Rodenstock IMAGON

Plastic Depth Lens

sees like the artist's eye.

The photographic objective, the "eye" of the camera, is expected to accomplish many widely different results. To accomplish all at the same time is not possible with any single design. One type of lens will give maximum, impersonally cold sharpness, while another lens pictures as closely as possible the personal, joyful, visual impression, trying to portray nature in all of its charming play of light and shadow, to give unusual depth and atmosphere and to break through superficial surface details into the depth of the scene. It is a fallacy to believe that the mood of the picture, which is essentially the expression of a highly personal reaction of the artist's mind, can be created effortless and automatically. The same importance must not be given to nonessentials as to the essential part (the "Motif") of the picture; without intellectual creative ability pictures can not be made which will do justice to the chosen theme. Only appropriate and skillfully employed means will lead to the desired goal of perfection.

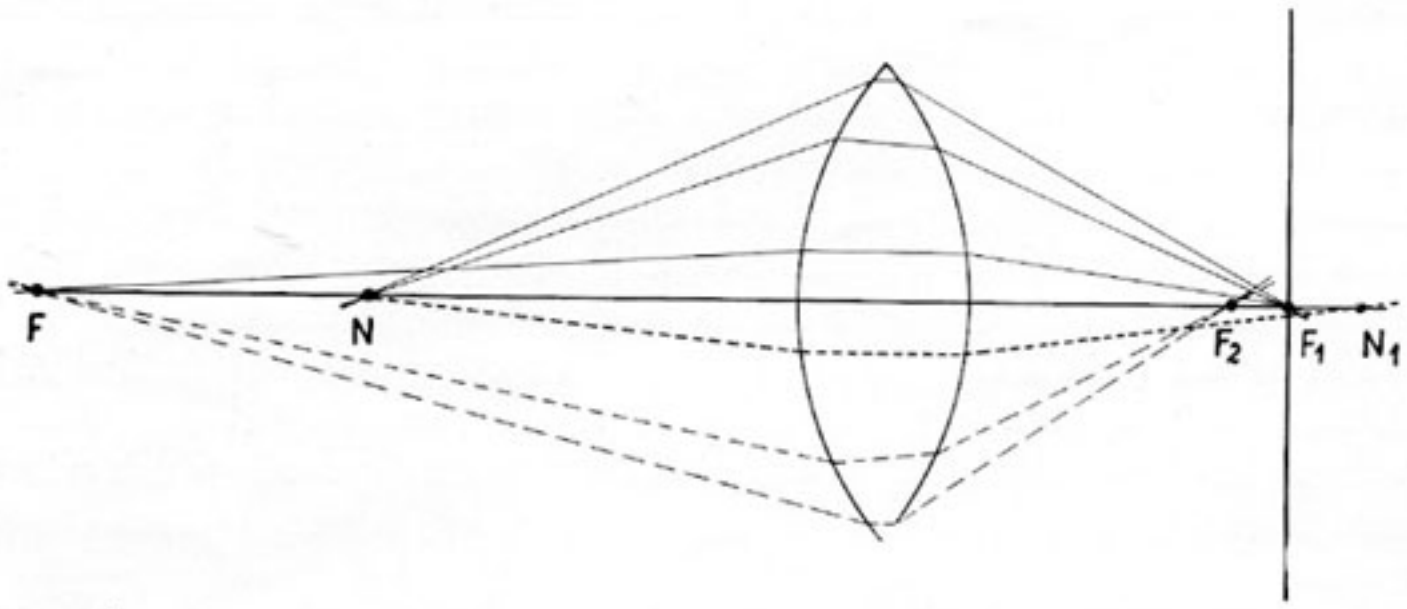
The design of the IMAGON follows the construction and performance of the human eye as the ideal model. It is not easy to find a way of describing optical structures which will show readily, even to the less initiated, radically different design conceptions. The well known anastigmat is designed to give, as near as possible, perfect reproduction in a single plane (the ground-glass) of a single vertical plane in nature. Objects which are in front of, or in back of this imaginary vertical plane will not register with absolute sharpness on the ground-glass; the light pencils emerging from the objective will create diffused discs because the apex of the light cones will be either in front of, or behind the plane of the ground-glass. The depth obtainable with an anastigmat is determined, in addition to its focal length and relative opening, by the diameter of these diffusion discs which is considered acceptable for good definition. These discs are evenly illuminated, but lack the beautiful, luminous center and transform hairlines into "wool-strands", giving to the picture a washed-out indistinctness which is particularly annoying if their diameter is large and they are in close proximity to absolutely sharp portions of the picture.

Highly corrected objectives have, therefore, the limitation foreign to the eye, of rendering only one plane sharply, but this with the highest possible perfection. Nature, however, is not as flat and even as a map; our eye does not see hard, glaring lights on top of a lifeless, dull surface. On the contrary, these lights *gleam*, radiating delicately over their surroundings, and it is for this reason very difficult to portray depth and glittering sunshine adequately with an anastigmat. The alternative, to use objectives of extremely short focal lengths, or very small lens stops, will in extreme cases make objects, which are separated in space considerably from each other, appear to be compressed into one plane. On the other hand, all means such as auxiliary lenses a.s.o., which are intended to soften detrimental hardness of line and tone, cannot change the anastigmat *basically* to any great extent, It is not possible to achieve the same success with an objective which has been deliberately de-corrected, after infinite pains were taken to calculate and correct it, than with a design which was correctly oriented from the start.

Definition which is painfully exaggerated in the focussing plane can give the effect, for instance, of a portrait where the skin appears like a clinical preparation as seen through a microscope; the eye is attracted more by accidental surface details than by the characteristic lines and forms of the face, which were the original inspiration for making the portrait.

Basically different from these highly corrected sharp-focus lenses, which have found well deserved recognition in their specific fields, is our plastic depth lens IMAGON. The IMAGON design is based generally on the optics of the eye, fully realizing that it is, however, not possible to imitate by mechanical means its lively accomodation to different conditions. The construction of the IMAGON is *basically* new and fully covered by patents. The IMAGON is intended to portray the phenomenon "light" as the eye sees it - luminous and sparkling - to give depth definition similiar to that of the eye independent of the diaphragm used, and to render all neccessary details faithfully, *but without making them obtrusively prominent.*

The following schematic diagram is intended to illustrate how the peculiar depth definition of the IMAGON is accomplished.



If we examine the path of light rays through a simple magnifying lens, we find that light pencils coming from a point F will focus at slightly different points, depending on their passage either through the center of the lens or near its edge. In the first case, rays near the axis pass through almost parallel lens surfaces, are therefore, little diffracted and focus relatively far behind the lens (at point F 1). In the second case, however, where the light rays from the same point F (shown in broken lines) pass through the lens near its edge, they are much more diffracted - diffracted towards the axis as if by a prism - and they will focus closer to the lens (at F 2). They will then diverge and form a disc of diffused light in the focussing plane, which is, of course, less bright than a sharply focussed point.

Now let us follow the path of a light ray coming from a point closer by! Light rays near the optical axis (shown in dotted lines in the sketch) would focus slightly behind the focussing plane (at N 1), thus forming small discs of confusion at the focussing plane. The focussing point for light pencils, starting from N and passing through the lens near its edge, can in the most favorable case be F 1, the same as that for light rays passing near the center of the lens as mentioned before. Rays coming from a distance, and passing through the center of the lens, and rays coming from close by, and passing near the edge of the lens can, therefore, have the same focussing point at the apex of a cone of light.

In this way, and this is one of the basic design factors in the construction of the IMAGON, a sharply defined outline of the image is formed on the focussing screen both of distant objects and of those close by, composed of an infinite number of luminous points, because any lens-zone will render any part of an object at the apex of a light cone in the focussing plane. The extraordinary depth rendition of the IMAGON is based on this.

It is, however, quite evident that ordinarily light rays coming from close by will not meet with our wishes to pass only near the edge of the lens; neither will light rays coming from a distant point pass only through the lens center, but will also pass through the edge zones. Small discs of diffused light are, therefore, formed everywhere; however, in comparison with the luminous focussing points they are not very bright, and even if due to their great number they would generally brighten up the whole picture considerably, they are much less effective photographically, if adequate provisions are made and precautions taken, than the apexes of the light cones in which the light is concentrated.

The diffusion discs of an IMAGON have a totally different character than those of an anastigmat. With the latter, the luminosity is evenly divided over a sharply confined surface,

the image forming acumination of the light is missing, and the general indefiniteness of not absolutely sharply focussed parts with an anastigmat, will lead to the well known disagreeable "wooliness". With the IMAGON, however, the diffusion discs will overlap, starting from a sharp, bright point and become increasingly larger and markedly less bright. For this reason, a point on an object will be pictured as a sharp, luminous point, surrounded by a less bright and softer diffusion disc, as light rays will travel from the point on the object through the lens at its center as well as near its edge. The light is not hard as with an anastigmat, but it *shines*. The brightest highlight will radiate a luminous brilliance over its surroundings, diminishing in brightness gradually from the sharply defined nucleus.

Without any stopping down the image on the ground-glass will appear bright, airy and sparkling everywhere, because the sharply outlined image skeleton has an incalculable number of less bright light cone sections superimposed on it, and because certain reflections occur at the lens surfaces. The picture has an alluring delicacy, and on account of its great pictorial charm will lead easily to exaggerations; it has, however, no immediate usefulness - that would require experience quite out of the ordinary with exposure and development. Some order will have to be brought first into the topsy-turvy vagabonding of the light rays. The halations and general brightening-up, which in comparison with the multi-lens anastigmat give a light intensity about 50% greater, must be diminished to the correct amount corresponding to the natural appearance and the outlines must be strengthened to some extent. Diaphragms are used for this purpose, which with the IMAGON have acquired through painstaking, systematic work over many years, totally new, physically, exactly defined and calculated forms for definite light ray conduction.

If it were attempted to stop down centrally only by means of an iris diaphragm, as is usually the case with "soft focus" lenses, which then, however, begin to lose their characteristics below F/8, the peculiar pictorial charm would be lost. The edge rays would be cut off more or less, and with this the particular plastic definition would, of course, disappear. At the same time, the highlights would lose their sparkling, lively radiance; they would become hard and the atmosphere creating mistiness, which brightens up the shadows, and which our eye senses (a little power of observation is however required for this!!), and which the photographic process until now has so often destroyed, would disappear. This, the shadows suffusing radiance, is wonderfully effective as long as no attempt is made to photograph against the light. Under no conditions must glaring light be permitted to fall into the lens.

Experience has shown that attempts to incorporate in the calculation of photographic lenses certain under-corrections peculiar to the eye, are fraught with danger, inasmuch as being attractive, in time unbearable pictures are usually the result. This can be met only by certain provisions in the lens - as well as diaphragm-construction. All attractive but un-natural softness must be guarded against. It is definitely not the purpose of the IMAGON to be just another "soft focus" lens. To be sure, it is intended to help avoid exaggerated hardness which is of no benefit to pictorial roundness; it is its purpose to portray nature in its sunny moods, as a sensitive eye beholds it with sympathetic understanding.

It should be emphasized once more that a momentarily fascinating appearance of the ground-glass image may tempt one to exaggerate the pictorial character. It is, therefore, advisable in the beginning to stop down a little more than appears necessary, to use for a start the central opening of the medium size diaphragm, and to choose, at least for the preliminary experiments, nearby contrasty subjects in about three quarter sunlight.

With the new *rotary diaphragms* two aims have been attained at the same time; first, it has become possible to study through unhurried examinations of the ground-glass image how the inclusion of the edge rays affects changes in the character of the image; and, second, the ability to create that condition for the presentation of the picture which is correct and desirable for any given case. Nature with its many varied forms, its ever changing lighting and moods is not monotonous. On the contrary, it is diversified to the utmost. The impression which a particular scene has made on our mind must always be regarded as the ideal under

all conditions. To make the beholder enjoy the same sensations as the maker will require strong emphasis of the more important features.

The principal functions of the IMAGON is to *portray bright sunshine*. For sombre moods, which have been photographed almost too often, and for photography against the light, new optical means are not required. But life without sun is joyless and it is for this reason that we should strive to fill our pictures full of sunshine and not give only a vague indication of it.

A few more words to the purely technically inclined: The use of a ground-glass enables one to follow closely the effect produced on the picture by rotating the diaphragm slightly. If it is desired to work without a ground-glass, some experiments will be necessary to acquire a certain amount of experience. The practical lens stops are engraved on each diaphragm and correspond to the equivalent stops of an anastigmat with iris diaphragm. It is not difficult to interpolate intermediate values. In the beginning avoid using the edge holes as much as possible. The edge rays give in addition to a general brightening-up the luminous highlights which are so characteristic of sunny lighting - but only of this! It is important to watch glaring reflex-lights in order to avoid un-natural effects.

For the work of professional photographers it is desirable even today to work with the larger negative sizes, if possible, directly with the size of the desired picture. Difficulties generally encountered when using long focus lenses in obtaining sufficient depth do not exist with the IMAGON. The plasticity of the pictures is striking, and is retained even with small stops, due to the fact that the edge rays seem to reach around the object to be photographed. If the edge rays are totally eliminated anastigmat definition is approached.

The following may be helpful to simplify correct focussing on the ground-glass: with the small holes of the rotary diaphragm totally closed, thereby using only the central rays, not the slightest difficulty in focussing should be experienced. If, however, the edge rays form a considerable part of the picture it becomes very important to focus accurately on the light nucleus, which may be more difficult to observe due to the great luminosity of the radiant light which surrounds it. *That* condition where the light halo is the smallest is, therefore, not the correct one. It should rather be, for example, like the filament of an electric light sharply defined inside of a large aureola. For short focal lengths the conditions are simpler, not, however, because in this case the depth definition of the IMAGON is quite extraordinary, but on account of the fact that for this type of photography exposures on the short side are generally customary.

This statement will probably surprise the photographer who is used to work with anastigmats, however, if ever difficulties are encountered with the use of the IMAGON, they can invariable be traced to a much too prolonged exposure of the negative. The effects of this overexposure are to some extent considerably different than those obtained by the use of an anastigmat; however, an anastigmat does also not prevent tone deterioration due to overexposure. Let us remember that the picture is made up of bright nuclei surrounded by less bright diffusion discs, which are the more prominent the more the edge rays are used. If we overexpose - and the following considerations are important! - the sharp nuclei will not reach the desired and absolutely necessary blackening of the highlights in the developer alone, but the less bright diffusion discs will also be blackened, and this will result, together with the overexposed highlights, in a monotonous broad softness. The otherwise typical luminosity, together with the sharp definition is now obviously lost. Once these principles have been thoroughly understood, and a certain amount of experience has been acquired, perfect results are as easily obtained as with any other objective. Results which have been obtained in practice are ample proof of this.

If it is further considered that the IMAGON will add a certain amount of transparency to the shadows, it becomes clear that for this reason also, a too much prolonged exposure would be only harmful, because the negative would "clog-up" too rapidly. Finally, it must not be forgotten that during exposure the silver bromide particles become self-luminous, and will radiate a certain amount of light in their immediate vicinity. The exposure will

cause a spreading of the lights, which is the more pronounced, the brighter the light is, and the longer it is permitted to act, and this spreading action may be considerably more than the desired halo observed on the ground-glass. Anti-halation negative material is, therefore, an absolute necessity.

The expert knows that a slightly (!) full exposure will not necessarily lead to failure, if it is compensated for at the time of development. IMAGON exposures, if they were not very much on the short side, should always be developed to give a "strong" negative. We recommend to *start* development in developer containing plenty of bromide, ev. in used developer (suitable are Glycin, also Rodinal and Perinal - the latter in 1:10 dilution) until the highlights are well developed, and then to *finish* the development in fresh developer (most suitable Metol 1:6, or Rodinal or Perinal 1:20 or at most 1:40). The negative must not come up too rapidly - if this happens the exposure has been too long and the developer is too vigorous. It is desirable to add to Rodinal and Perinal a few ccm of a 1:500 Pinakryptol-Green solution. Results with the commonly used M-Q developers have been less satisfactory. If it is, however, desired to use these developing agents, then the development should be started in Hydroquinone and finished in Metol alone.

The rotary diaphragms have made it considerably simpler to gain experience with the IMAGON. Some photographers use this almost too abundant variability to the greatest extent while others confine themselves to perhaps two diaphragm settings, which seem to be most suitable for their particular type of work. It is hardly necessary to mention that the IMAGON is intended for direct exposure only, and that it should not be used for enlarging, because in this case an absurd spreading of the shadows over the lights would occur.

For *printing* and *enlarging* generally harder working papers with not too rough surfaces are preferred. Retouching of any kind is unnecessary and only detrimental. Enlarging, particularly from negatives made with large stops, requires much practice and painstaking focussing, because all the delicate details of the original must be retained under all conditions. Condenser enlargers have generally proven successful.

It may be possible, that after reading the above description many things appear to be more complicated than they really are. We believe, however, that those who are interested, and who want to be, and should be sure of their ground, should be informed about all possible contingencies *in advance*. The joy of discovering particularly charming applications and the satisfaction of solving difficult lighting problems, is thereby not impaired in the least.

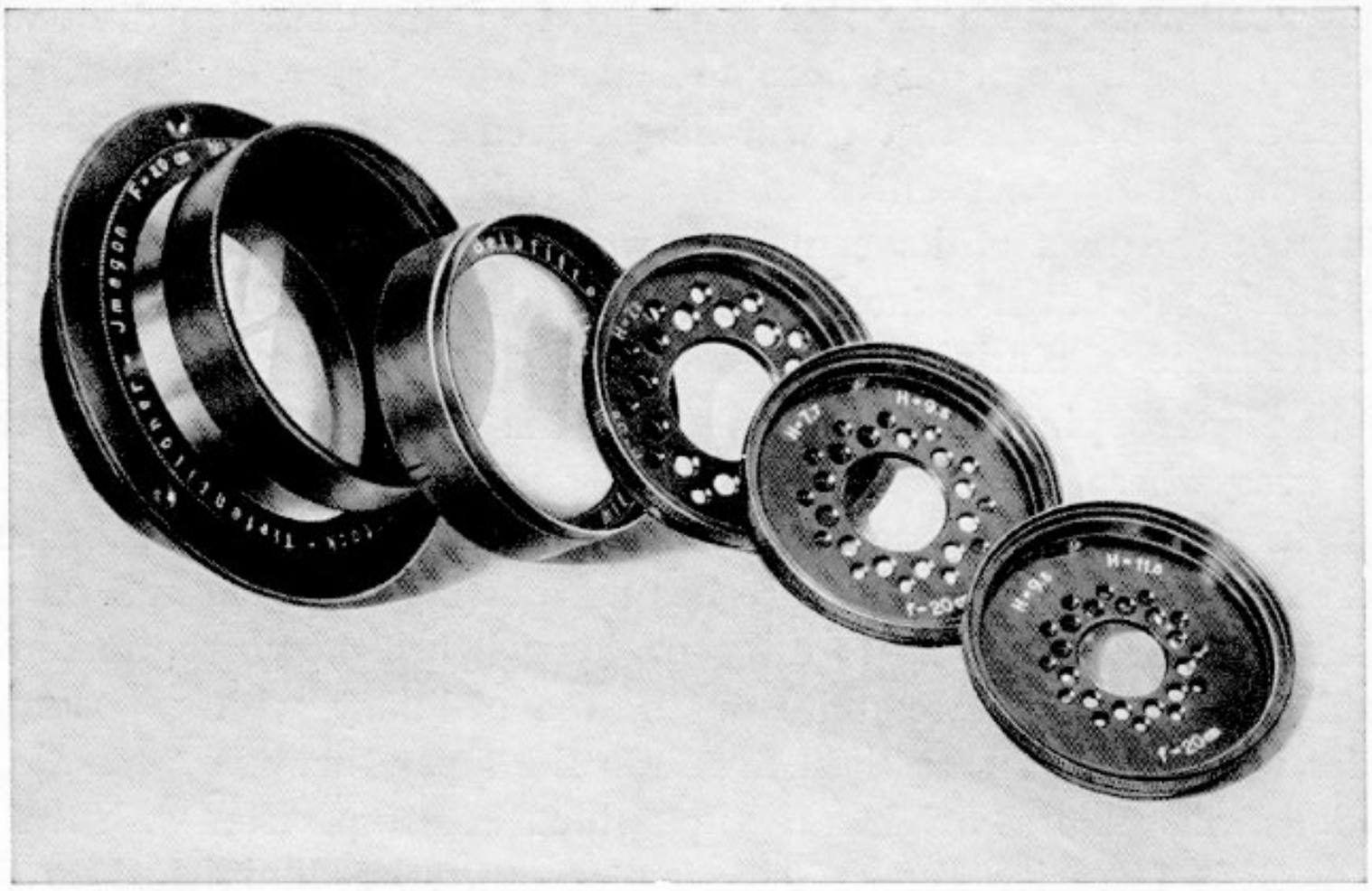
In conclusion, we want to express the hope that our IMAGON may be helpful to further a sympathetic understanding of nature in its joyful moods. The IMAGON was created to be the most perfect optical instrument to portray the sunny side of nature, and to image the radiant luminosity of our world faithfully.

The lens contours and diaphragms of the IMAGON were calculated by Dr. Staeble, the Scientific Director of the Optical Works of G. Rodenstock, who has succeeded with profound understanding to translate the artistic requirements into the formulas of the mathematician.

Heinrich Kühn, Birgitz.

Translated by
Rudolf Wolf
New York.

The Plastic Depth Lens **"IMAGON"** 1:5.8



Focal distance cm.	Size cm.	Exterior ∅ of front barrel with normal mount mm.	Necessary aperture of lens board for normal mount mm.	Number of Special Shutter	Number of Compur Shutter	In Normal Mount	In Special Shutter	In Compd. Shutter	Further Yellow Filter	Green Filter
17	6.5x9	51	58	IV.	II/5*					
20	9x12	57	63	V.	III/7					
25	10x15	67	70	VI.	III/7					
30	13x18	77	81	VII.	V/12					
36	16x21	87	95	VIII.	—					
42	18x24	98	104	IX.	—					
48	24x30	107	114	X.	—					

* in Compur Shutter

G. RODENSTOCK MÜNCHEN

Imagon-sets (containing 3 resp. 4 complete objectives with 1 yellow filter in special shutter VII resp. Compound shutter V/12)

Nr.	Focal distance cm.	In Normal mount	In Special Shutter	In Compound-Shutter
I	17, 25 u. 30 (with 6 rotary diaphragms)			
II	17, 20, 25 u. 30 (with 6 rotary diaphragms)			
III	20, 25 u. 30 (with 5 rotary diaphragms)			

OPTICAL WORKS G. RODENSTOCK, MUNICH 15

5396 k 7367 engl.