^0, and the 5 cm. lens only an angle of 48^0, the former has an undoubted advantage over the latter when architectural subjects are to be photographed. The smaller lens is also very useful for interiors. This lens, it should be noted, is mounted in an inextensible tube. We should like to mention that photographs of interiors are possible with long exposures even without a tripod, by holding the camera with its back against a wall. For the 3.5 cm. lens the universal view-finder is used. (Particulars on view-finders will be found on page 45.)

This lens may also be used for photographing general subjects, especially when taking photographs of objects at rapidly changing distances. By this means, one can avoid constantly altering the focus, as the great depth of field resulting from the short focus makes it possible to keep a large depth of field in sharp focus at a constant focal adjustment. For instance, at an aperture F/4.5 and the focus set to 21 ft., the field extends from $9^1/_2$ ft. to infinity. Further data may be obtained from our depth of focus tables.

The "Leitz-Elmar" lens 3.5 cm. focus also has a working aperture of F/3.5, although a slight vignetting effect due to the large aperture and wide angle is removed only by stopping down to 4.5 or 6.3.

The "Leitz-Elmar" F/4.5, 3.5 cm. focus is specially designed as a snapshot lens, as on account of its short focal length and reduced aperture it gives a great depth of focus. The lens is not coupled with the rangefinder and is primarily intended for use with the "Standard" Leica. It can be set to only four fixed distances, 6 ft., 9 ft., 30 ft. and infinity.

The "Leitz-Elmar" Lens F/6.3, 10.5 cm. focus is a relatively small and light distance lens, weighing about 7 ozs., and is particularly favoured by mountaineers. Its lesser aperture is in most cases perfectly sufficient, as when photographing distant views one mostly has to stop down to 6.3 in any case, in order to overcome unsharpness which may arise due to distant haze. Those who demand a greater aperture (implying increased weight and volume) will choose one of the following distance lenses.

The "Leitz-Elmar" Lenses F/4, 9 cm. focus and F/4.5, 13.5 cm. focus are mainly used for photographing distant views, but they are also very suitable for portraits when it is desired to fill the whole negative with head or head and shoulders without the necessity of getting too close to the subject. Owing to the increased working distance they are frequently used to avoid distortion of proportion. These lenses are used with our universal view-finders (see page 45). The image angle for Leica negatives of the "Leitz-Elmar" 9 cm. lens is 27^0 and of the "Leitz-Elmar" lens 13.5 cm. 19^0.

The "Leitz Elmar" lens 13.5 cm. is approximately 5" long and weighs $14^3/_4$ ozs., whilst the "Leitz Elmar" lens 9 cm. measures only 3" and weighs 10 ozs. Where it is required, therefore, to have a distance lens of fairly wide aperture but small size and weight, the latter lens will be preferred.

The "Leitz-Hektor" F/4.5, 13.5. cm covers the same range of application as the "Leitz Elmar" 13.5 cm., but surpasses the latter in that it has a higher resolving power.

When working with these long focal length lenses it is particularly important to keep the camera steady. When using the 13.5 cm. lens the left hand should hold the lens mount from below, in rifle fashion, whilst the right hand should control the release. This should not be done in jerks but by gradually applying pressure as when working the trigger of a rifle. Preferably a tripod stand should be used with this lens, in order to avoid blurred pictures.

The "Leitz-Hektor" lens F/2.5, 5 cm. focus meets the wishes of those Leica photographers who desire to obtain snapshots under unfavourable lighting conditions both out of doors and indoors. The "Leitz-Hektor" lens is not a soft picture producer like many other lenses of this aperture, although it naturally does not quite attain the same crisp definition as the "Leitz-Elmar" lens.

The tubular socket of the "Leitz-Hektor" 5 cm. lens is pulled out for photographing in the same way as the standard lens and locked in a bayonet catch by turning it to the right (clockwise). When the camera is not in use the lens socket is turned to the left and pushed into the camera body.

Fig. 38

The "Leitz-Hektor" F/6.3, 2.8 cm. focus, is purely a wide-angle lens with an angle of image of 76°. Even at the remarkably large aperture for this angle of F/6.3 it gives absolutely sharp negatives entirely free from distortion. We wish to mention particularly that this lens also is coupled with the range-finder, which has not been done before with lenses of this focal length. The relatively great light transmitting capacity of the lens permits of making short instantaneous exposures even under unfavourable lighting conditions.

The "Leitz-Summar" F/2, 5 cm. is a first-class universal lens. Even at full aperture, this lens gives critical definition right to the very corners. The particularly good chromatic correction is especially important in conjunction with the use of modern panchromatic films. The construction of this lens is such that pictures taken with it have a definite plastic effect. The lens is therefore equally suitable for all kinds of artificial light and Press photography as for general amateur photography.

The "Leitz-Summar" is obtainable in collapsible or non-collapsible mount.

The "collapsible Leitz-Summar" has arrows at right angles to each other on the lens socket-tube, for use when pulling out

Fig. 39a. "Leitz-Elmar" lens F/6.3, 10.5 cm. focus

Fig. 39b. "Leitz-Hektor" lens F/1.9, 7.3 cm. focus

and locking the lens. On the ring which encircles the lens socket-tube, there is a short line. This line must be flush with the arrow in the longitudinal direction of the socket-tube. The lens can then be drawn out completely, and the second arrow then appears horizontally on the socket-tube (see Fig. 39c), indicating the direction in which to lock the lens. The lens is simply turned right round to the stop and is then securely locked. The aperture figures can be conveniently read from above. When locking the lens, hold only the first milled ring, without touching the milled ring behind, which serves for adjusting the aperture.

Fig. 39c. "Summar" F/2, 5 cm., collapsible mount

The aperture should be set only after the lens has been locked.

Owing to its great light transmitting capacity, the **"Leitz-Hektor" lens F/1.9, 7.3 cm.** is of particular importance for the Press photographer and where a longer focus for greater distances is desirable. At full aperture attention must be paid

to correct setting, in order to remain within the depth of field. As the lens is stopped down, the image gains rapidly in sharpness, so that it is also suitable for landscape photography.

At full aperture it is an ideal lens for portraits, as the long focal length and large aperture result in a neutral background, an effect which is often desirable in portraiture.

The "Leitz-Telyt" F/4.5, 20 cm. focus is, like the long distance lenses of 13.5 cm focus, mainly for distance photographs, but it may also be employed successfully for portraits (large heads, etc.), sport and Press photography at great distances, photographs of animals in zoological gardens and in their natural surroundings. With the "Leitz-Telyt" the image ratio is rather more than one half larger than with the lenses of 13.5 cm. focus; accordingly the angle of image of the "Leitz-Telyt" is only 12^0. With this small angle an exact determination of the field as well as exact compensation for parallax with one of the ordinary view-finders is difficult. The lens is therefore equipped with a reflex arrangement in which parallax is eliminated as a matter of course and the field of view can be observed on the ground glass screen. The focus is also adjusted with this reflex arrangement, thus eliminating the coupling with the rangefinder. The viewing of the image on the ground glass screen and the focusing are simplified by a X 5 and a X 30 magnifier.

It is advisable always to use the lens on a tripod, to avoid shaking. The exposure is made by means of a double release, which in rapid succession removes the mirror out of the path of the rays and than operates the shutter. A detailed description and instructions for the use of this lens are contained in the special leaflet "Leitz-Telyt" F/4.5, 20 cm.

The "Leitz-Hektor" F/4.5, 13.5 cm. can also, in a shorter mount without coupling, be used interchangeably with the "Leitz-Telyt" in conjunction with the reflex arrangement.

The "Leitz-Thambar" F/2.2, 9 cm. focus gives at full aperture and moderately stopped down, soft definition and is therefore chiefly suitable for portraits and for certain landscape photographs; when stopped down further the definition becomes sharp, so that it may also be used for sharp landscape and distance photographs.

The degree of the soft effect obtained is controllable within wide limits by the use of the normal iris diaphragm and an addition screw-in central diaphragm. It is greatest with the iris diaphragm at full aperture and with the central diaphragm screwed in, and somewhat less when working with the iris diaphragm at full aperture and without the addition screw-in diaphragm. Stopping down the iris diaphragm lessens the softness, but only then uniformly over the whole field when the central diaphragm is screwed in.

The white aperture scale on the "Leitz-Thambar" applies when working without the central diaphragm, the red one when the central diaphragm is screwed in.

The image ratio of the various lenses is preportionate to their focal length, i. e. 28 : 35 : 50; 73 : 90; 105 : 135 : 200.

The helical mount. Every lens possesses its own helical mount for focusing. That of the "Leitz-Elmar" lenses 3.5 and 5 cm., also that of the "Leitz-Hektor" lens 5 cm., is actuated by the focusing lever 17 (Fig. 1); that of all other lenses, however, by means of the large milled ring (see Fig. 38 and 39b). An index line indicates the distance.

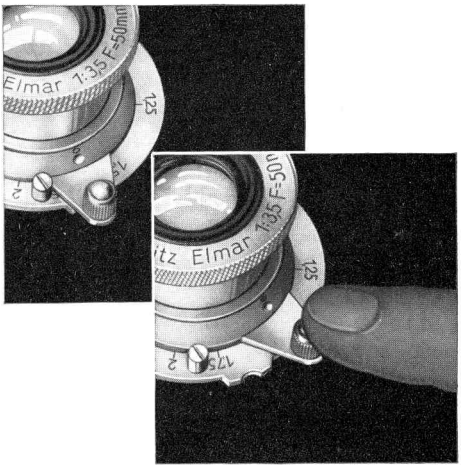

Fig. 40. The infinity catch

In addition to the main index line, all Leica lenses except the "Leitz-Elmar" 3.5 cm. now have a second index denoted by R, which serves for focusing when taking infra-red photographs. The object is focused differently according to whether the lens is coupled with the rangefinder (Leicas II and III, Leica 250) or not (Leica I and "Standard"). When the lens is not coupled with the rangefinder, the distance is read off on the rangefinder scale and the lens set to that distance by means of the index R. When the lens is coupled and in the case of the accessory for single exposures ("Oleyo", "Oligo"), the lens is first focused in the usual manner, then the helical mount displaced until the index R points to that position on the scale which was first indicated by the main index.

The infinity catch. If the helical mount has reached the infinity position (∞), it is automatically engaged and locked. By pressure on the button of the focusing lever it may be released. This device (see Fig. 40) is fitted to the lenses "Leitz-Elmar" 3.5 and 5 cm., also the "Leitz-Hektor" and "Leitz-Summar" 5 cm. lenses.

Coupling. The mechanism of the built-in rangefinder is interconnected with the helical focusing mount of the lens by means of special devices. By screwing the lens into the camera, the connection is automatically ensured. The automatic coupling represents fine motion mechanism of highest precision and guarantees utmost convenience and greatest rapidity in photographing with the Leica.

The diaphragm of the "Leitz-Elmar" 3.5 and 5 cm. and "Leitz-Hektor" 5 cm. lenses is adjusted by means of a small lever with index line. The other lenses have a thin milled ring for adjusting the diaphragm The figures read off are the relative apertures of the lenses. The ratio of time of exposure compared with the full open aperture is as follows:

Relative aperture	1.9	2.0	2.6	3.2	3.5	4.5	6.3	9	12.5	18
Ratio of exposure	0.36	0.4	0.6	1	1.2	2	4	8	16	32

The excellent quality of our photographic lenses is due not only to progress in the art of computation and more exact methods of production, but also to the use of special kinds of glass. Maintaining the high reputation of our Works, it goes without saying that we use optical glass of the very best quality only; in spite of all technical advancement, however, it has not yet been practicable to produce glass having certain novel optical properties so as to leave it entirely free from small air bubbles. Hence, complaints as to these are not justified, since their presence in our special lenses merely indicates the use of glass with valuable physical properties. Isolated bubbles, such as are allowed to pass through our controls, have no influence whatever on the quality of the image, and the loss in light intensity is absolutely negligible.

The Depth of Focus Scale

To enable one to read off figures for the depth of focus for the different lens apertures directly from the Leica camera, a special scale has been provided on the lens mount bearing the aperture figures from 1.9, 2, 2.5 or 3.5 respectively to 18, diverging from either side of the central index mark. (See Figs. 39 and 41.)

The following is the method of ascertaining the depth of focus.

First, set the main index to the appropriate distance figure obtained by measuring or guessing of the distance to the object, say 12 feet. With aperture 6.3 the two index lines marked 6.3 on the depth of focus scale indicate a range of depth of focus from 9 to 18 feet; with aperture 4.5 a range from 10 to 15 feet; and with aperture 18.0 a range from 6 feet to "infinity".

If it is desired to obtain the utmost depth of focus for a distant view with foreground, not the main index is set to infinity but that index line of the depth of focus scale which corresponds to the aperture used. With aperture 18.0 the depth of focus then covers a range from $6^1/_2$ feet to "infinity", and with aperture 6.3 a range from 18 feet to "infinity".

Fig. 41. The depth of focus scale

It is understood that the reading of the depth of focal range is limited by the two ends of the distance scale, namely, 3.5 feet and "infinity". All figures on the depth of focus scale appearing beyond these limits have no significance on the reading. In other words, when setting the main index to 3.5 feet the near point of the depth of focus range **cannot** be read off. When set to 100 feet the far point of the depth of focus range for aperture 3.5 lies at infinity, and similarly for all smaller apertures, although the far index of these small apertures extends beyond infinity.

The reading of the depth of focus at the depth-of-focus scale is sufficiently accurate for all practical purposes. A specially computed table issued by us contains more accurate figures, the calculation of which is based on a circle of confusion of $^1/_{30}$th mm.

The beginner will find it advisable not to worry about the depth of focus scale, and especially not about the tables. His first aim will be to obtain his results with two settings of the focusing scale: for distant views, stop at 6.3 and setting on infinity, for portraits, full lens aperture and exact focusing on his subject. Only when he approaches more difficult subjects will he learn to avail himself of the depth of focus scale and later on of the tables, should he have to work very exactly.

L. Accessories to the Leica

Leitz Angular View-Finder

for the Leica Camera with 5 cm. lens

The Leitz Angular View-Finder ("Wintu") enables one to make exposures without attracting attention as the sighting device lies at right angles to the object to be photographed: that is, the photograph is taken as it were "round the corner". The forked bracket of the angular view-finder is slipped into the clip on top of the camera and the small prism attached to the finder is switched in front of the eyepiece of the range finder (see Fig. 42). The camera is held during the exposure as illustrated in Fig. 43. Focusing by means of the reflecting prism of the angular view-finder is simplified if the object is first sighted in the eyepiece of the finder.

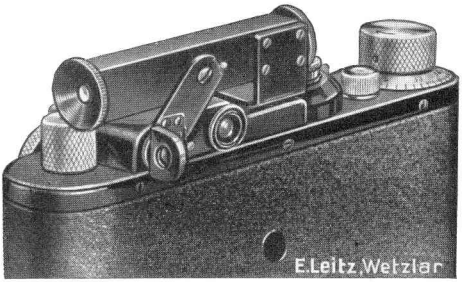

Fig. 42. The Angular View-Finder

The angular view-finder can only be used with the Leica camera and Leica lenses of 5 cm. focal length. The image appears right and left reversed.

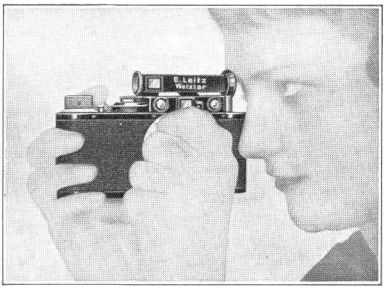

Fig. 43. How to use the Angular View-Finder

Leitz Universal View-Finders

for the Leica camera with interchangeable lenses

When using the Leica camera with interchangeable lenses, the various fields covered by the different lenses are determined with the aid of special optical viewfinders which slip in the clip on top of the camera body.

The Large Universal Finder "Vidom"

for all Leica lenses

This finder contains an oblong diaphragm which is adjustable in size. By means of a milled ring the field of view is reduced or increased. The proportion of the sides remains always 2 : 3. The milled ring is engraved with the various focal lengths of the Leica lenses. The diaphragm shows, therefore, only the field of that lens for the focal length of which the index line has been set, and this for distances from 30 feet to infinity (∞). A second shorter index line close to the other is referred to when taking close-ups, i.e. for distances from 3.5 to 6 feet. It gives the reduced field obtained at these short ranges with all Leica lenses, with the exception of the wide-angle lens. For distances between 9 and 30 feet the milled ring is best set between the two index lines.

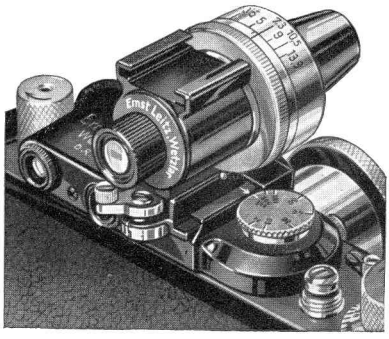

Fig. 44
The Large Universal View-Finder

For compensation of the parallax between finder and lens (displacement of both optical axes) this view-finder is fitted with a cam and lever motion for tilting the finder. By this arrangement it is ensured that an object sighted through the centre of the finder appears really in the centre of the photograph. The parallactic effect is not noticeable at distances over 12 feet. For shorter distances, however, it has to be compensated for by tilting the finder. This is done with the small lever underneath the eyepiece which is marked with figures for the respective short distances and for infinity (∞).

When taking a portrait, for instance, after having focused the camera, the distance is read off at the focusing scale of the lens, and the parallax lever set accordingly.

When taking a portrait, for instance, after having focused the camera, the distance is read off at the focusing scale of the lens and the small index line of the milled ring set to the focal length of the lens used; lastly the parallax lever is set according to the distance read off.

For changing over from horizontal to upright pictures and vice versa, see page 48.

The small Universal Finder

for specific lens combinations

Unlike the large Universal Finder "Vidom", the second model is only designed for vertain specific combinations of lenses, as follows:

Model I	"Viuna" for	3.5—5 — 7.3 cm. lenses,
II	"Vizwo"	3.5—5 — 9 cm. lenses,
III	"Vitre"	3.5—5 —10.5 cm. lenses,
IV	"Vifur"	3.5—5 —13.5 cm. lenses.

The various fields are shown on a line drawn plate. Fig. 45a shows one of these line drawn plates as it appears when seen through the finder.

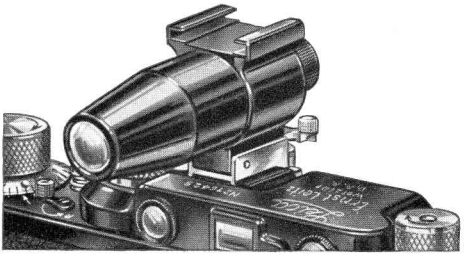

Fig. 45. The Small Universal View-Finder on the Leica

The broad outer border indicates the field covered by the wide-angle "Leitz-Elmar" lens of 3.5 cm. focus; the second broad line is for the standard lens 5 cm., the third for the long-focus distance lens "Leitz-Elmar" 13.5 cm. These fields are all correct for distances over 30 ft. The thin lines within the various fields, however, are correct for close-ups (at about 6 ft.) and show the reduced field obtained at these short ranges. A small cross in the centre simplifies central sighting.

The parallax between finder and lens is compensated for by tilting the finder. This is done as described above by means of a small lever fitted underneath the eyepiece.

Both models are built after the principle of a small astronomical telescope in combination with an image-erecting prism. The image, however, appears right and left reversed. The unique arrangement of these finders has the special and important advantage that any slight tilt of the camera will cause the image seen through the finder to assume a pronouncedly oblique position. The tilt of the image in the finder, due to the prism arrangement, is twice as great as that of the camera

body itself, thus providing an excellent means of setting the camera accurately horizontal or vertical, as the case may be.

When the camera is turned for taking upright pictures, the image in both finders appears upside down. In order to be able to see the view in its natural position, the prism in the eyepiece is made to turn through 90°. The limits of the movement are felt by definite stops. It should be noted that with the finder in working position, the oblong diaphragm in the eyepiece should always be set **horizontally.**

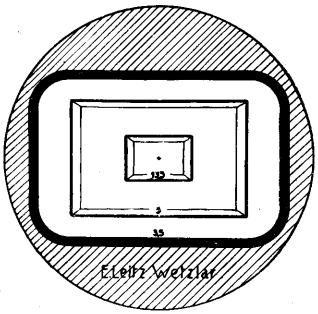

Fig. 45a. The field of view in the small Universal Finder "Vifur" (Model IV)

When following rapidly moving objects, owing to the left and right mirror reversal of the image in the finder, it is advisable to keep both eyes open so as to retain the object more easily in the centre.

For finding the proper pictorial composition the universal finder is used without camera. Sighting through the finder shows immediately whether the desired effect can be obtained with any particular lens. This is a great convenience, especially when working with long focal length lenses, as one need not take the camera and lenses from the case until the best position has been found.

Fitting the Universal Finders. The universal finders slip into the clip provided on top of the Leica body. A similar clip is fitted to the top of the universal finders to enable one to attach a separate range finder. Care must be taken to ensure that the universal finder is always pushed into the clip as far as it will go.

Subsequent Fitting of a Universal Finder. The universal finders will, without special adaptation, fit all Leica cameras, and an adjustment of the clip on previously supplied cameras is not as a rule necessary. If in particular cases the image of the finder does not exactly agree with the image obtained on the film, it is advisable to send both finder and camera to us for adjustment.

The Sports Finder

For the lenses of 7.3 to 13.5 cm. focal length, a Sports Finder is supplied through which a rapidly moving object can

be observed before it actually enters the field of view of the Leica. The field of the Leica is defined by a plainly visible light rectangle.

Leitz Frame Finder

for the Leica camera

This finder can be highly recommended, especially for sports photography and for exposures from aeroplanes.

Its most noteworthy feature is that it covers all possibilities of use, because it is not only of service for the standard lens of 5 cm. focus, but also shows the angle of field for the 3.5 cm. and 9 cm. "Leitz-Elmar" lenses, as well as the 7.3 cm. "Leitz-Hektor" lens.

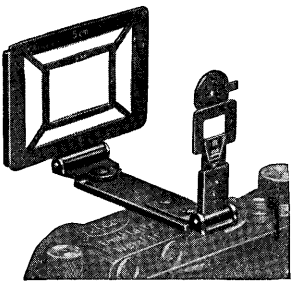

Fig. 46

For this purpose the image frame can be rotated through 180° against two stops. The normal position as shown in the illustration indicates the fields of the 5 cm. and 9 cm. lenses, while the field of the 3.5 and 7.3 cm. lenses is shown when the frame is swung round, owing to its eccentric motion. By fixing a special mask on the front side, it also serves in its normal position to give the field of the 13.5 cm. lenses and in the opposite position, that of the 10.5 cm. lenses. So as to facilitate the exact alignment of the narrow angle of view when the long focus lenses of 10.5 cm. and 13.5 cm. focus are used, a pin-hole can be clipped in position in front of the rear sighting aperture. This pin-hole can, however, not be used with the other lenses, as it would cause the field of view to appear too much enlarged.

Parallax in the case of close-ups can be compensated for by vertical displacement of the back sight of the finder. To this purpose it is engraved with notations ∞, 6 ft. and 3.5 ft.

When using the lenses of 3.5 to 9 cm. focus care should be taken to look straight through the frame of the finder; this ensures the exact coincidence of the centre of the field and its boundaries with those of the negative on the film. The sighting frame is always held close to the eye. The Frame Finder can be collapsed when not in use.

Leitz Reflecting Finder

for the Leica camera

Contrary to the principle of direct vision at eye-level embodied in all other Leica viewfinders (normal, Universal and Angular Finders), the Reflecting Finder is constructed on the principle of the well-known reflecting finders. The image is consequently not viewed at eye-level but from a position about 8 inches above the finder. This finder is found convenient mainly where it is required to photograph from a lower position, as, for instance, when photographing children, small animals etc.

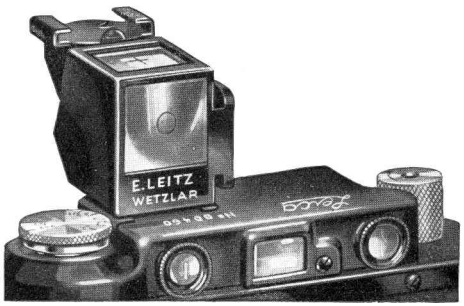

Fig. 47
The Reflecting View-Finder on the Leica

The finder consists of a housing containing a so-called "penta" prism in conjunction with a negative lens (Newton finder). This novel combination results in a very clear, bright and sharply-defined image.

To indicate the size of field for horizontal or vertical photographs the four corners are blocked out in the usual way. The image is upright and correct as to right and left. The field of view corresponds to that of the Leica lenses of 5 cm. focal length and Leica negative size 24 × 36 mm.

On special request this finder can also be supplied equipped with a negative front lens, enabling it to be used with the "Leitz-Elmar" 3.5 cm. wide angle lens.

The finder has engraved on top small cross-lines and in front a small circle. Sighting should be done with one eye only, and the cross-lines should appear in the centre of the circle so as to ensure that the camera is not slanting.

A special clip fitted to the side of the finder may accomodate a case level. The Reflecting Finder has two fixing flanges for horizontal and vertical pictures and is slipped into the clip on top of the camera body.

Leitz Slow-Speed Attachment

for the Leica Camera

The Slow-Speed Attachment screws on the release button of the Leica camera Model I, "Standard" and Model II and allows of obtaining with these models also the same slow speeds of 1, $^1/_2$, $^1/_4$ and $^1/_8$ second as with the Model III, without any conversion being necessary.

The application is as follows: Wind the shutter of the camera and adjust the shutter speed dial to Z (time). Then wind the Slow-speed Attachment by gripping with thumb and forefinger the two studs of the winder, and turn clockwise right to the stop. Only after winding can the desired speed be set by lifting the longer part of the winder from underneath and then turning it until the index line at its edge points towards the speed required; letting the winder go it engages with the pin in the respective arresting hole.

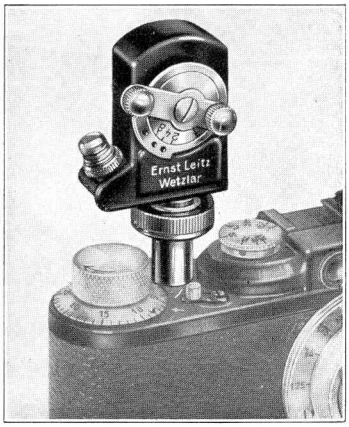

Fig. 48

The shutter is released by means of the press button fitted to the side of the attachment, either directly with the finger or by means of a wire release.

The button should be depressed until the shutter has entirely run down. Do not remove the finger before, or it may cause shaking.

With older cameras the height of the release button varied slightly as compared with the later models, it may happen that when depressing the button of the Slow-speed Attachment the shutter of the camera is not properly released and an adjustment is required.

The hollow shaft which contains the thread to screw the attachment on the release button shows the large head of an adjusting screw. By means of a suitable screwdriver this screw is given a quarter to half a turn right or left, until the proper release is ensured. If the release button of the camera is too low, the adjusting screw of the Attachment does not bear sufficient pressure on it to release the shutter; in this case the screw is turned anti-clockwise. If the button is too high, the rotating levers in the attachment do not work properly, with

the consequence that the shutter opens only half and remains open. In such a case the adjusting screw is turned clockwise. Needless to say, this adjustment, which by the way is quite easy, need only be done once and for one particular camera.

Leitz Supplementary Front Lenses

to the Leica Camera

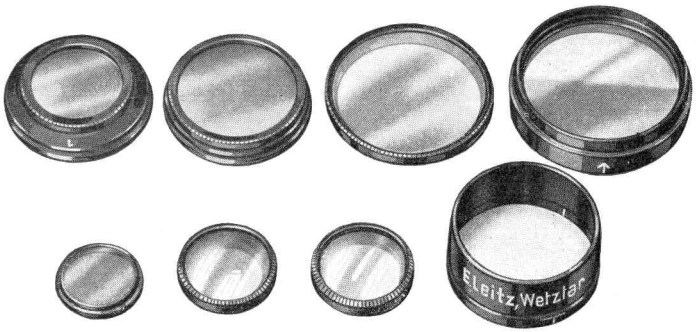

Fig. 49. Yellow Filters, Supplementary Front Lenses, and Lens Hood (half actual size)

These supplementary front lenses are **achromatic** converging lenses and are used for photographing small living creatures, plants, art objects, etc., at **ranges shorter than $3^1/_2$ ft.** as well as for the reproduction of printed matter, illustrations, documents, etc. They screw in the front lens mount of the 5 cm. F/3.5 "Leitz-Elmar" or 5 cm. F/2.5 "Leitz-Hektor" lenses and should only be screwed home moderately firmly.

We supply them in three powers, namely:

No. 1 for distances from $39^1/_2$—$22^9/_{16}$ ins.
For objects of sizes $16^9/_{16} \times 24^{13}/_{16}$ ins., to $8^9/_{16} \times 12^7/_8$ ins.

For reducing from 17.5 to 9.1 times.

No. 2 for distances from $21^9/_{16}$—$15^{15}/_{16}$ ins.
For objects of sizes $8^7/_{16} \times 12^5/_8$ ins., to $5^5/_8 \times 8^1/_2$ ins.

For reducing from 8.9 to 6.0 times.

No. 3 for distances from $12^1/_4$—$10^{11}/_{16}$ ins.
For objects of sizes $4^1/_4 \times 6^5/_{16}$ ins., to $3^3/_8 \times 5$ ins.
For reducing from 4.5 to 3.5 times.

The distances are measured from the back of the camera (plane of the film) to the object.

It may be observed here that 5 cm. lenses of the Leica camera ("Leitz-Elmar", "Leitz-Hektor" and "Leitz-Summar") without supplementary lens render it practicable to take objects at a distance of $3^1/_2$ ft. and in these circumstances reduce the size of an object measuring $26 \times 17^1/_4$ ins. to one-eighteenth its original size.

By enlarging the negative obtained with the front lens in use, a picture can be made to show the object in natural size and, where the front lens No. 3 has been used, it can even be enlarged beyond natural size.

Detailed particulars respecting the setting of the camera lens by its helical focusing mount, the distance and practicable size of the object, as well as the resulting reduction and depth of focus, may be found from the "Tables for Use with the Leica Camera" compiled by us.

The supplementary front lenses Nos. 1 and 2 for the "Leitz-Elmar" lens are available for use at full aperture for snapshots. When using them for copying work they should be stopped down. In particular, it is advisable in the case of the No. 3 front lens always to stop down to at least F/6.3 in view of the very small depth of focus.

The front lenses to the "Leitz-Hektor" 5 cm. lens, however, require a restricted use of the iris diaphragm. For further particulars please refer to the "Tables for Use with the Leica Camera".

The supplementary front lenses to the "Leitz-Hektor" may also be used with an intermediate ring "Vorgi" for the "Leitz-Summar" 5 cm. lens, while in the same manner the supplementary front lenses to the "Leitz-Elmar" may be used with an intermediate ring "Vmcoo". It is obvious that the somewhat smaller diameter of the "Leitz-Elmar" and "Leitz-Hektor" front lenses necessitates stopping down to a certain extent, but this is in any case advisable in this kind of work.

The exposure is the same, whether one photographs the same object with the "Leitz-Elmar" lens alone at a distance of 3.5 ft. or with a supplementary front lens No. 1 at $23^1/_4$ ins., or with the supplementary front lens No. 2 at $16^1/_8$ ins. or with the front lens No. 3 at $10^{11}/_{16}$ ins. To enable one to use yellow filters in conjunction with the front lenses, we supply an intermediate collar ("Firgi").

Particulars of reproduction work, for which the supplementary front lenses are especially well suited, are given in our catalogue on reproduction devices in conjunction with the Leica. Our catalogue "Auxiliary Reproduction Devices" deals at length with the use of these front lenses.

Leitz Yellow and Green Filters

The **yellow filters** serve to render correctly the colours in conjunction with the more or less sensitized film. For instance, they enable one to capture cloud effects when

The filter factors for the exposure

Type of film	Sensitivity in Din degree	By sunlight		
		Filter No.0	Filter No.1	Filter No.2
Agfa				
Leica-Isochrom FF	10/10	1.5	1.6...2.4	2.0...2.7
Leica-Isochrom F	16/10	1.5	1.6...2.4	2.0...2.7
Leica-Superpan	20/10	1.2	1.3...1.8	1.9...2.5
Leica-Finopan FF	10/10	1.2...1.8	1.5...2.0	1.9...2.5
Leica-Isopan F	17/10	1.6...2.0	1.9...2.0	1.9...2.5
Gevaert				
Leica-Special	9/10	1.6...2.0	3.0...3.2	4.0...8.0
Leica-Express-Superchrom	13/10	1.7...2.5	2.5...4.0	4.0...9.0
Leica-Panchromosa	15/10	2.0	2.0	2.5...3.2
Hauff				
Leica-Special-Feinkorn	11/10	1.3...1.8	1.7...2.5	2.5...5.0
Leica-Ultra	14/10	1.3...1.9	2...3	2.8...5.0
Kodak				
Leica-Panatomic	15/10	1.2	1.3...1.8	1.6...2.0
Leica-Supersensitiv (SS)	16/10	1.2	1.2...1.8	1.6...2.0
Mimosa				
Leica-Extrema	18/10	1.3...2.0	2.7...4.0	3.1...6.3
Perutz				
Leica-Spezial-Antihalo	12/10	1.3...2.2	2.0...3.2	2.5...3.5
Leica-Neopersenso	14/10	1.7...2.0	2.2...3.2	3.1...5.0
Leica-Rectepan	10/10	1.6...2.0	2.2...2.5	2.6...4.0
Leica-Perpantic	15/10	1.6...2.0	2.0...2.5	2.5...3.5
Leica-Peromnia	17/10	1.6...2.0	1.9...2.5	2.5

* The values have been computed afresh by ourselves. The latitude between the figures given in the table is due to the various factors which affect the time of exposure, e. g. composition of the light, variations in the emulsion, mode of development, etc.

for the Leica Camera*

photographing landscapes. The filter factor for the exposure becomes less in proportion to the degree of sensitivity of the film.

are approximately as follows:

By sunlight		By artificial light				
Greenfilter	U.-V. Filter	Filter No. 0	Filter No. 1	Filter No. 2	Greenfilter	U.-V. Filter
	1.1	1.2...1.8	1.3...1.8	1.3...2.0		1.1
	1.1	1.2...1.8	1.3...1.8	1.3...2.0		1.1
2.5...3.2	1.2	1.1	1.3	1.5...1.8	1.9...2.0	1.2
1.9...2.5	1.5...1.8	1.3...1.8	1.7...1.8	1.5...1.8	1.9...2.5	1.3...1.9
1.7...2.5	2.0	1.1	1.2...1.8	1.3...1.8	1.6...2.3	1.7
	1.6...2.0	1.6...2.0	2.0...2.5	2.5...3.2		1.6...2.0
	1.6...2.0	1.6...2.0	1.6...2.5	3.1...3.9		1.2...1.8
2.5...3.2	2.0	1.3	1.6	1.6...2.0	1.6...2.0	1.3
	1.6...2.0	1.9...2.0	1.9...2.5	2.5...4.0		1.6...2.0
	1.6...2.0	1.5...2.0	1.8...2.5	2.5...3.8		1.4...2.0
1.6...2.5	1.2	1.1	1.2..1.3	1.6....1.8	1.6...2.0	1.2
1.9...3.2	1.2	1.2	1.1...1.3	1.2...1.8	1.9...2.5	1.2...1.3
	1.6...2.0	1.3...2.0	1.7...2.5	2.5...3.2		1.3...2.0
	1.6...2.2	1.1	1.2...1.8	2.2...2.5		1.1
	1.6...2.5	1.2...1.8	1.6...2.5	1.6...2.5		1.2...1.8
2.2...5.0	1.6...2.0	1.1	1.2...1.6	1.3...1.8	1.9...3.1	1.1
2.3...4.0	1.7...2.3	1.3...1.6	1.4...1.8	1.4...2.0	2.0...2.7	1.2...1.6
2.5...3.9	1.8...2.5	1.2...1.8	1.6...1.8	1.6...2.0	2.2...2.5	1.2...1.7

The figures given in the table under "Sunlight" factors are correct for white light, e. g. blue sky with white clouds. The exposure should be increased by approximately one half when the light is dark blue, e. g. in summer from about 11 a.m. to 2 p.m. (blue sky without any noteworthy clouds).

The use of dense (i. e. dark) filters is not to be recommended, since they cause blue to appear too dark and green and yellow too light. In practical photography, such photographs have a pronouncedly overfiltered and consequently unnatural appearance. Care must always be taken to choose the density of the filter one uses so that it may suit the subject, the film material, the time of day and the illumination. This method will be found to give the best results as far as the correct rendering of colours is concerned. It should be noted that,

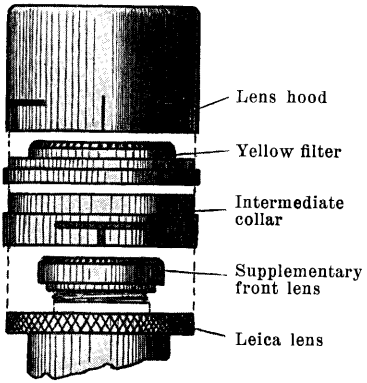

Fig. 51. How to use the various front attachments (two-thirds actual size)

according as the film is more correctly sensitised as to colour rendering, the filter in use can be correspondingly lighter; for instance, a lighter filter will be used with panchromatic film than with orthochromatic film and in the same way, a lighter filter will be chosen for the latter when it is sensitised more especially for yellow-green. Another factor to be borne in mind is that in the morning and evening the light from the sky contains a greater proportion of yellow rays and only little violet light, so that at these times a lighter filter or even no filter at all should be used. In the middle of the day, on the contrary, the light is bluer and necessitates a somewhat denser filter. In the same manner, a deep blue sky necessitates a denser filter than a sky with highly reflecting white clouds.

There is, however, yet another reason why one should abstain from the use of too dense a filter, besides the effect of over-filtration referred to above. In unfavourable circumstances a dense yellow or green filter can impair the absolute sharpness of the negatives, especially in the case of films with a thick coating of emulsion. The plane parallel finish of good filters (which, one might say, is almost carried to excess) certainly obviates a distortion, but the difraction of the light in a thick coating of emulsion cannot fail to cause a slight deterioration in the sharpness if the blue rays are disproportionately cut out. This is due to the fact that the short wave blue and violet rays form the image on the surface of the emulsion; they hardly penetrate the interior of the emulsion and can consequently not be diffused. Rays of longer wavelength (yellow and above all red rays) penetrate on the other hand comparatively far into the emulsion and suffer difraction; this difraction increases proportionately to the depth of the emulsion. The surface image is in consequence somewhat impaired in its sharpness by this diffused image formed inside the emulsion. The denser the yellow filter or the green filter, the more blue rays are cut out, and other things being equal, the greater is the loss in sharpness.

This loss of sharpness must of course not be exaggerated. It can in fact be completely overlooked in the case of films having a very thin coating of emulsion.

For use with the Leica camera with focal plane shutter the yellow filters are usually supplied in slip-on mounts. Fig. 51 shows how they are attached, either alone or in conjunction with a supplementary front lens or lens hood. For the simultaneous use of a supplementary front lens and a yellow filter an intermediate ring is required ("Firgi").

If desired, yellow filters can be supplied in screw-in mounts for use with the focal plane shutter camera. The iris diaphragm in this case is actuated directly, but the yellow filter cannot then be used in combination with the front lens.

For the two lenses "Leitz-Elmar" F/4.5, 13.5 cm. focal length, and "Leitz-Hektor" F/2.5, 5 cm. focal length, the filters are supplied in slip-on mounts only (see Leica catalogue).

The Graduated Yellow Filter. When photographing scenes with a particularly bright background and a dark foreground, we recommend using the graduated yellow filter to avoid partial over-exposure. This filter is supplied in a fixed slip-on mount to fit all Leica cameras having a focal-plane shutter. The dividing line of the filter is in the centre. Care must always be taken to ensure that the arrow engraved on the outer edge of the mount lies on top. The filter doubles normal time of exposure.

Vice versa the graduated yellow filter can also be used for scenes with a particularly bright foreground (snow scenes etc.). In this case the arrow engraved on the mount must lie underneath.

Green filter. All panchromatic negative material to be had on the market and destined for use with the Leica presents a gap in the scale of reproduction in the green section of the spectrum as compared to its sensitivity to red and blue-violet. A suitable green filter remedies this defect. The filter factors for our green filter are given in the table on Pages 58 and 59.

The new panchromatic films with reduced sensitivity to red necessitate a filter which transmits chiefly yellow and green; our yellow filter No. 0 may be used for this purpose.

Red filters. They are used in conjunction with infra-red film, which is also sensitive to infra-red rays in addition to the range of a visible spectrum. The use of this filter allows only the visible red and a portion of the (invisible) infra-red rays to be used for the formation of the image, since it absorbs yellow, green and blue almost entirely. The peculiar effect of these infra-red photographs is of less importance for general amateur photography than for special scientific purposes.

For example, it is possible with the help of infra-red photography to obtain clear photographs of mountains, scenery or towns through the mist and fog present in the atmosphere; this is of special importance in the case of aerial photography. In every case, however, the infra-red photograph differs to a greater or a lesser degree from the image seen with the naked eye.

When the sky is clear and the sun is shining brightly, the red filter causes the blue of the sky to appear black; objects in the scenery (foliage and buildings) reflect the infra-red rays strongly and consequently appear bright in the picture. Taken together, the general effect is one of a night photograph. It is, however, not exactly similar to a night photograph, in that the latter would cause the landscape to appear dark.

A correct use of infra-red film can, however, be of advantage for reproducing certain features of anatomical specimens, reproductions of paintings, etc.

The helical focusing mounts of all Leica lenses now bear a second index mark, indicated by R, which serves for focusing when taking infra-red photographs. The object is focused differently according to whether the lens is coupled with the rangefinder (Leicas II and III, Leica 250) or not (Leica I and "Standard"). When the lens is not coupled with the rangefinder the distance is read off on the rangefinder scale and the lens set to that distance by means of the index R. When the lens is coupled and in the case of the accessory for single

exposures ("Oleyo", "Oligo"), the lens is first focused in the usual manner, then the helical mount extended until the index R points to that position on the scale which was first indicated by the main index.

In the case of lenses of less recent manufacture which have as yet no second index line, instead of using the main index line for setting the lens, one takes the diaphragm stop index given in the following table for each individual objective. Since each of these diaphragm stops is marked twice on the depth of focus ring it should be added that the one used in this case is that nearer to the infinity (∞) mark.

Infra-Red Photographs with the Red Filter

Lens	Instead of the main index line, use the following line on the depth of focus ring
Leitz-Elmar 3.5 cm.	$1^1/_2$ mm.*
Leitz-Elmar 5 cm.	6.3 towards ∞
Leitz-Hektor 5 cm.	6.3 ,, ∞
Leitz-Summar 5 cm.	2 ,, ∞
Leitz-Hektor 7.3 cm.	4.5 ,, ∞
Leitz-Elmar 9 cm.	6.3 ,, ∞
Leitz-Elmar 10.5 cm.	9 ,, ∞
Leitz-Elmar 13.5 cm.	6.3 ,, ∞
Leitz-Hektor 13.5 cm.	6.3 ,, ∞

The method is the following (taking for example the 5 cm "Leitz-Elmar"):

First ascertain the distance by means of the rangefinder, e. g. 15 ft. Then rotate the helical mount of the 5 cm. "Leitz-Elmar" in such a way, that instead of the main index line, the depth of focus index 6.3 situated nearer the ∞ mark points to 15 ft. The exposure may then be made. In the event of the distance measured being ∞, then the lens is not completely rotated up to the stop when the index 6.3 points to ∞.

If particular emphasis is laid on sharpness when taking infra-red photographs, it is generally advisable to stop down. This depends particularly on the way in which the image is formed in the emulsion. There is obviously no limit to the amount of stopping down except when time exposures are to be avoided.

* Since none of the stop marks engraved on this lens can be used, the lens is extended approximately $1^1/_2$ mm in each case, measured along the periphery of the depth of focus ring.

It should be observed that when using the red filter, the exposure time which varies within wide limits is at least ten times and often fifty to a hundred times as long as when using a film of 8/10° Din.

Since infra-red film has a fairly coarse grain, it should be developed 10 minutes with Agfa Final Developer or 10 to 12 minutes with Hauff Microlin Developer. Longer developing times should be avoided to prevent the grain becoming still more apparent.

U-V protective filter. For taking photographs at high altitudes (about 6,500 ft.) the customary yellow filters are not so well suited, because they absorb **completely** the light preponderant at these heights, namely blue, violet and ultra-violet. (The sky appears black.)

We recommend in these cases the use of our U-V protective filter, which, as its name implies, absorbs ultra-violet light, but not all the blue and violet light. As a result, the sky appears in its natural tone. The exposure time as compared with photographs taken without a filter is shown in a table on pages 58 and 59. As at such heights the time of exposure generally required is only half that needed at lower altitudes, the exposure with the ultra-violet filter will be about the same at above 6,500 ft. as down below when working without this filter.

The lens hood (Fig. 52) which is fixed over the front mount of the lens is used when photographing obliquely against the sun, in order to prevent as far as possible direct rays from entering the lens and setting up unwanted reflections. It is supplied in three models. The first model is of fixed length and intended for use with the "Leitz-Elmar" 5 cm. lens. The second is similar to the first, but shorter and destined for use with the 3.5 cm. wide angle "Leitz-Elmar" lens. The third

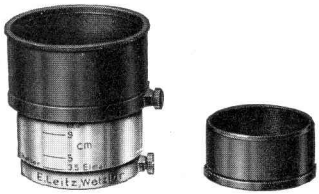

Fig. 52. The lens hoods

model has an extensible tube which may be altered so as to suit the various focal lengths. Placed on the lens mount, it is fixed like the other two by means of a clamping screw. Its extension may also be clamped in the desired position by means of a screw.

Leitz Panoramic Tripod Head

with interchangeable scale rings

The Panoramic Tripod Head makes it possible to take composite pictures of a panorama up to a complete revolution, whether in upright or in horizontal pictures. The scale ring of the Panoramic Tripod Head is interchangeable and can be supplied to suit the focal length of any Leica lens.

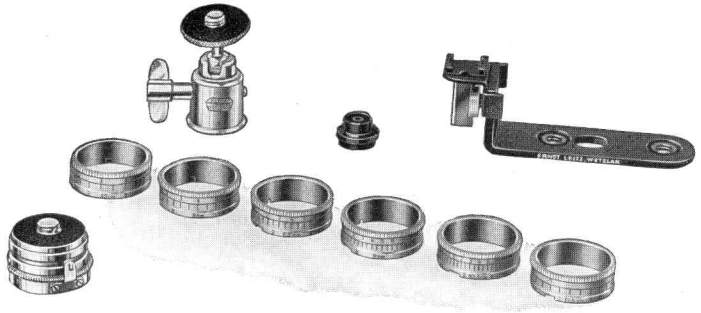

Fig. 53. Ball-jointed tripod head, case level, angular bracket, panoramic tripod head and interchangeable scale rings

Any strongly built tripod can be used for taking panoramic photographs with the Leica. It is better not to screw the panoramic tripod head straight on to the tripod, but rather on to a ball jointed tripod head, so that the camera may more easily be set absolutely horizontally. The first thing is to set the camera and consequently the optical axis of the lens in a strictly horizontal plane. The case level which serves to control this position (Doolu) is slipped into the clamp on the angular bracket. After the camera has been set exactly horizontal, the first exposure is taken with the panoramic tripod head set to the index 1, wherupon the camera is carefully rotated until the snap catch engages in the mark engraved 2. In this position, the second exposure is made, and so on. It should be noted that the scaled ring is engraved with two rows of figures. The upper row serves when taking upright photographs and the lower one when taking horizontal photographs.

The scaled rings are exchanged in the following manner: When the snap catch has caught in the position corresponding to the mark 1, the lower plane milled portion of the head is held in the right hand and the scaled ring simply removed with the left hand.

The new ring is inserted so that the snap catch slips over the notch in the ring at the mark 1. Should the spring not catch perfectly in this position, then the lower milled ring on the panoramic tripod head itself is turned until the scaled ring can be completely pushed down. When this happens, two fixing pins provided for this purpose catch in two notches in the ring.

Fig. 54. Arrangement for horizontal photographs

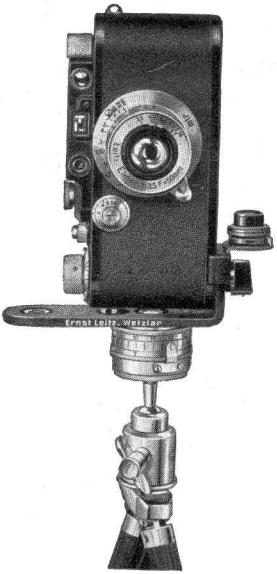

Fig. 55. Arrangement for upright photographs

In order to relieve the strain on the lid of the Leica when taking panoramic photographs with the heavy long focus lenses, we recommend the use of the special fixing cap "Vesuk". In the case of the "Leitz-Elmar" or "Leitz-Hektor" 13.5 cm. lenses the panoramic tripod head is screwed in to the tripod thread on the lens mount itself. In this case, neither the fixing cap nor the angular bracket are necessary.

The case level (Fig. 53) is required for taking panoramic views and its use is also recommended for architectural subjects.