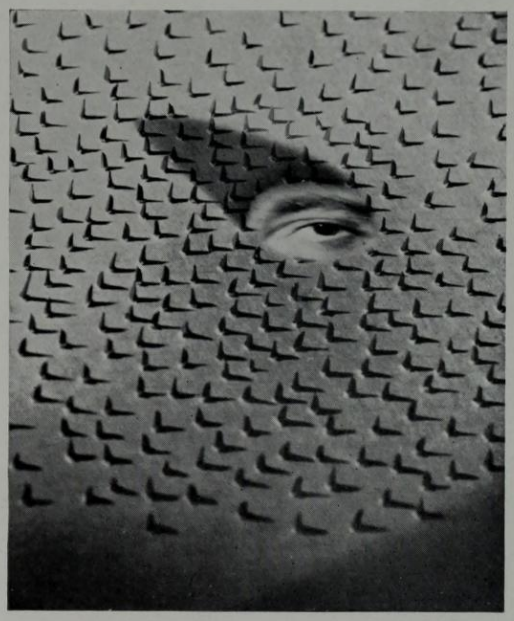
Fig. 225. © Nathan Lerner, 1940
Eye on nails
(photomontage without scissors)



black and white

Photography is a new medium of expression. Since its working rules have not yet been frozen into unalterable dogmas, it has experimental potentialities. Moreover, by analogy, one may find clues, may approach other media with fresh insight. In fact, it can be assumed that the analysis of photo, drawing, painting, would prove mutually illuminating.

In the official history of art, photography was for a long time considered only a mechanical means of recording. Being mechanical, it was argued, it could not produce art. And when any interpretation tried to elevate photography to art, it was with the esthetic-philosophic concepts customary in the definition of painting. That is why photography with conscious "art" ambitions has remained in rather rigid dependence upon the traditional forms of painting and has slowly passed through the successive stages of all the various art "isms." But fundamentally new discoveries cannot long be confined to the mentality of bygone periods. When that happens all productive activity is arrested. This was plainly seen in the photography of the last hundred years, which has yielded little results save as a sort of visual stenographer to science, criminology and journalism. But at least in these fields photography has been used with a knowledge of its working conditions, its science and technology, optics and chemistry; in other words, with a knowledge of its basic elements. Here photography proved to be the pioneer of an original development peculiar unto itself, unconcerned with whether it was called "art" or not.

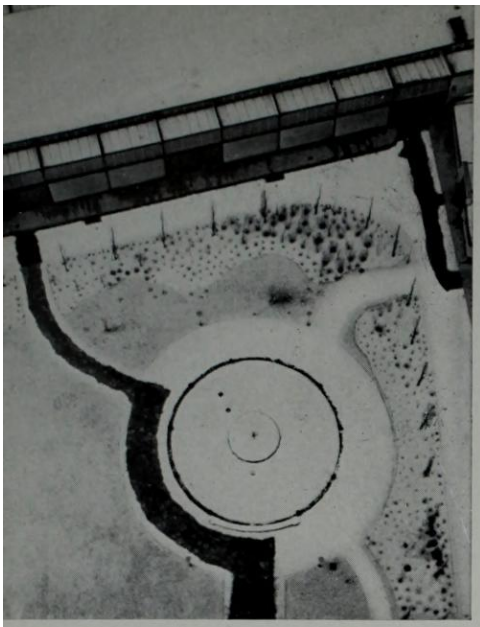


Fig. 226. O L. Moholy-Nagy, 1928

Fig. 227. O Lewis Fay, 1939

Fig. 228. O William Keck, 1939

Photography has not yet achieved anything like its full stature, has not articulated its own intrinsic structure. Yet this lack of "results" does not contradict the almost unbelievable impact which photographic vision has had upon our culture. It is unprecedented that such a "mechanical" thing as photography—regarded so contemptuously in the creative sense—should have acquired in barely a century of evolution the power to become one of the primary visual forces in our life. Formerly the painter impressed his vision on his age; today it is the photographer. One has only to recall the romantic outlook of former generations upon the pictorial presentation of landscape and other objects, and compare it with the way they are perceived now, namely, "photographically". Many people may not realize it but the present standard of visual expression in any field, painting, sculpture, architecture and especially the advertising arts, is nourished by the visual food which the new photography provides. There is the incisive sharpness of camera portraits pitted with pores and furrowed by lines; the air-view of a ship at sea moving through waves that seem frozen in light; the chiselled delicacy of an ordinary sawn block of wood; the close-up of a woven tissue; the whole of rarely observed details of structure, texture and surface treatment of whatever objects we care to choose within the realm of the traditional, monocular viewing and rendering of the world.

All these characteristics are not altogether dissimilar to those of naturalistic painting with its imitative rendering. But as in painting so in photography we have to learn to see, not the "picture", not the narrow rendering of nature, but an ideal instrument of visual expression. If we can see in the genuine elements of photography the self-sufficient vehicle for direct, visual impact based upon the properties of the light sensitive emulsion, then we may be nearer to "art" in the field of photography too.

photographic quality

Black-and-white photography revealed for the first time light and shadow in their interdependence. The development of reliable artificial illumination, like electricity, brought an increasing adoption of flowing light effects and richly graduated shadows. Through these elements a greater animation of surfaces and a more delicate visual intensification was possible. This multitude of gradations is one of the fundamental "materials" of photography. This fact holds true even when we pass beyond the immediate sphere of black-white-gray values and begin to think in terms of color.•

Through the black-white-gray reproduction of colored subject matters photography has enabled us to recognize the most subtle differentiations in both the gray and chromatic scales; differentiations that produce a new and hitherto unobtainable quality of visual renderings. This is only one element among many. But it is the point

• *A device to dispel poster-like effects and create a more delicate and melting impression is to use color in conjunction with the intermediate tones. When pure color is placed against pure color, plain tone against tone, a hard, decorative, poster-like effect generally results. Late cubism, neoplasticism and constructivism tried to overcome exactly this deficiency and this effort became an important part of their "problem area". This is one clear occasion in which photographic experiment lent an insight to painting.*

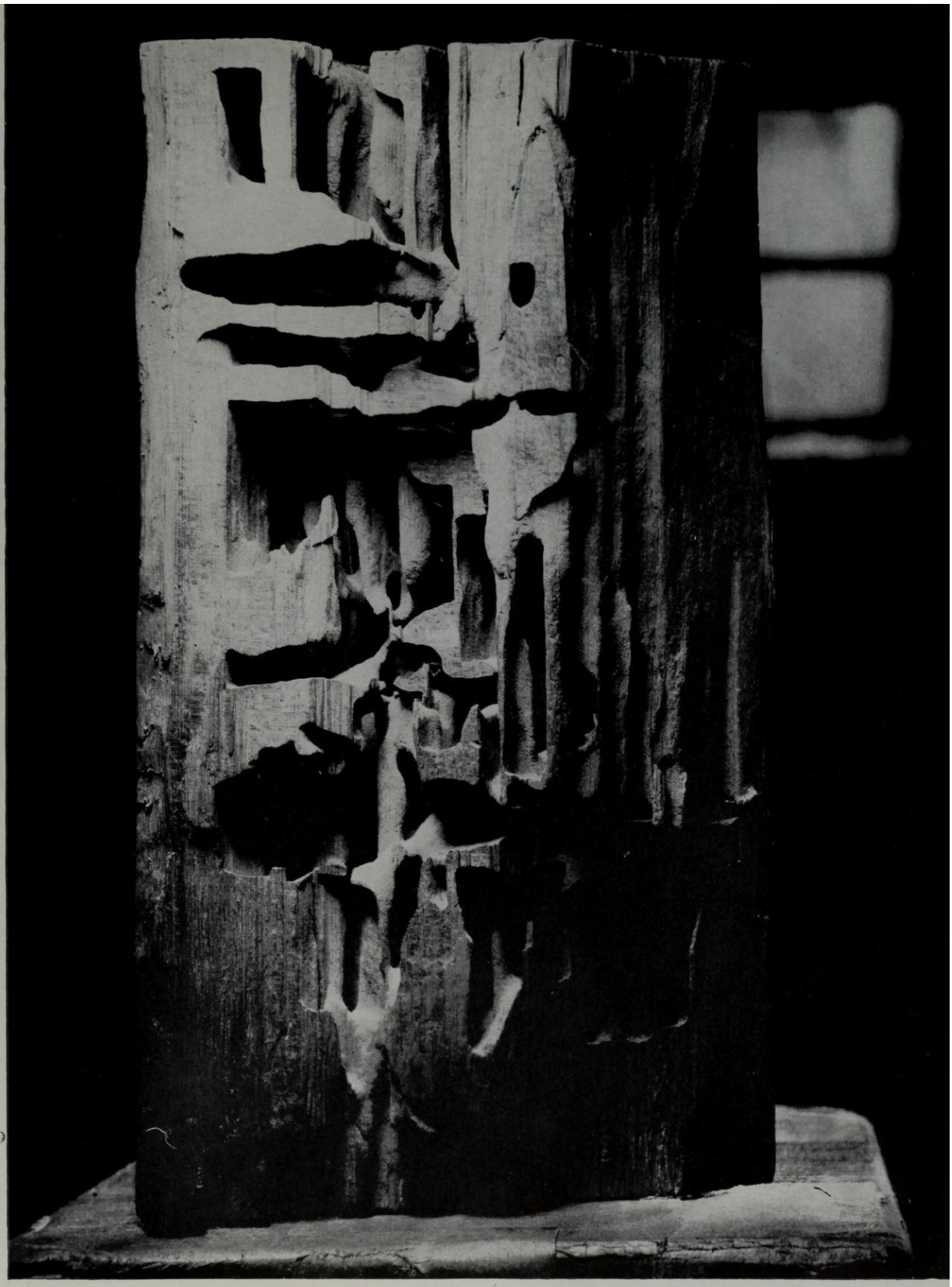


Fig. 229. Berenice Abbott, 1944
Termite building

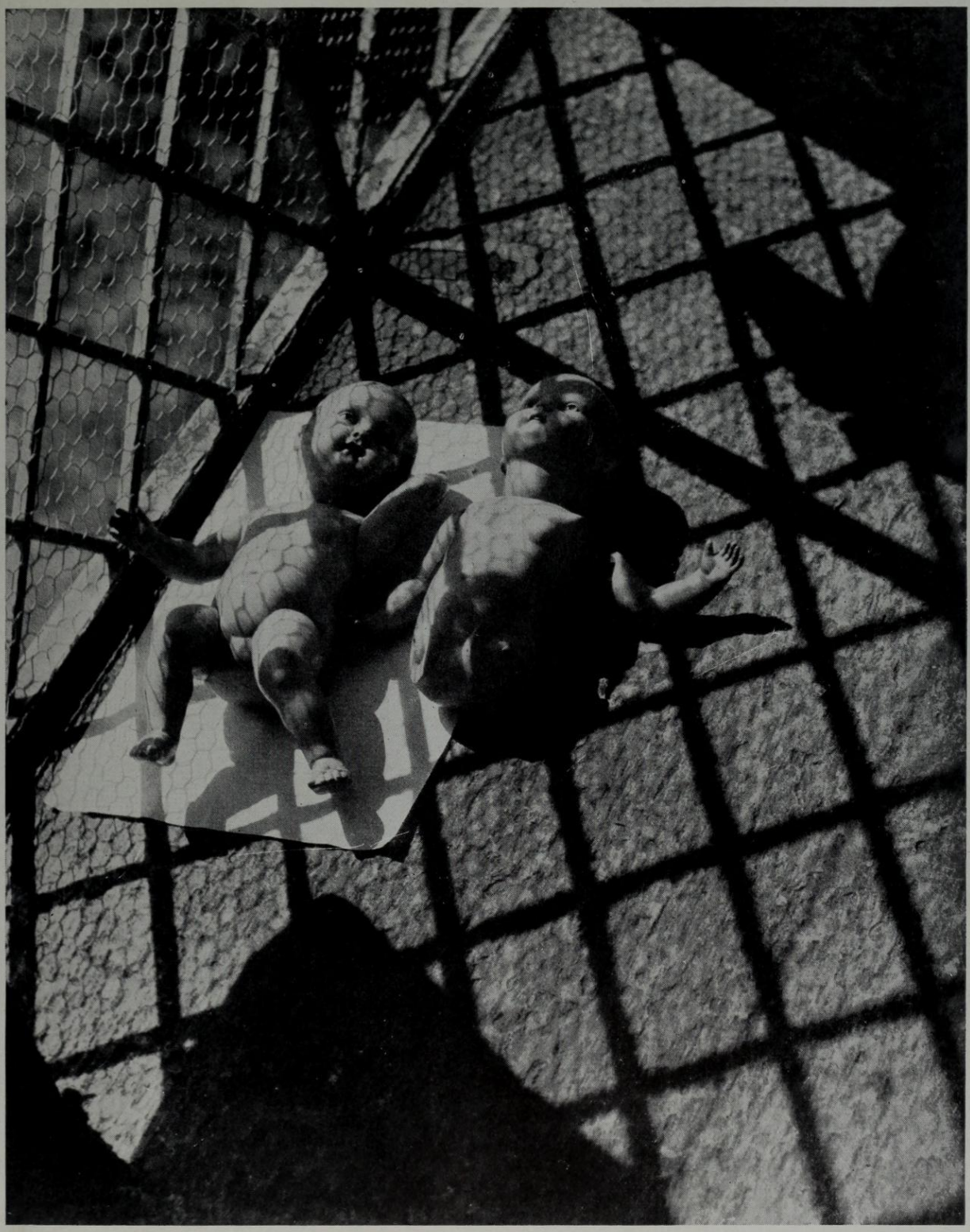
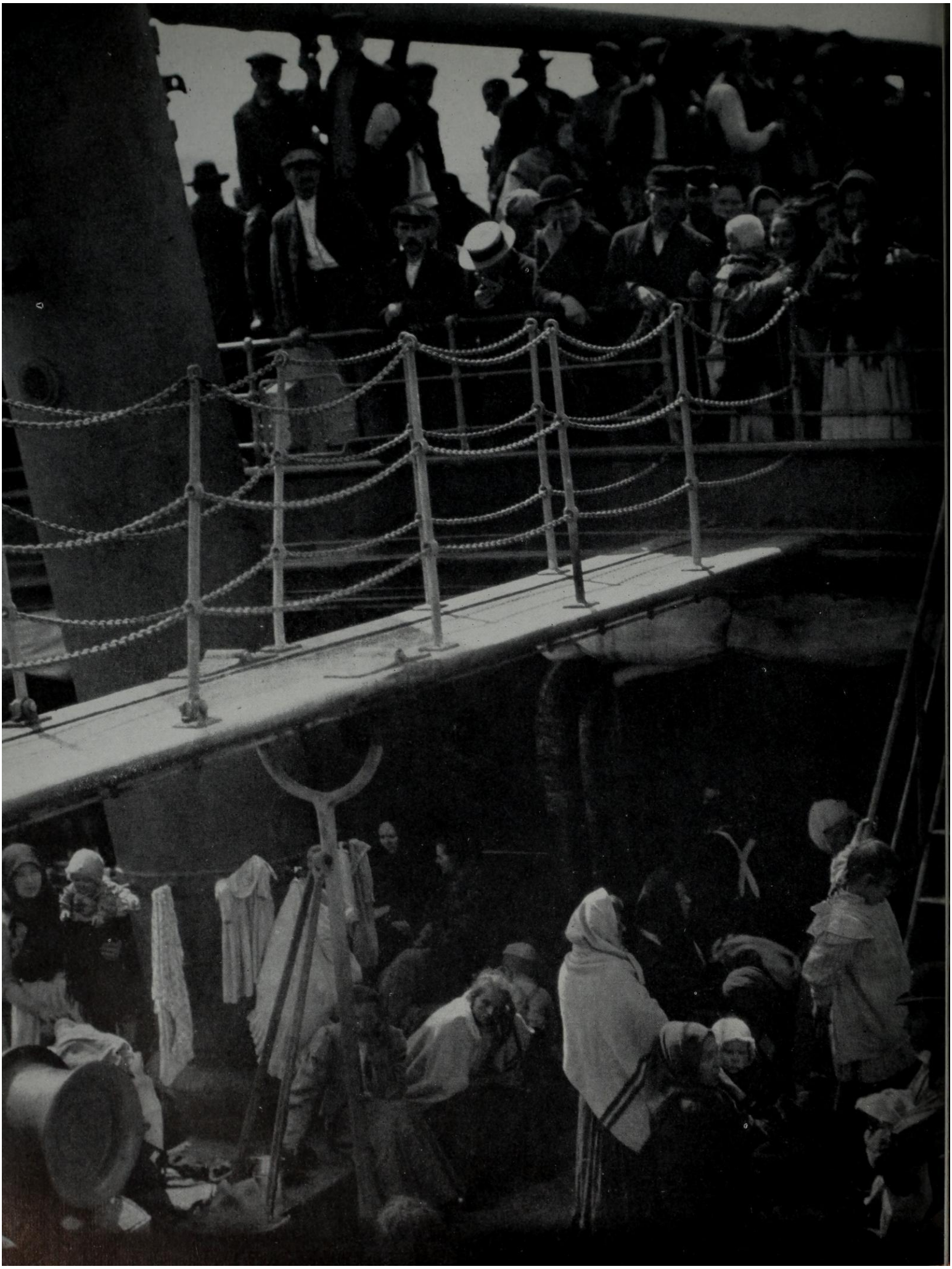


Fig. 231. O L. Moholy-Nagy, 1926

Fig. 230. O Milton Halbe, 1942
Portrait in the round

Fig. 232. Joseph Breitenbach, 1940
Photograph of fragrance of a coffee bean
Patterns of fragrances are obtained by extending the very small amount of matter of which fragrance consists of as a very thin (monomolecular) layer. The thickness of this layer is 1/1,000,000 mm, which means: if enlarged to the thickness of a sheet of paper, the thickness of the paper itself enlarged at the same degree would be higher than the Empire State building. The shapes develop in time and the forming of richer and richer abstract patterns may be observed and photographed. Generally the layman believes that every odor has its specific pattern, just as there is a name for every color. This is not at all the case. Very complicated phenomena caused by molecular structure, surface tension and electro-dynamical charges are involved. Besides, the odors we are used to looking upon as primary sensations of olfaction are highly complicated mixtures of a dozen and more odorant compounds

Fig. 233. O Frank Levstik, 1941
Billboard



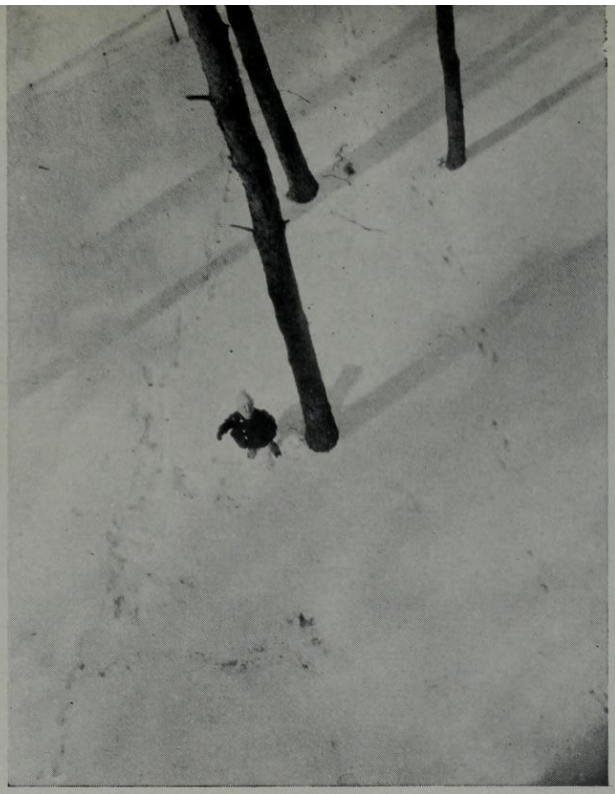


Fig. 234. Alfred Stieglitz, 1907
"The Steerage"
Alfred Stieglitz is the great pioneer of contemporary photography. His work and his integrity are already a matter of history

Fig. 235. O L. Moholy-Nagy, 1927

where we must start in order to master the properties intrinsic to photography; where we begin to deal more with the direct sensory impact of photographic values than with the reproductive, illusionistic function of portrayal.

teaching photography

In teaching photography one may be tempted to start with the familiar, with still life, landscape or portrait. Yet portraiture, for example, presents unsuspected difficulties. It is a complicated task to observe the multiplicity of details, the psychological expression, the texture of the skin, the relationships of the dark and light and middle values, and the other aspects of the face revealing its most characteristic features. How can a beginner, who has never done any work in photography, hope to master this complexity at once?•

• *The stimulating results produced in the Photographic Workshop of the Institute are due to the inventiveness and research consciousness of its former and present staff-artists as well as technical experts—Gyorgy Kepes, J. J. Smith, Leonard Niederkorn, Nathan Lerner, Jim Brown, Frank Levstik, Edward Rinker, Eugene Bielawski, Eugene Idaka, Frank Sokolik, William Kech, Harry Callahan and Arthur Siegel.*

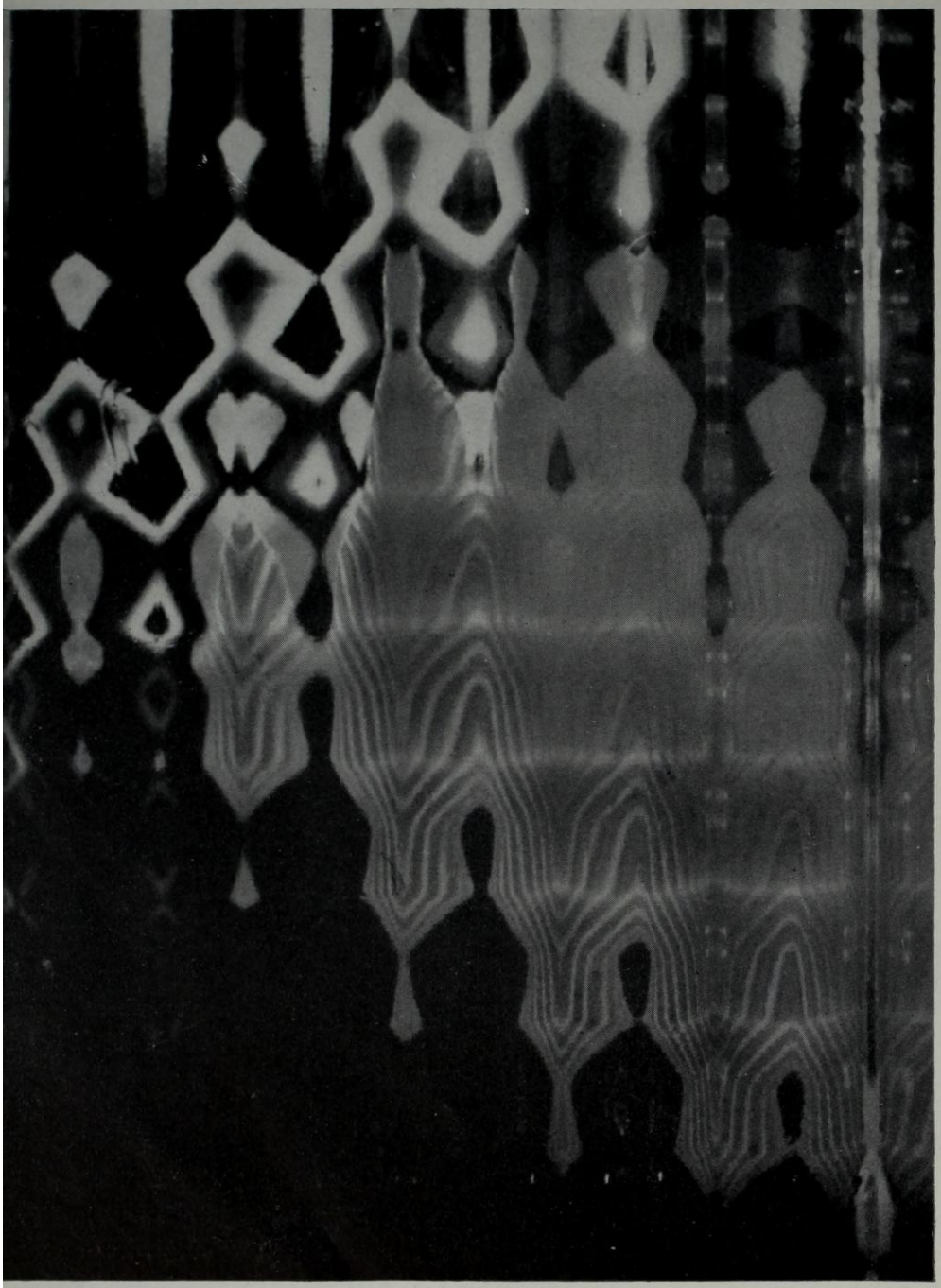


Fig. 236. Carlotta Corpron, 1944
Pattern of light in a glass brick

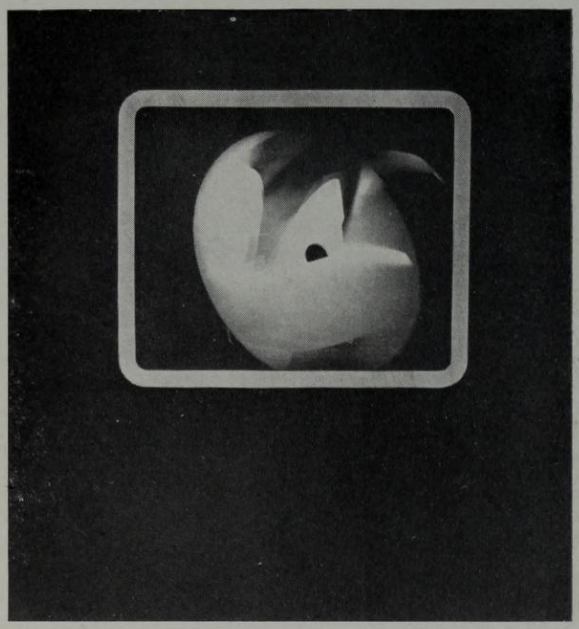


Fig. 238. O L. Moholy-Nagy, 1937
Photogram

Fig. 237.
The silhouette—the great pastime of the 18th century—is the predecessor of the photogram (cameraless photography), which introduced an infinite variety of gray values into the one-tone shadow picture

The problem is to find an approach to photography which breaks down the complex tasks into their fundamental elements, mastering them one by one yet pointing through each function to the wholeness of the solution.

photography without camera (photogram)

In order to learn about the properties of the light sensitive emulsion, which is the basic element of photography, it is best to start with the making of cameraless photographs. In 1835, Fox Talbot made the first crude photogram by laying lace on a paper treated with photo-sensitive emulsion.•

• *Around 1920 Man Ray and I, independent of each other, re-invented the photogram. This technique has since become a standard means of visual expression.*

Photopaper or film exposed to light will record the varied intensity of light sources in black and white and gray values. Practically, this is nothing more than a photo-negative, produced by laying objects on the emulsion-covered surface. Opaque objects contacting this surface block out all light leaving that part of the sheet unexposed, i.e., white. Shadows of these objects caused by lighting during the exposure result in varying gray-values depending upon the density of the shadows. Areas flooded with light, that is, fully exposed, become black.

The photogram exploits the unique characteristic of the photographic process—the ability to record with delicate fidelity a great range of tonal values. The almost endless range of gradations, subtlest differences in the gray values, belongs to the fundamental properties of photographic expression. The organized use of that gradation creates photographic quality. The photogram can be called the key to photography because every good photograph must possess the same fine gradations between the white and black extremes as the photogram.

The photogram conjures up as many interpretations as it has viewers and with new discoveries its original range can be greatly enlarged. For example, printed transparent cellophane sheets, blank films engraved, scratched glass plates covered with ink drawings, can be used as "negatives". In an enlarging apparatus combined with the usual technique of the photogram these materials may give startling results. The photogram may also be used as a new method of recording light values when materials such as oil, paint or ink are squeezed between glass plates. This procedure flattens out the oil drops or the still wet, painted lines and fashions them into astonishing shapes which vary with the pressure applied.• These glass plates, used as negatives, produce photographic records of the mechanical pressure. By substituting photographic evidence for guesswork in computing the performance of materials, this method may become a contribution to technological application, similar to M. Hetenyi's experiments with photo-elasticity developed for purely scientific reasons.•• These may also be used one day as elements of creative expression.

The photogram understood as a diagrammatic record of the motion of light translated into black and white and gray values can lead to a grasp of new types of spatial relationships and spatial rendering. The receding and advancing values of

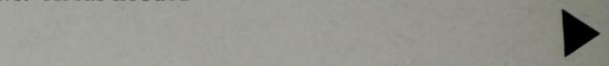
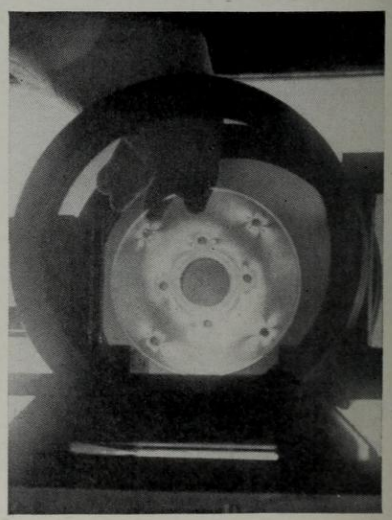


Fig. 240. O L. Moholy-Nagy, 1922
Photogram

Fig. 239. Dr. M. Hetényi, Westinghouse Laboratories, 1942
Photo elasticity stress—pattern of a flywheel model between two polaroid discs crossed and with a lamp behind them



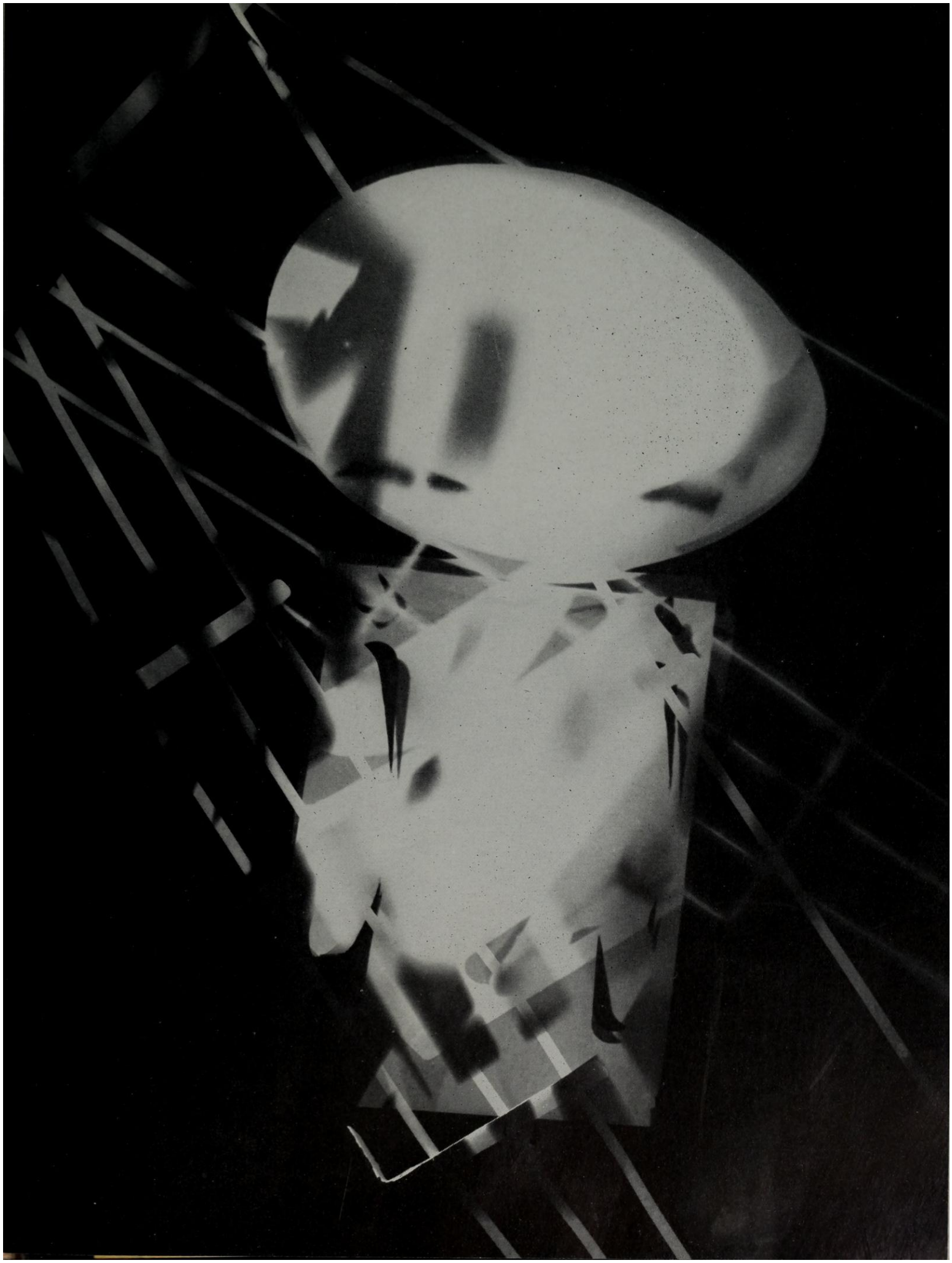
• *I had an opportunity to use the oddity of oil drops squeezed between glass plates and a great number of other devices as "special effects" in the motion picture, "Things to Come", by H. G. Wells, directed by A. Korda. (London Film, 1936)*

•• *The method of three-dimensional photo-elasticity is based on the experimental fact that samples of phenolic resins, such as Bakelite, Marblette and Trolon, when annealed in a loaded condition show a complete preservation of*

(a) the elastic deformation and

(b) the accompanying bi-refringence produced by the loading of the annealing temperature as it is described in the article, "The Fundamentals of Three-Dimensional Photo-Elasticity" by M. Hetenyi. (Research Laboratories, Westinghouse Electric Mfg. Co.)

A similar method is used for checking the hardening of eye glasses used in industry for accident prevention. The appearance of a Maltese cross seen on such a glass behind polaroid makes possible an immediate decision as to its perfect execution. The cross indicates diagrammatically the equalized centered stress performance.



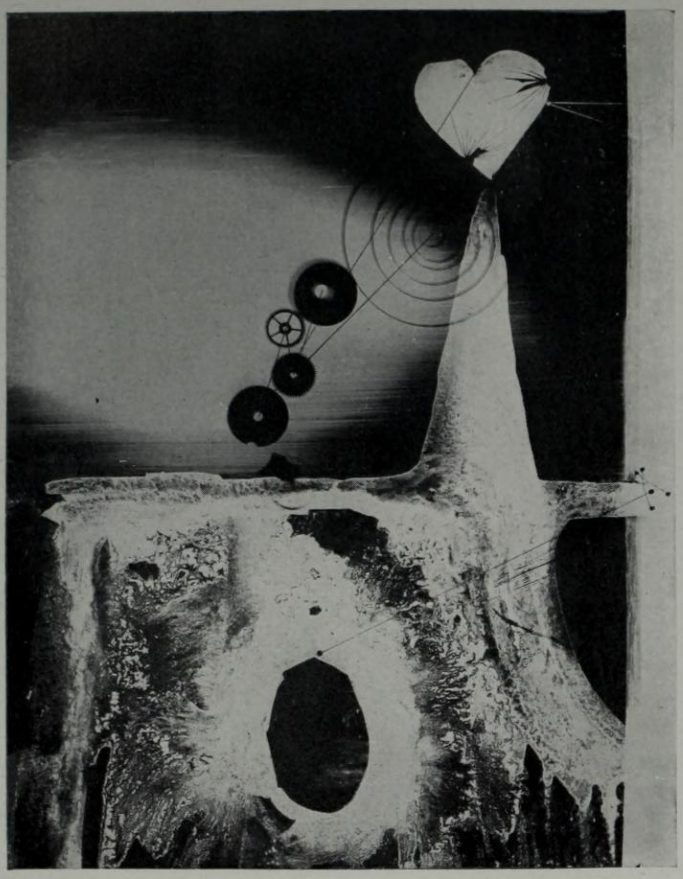


Fig. 241. O Gyorgy Kepes, 1939
Experiment without the camera

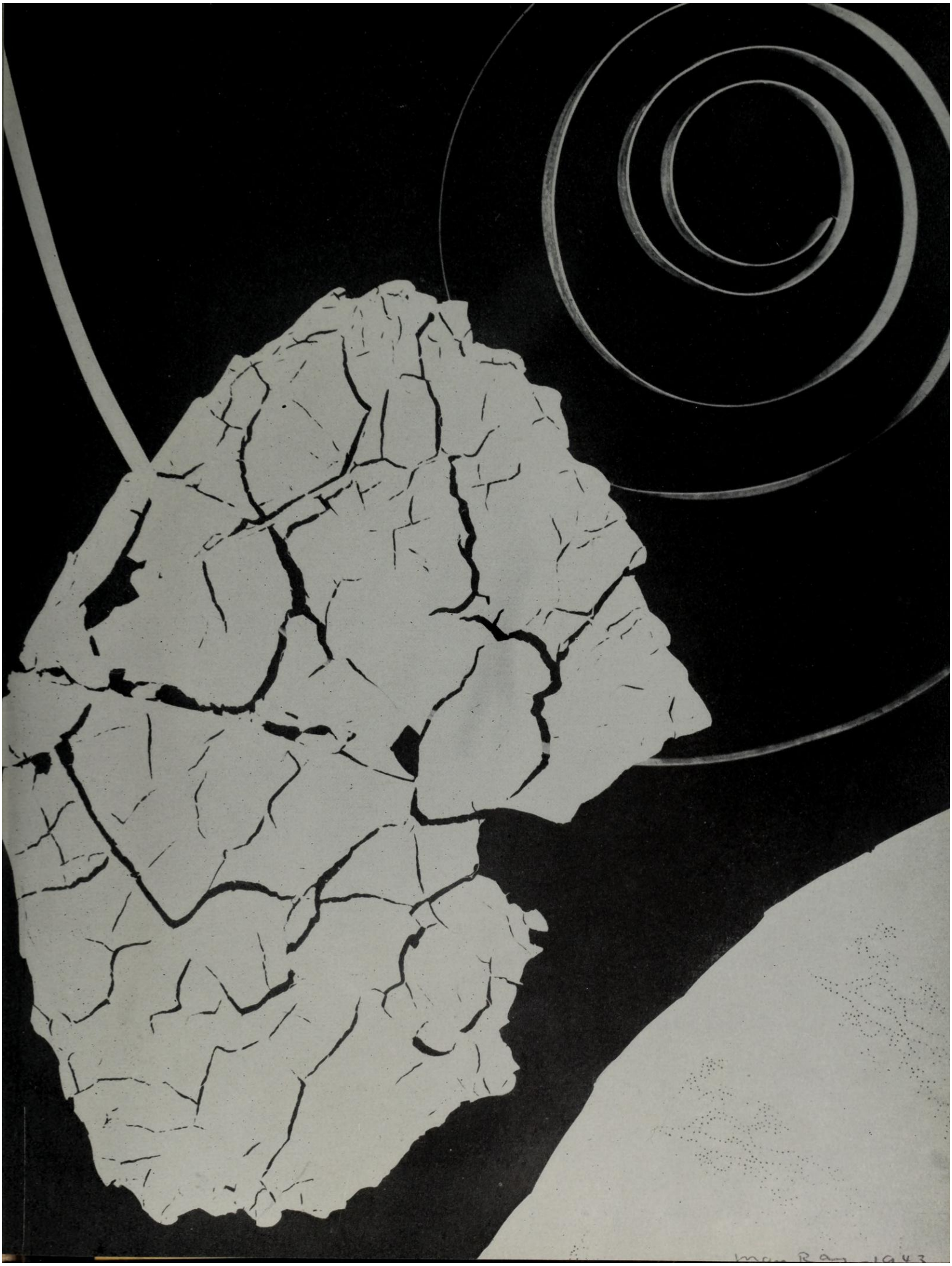
the gradations, which are projections of the "light tracks", can be used for space—that is, space-time—articulation.

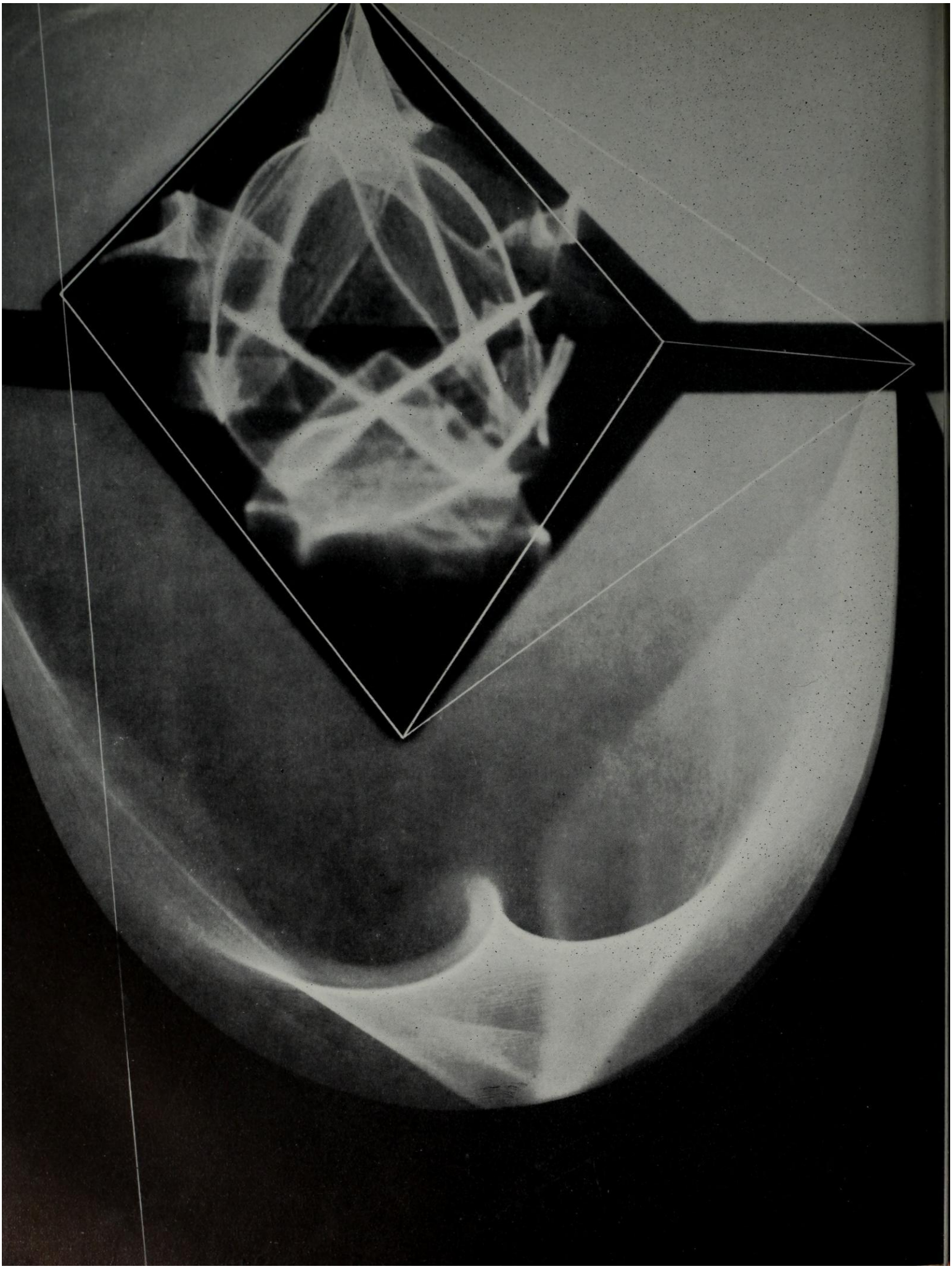
Architecture and the motion picture, both of which operate with light, should find new insight in that articulation.

●

This work need not only be for the sophisticated. Both the photographic amateur and the layman, acquiring through the photogram a deeper understanding of light and space values, will be inspired to explore the potentialities of the camera since the photogram teaches that the same characteristics of gradations and contrasts have to be applied to camera work too. Good photography with the camera must enable us to capture the patterned interplay of light and shadow exactly as in cameraless photography. Thus photography becomes the translation of a world saturated with light and color into black, white and gray gradations.

Fig. 242. Man Ray, 1943 ▶
Rayogram
Looking at the white surface full of black lines, one finds an astonishing configuration of lines, dozens of distorted faces and figures, in its pluralism a perfect counterpart of the Picasso etching (on page 250) May Ray calls his cameraless photographs, "rayograms"; Schade his photos without camera, "shadogram". When I started out in 1921 with my cameraless photographs I suggested the name "photogram" which has been adopted since by most people


man Ray 1943



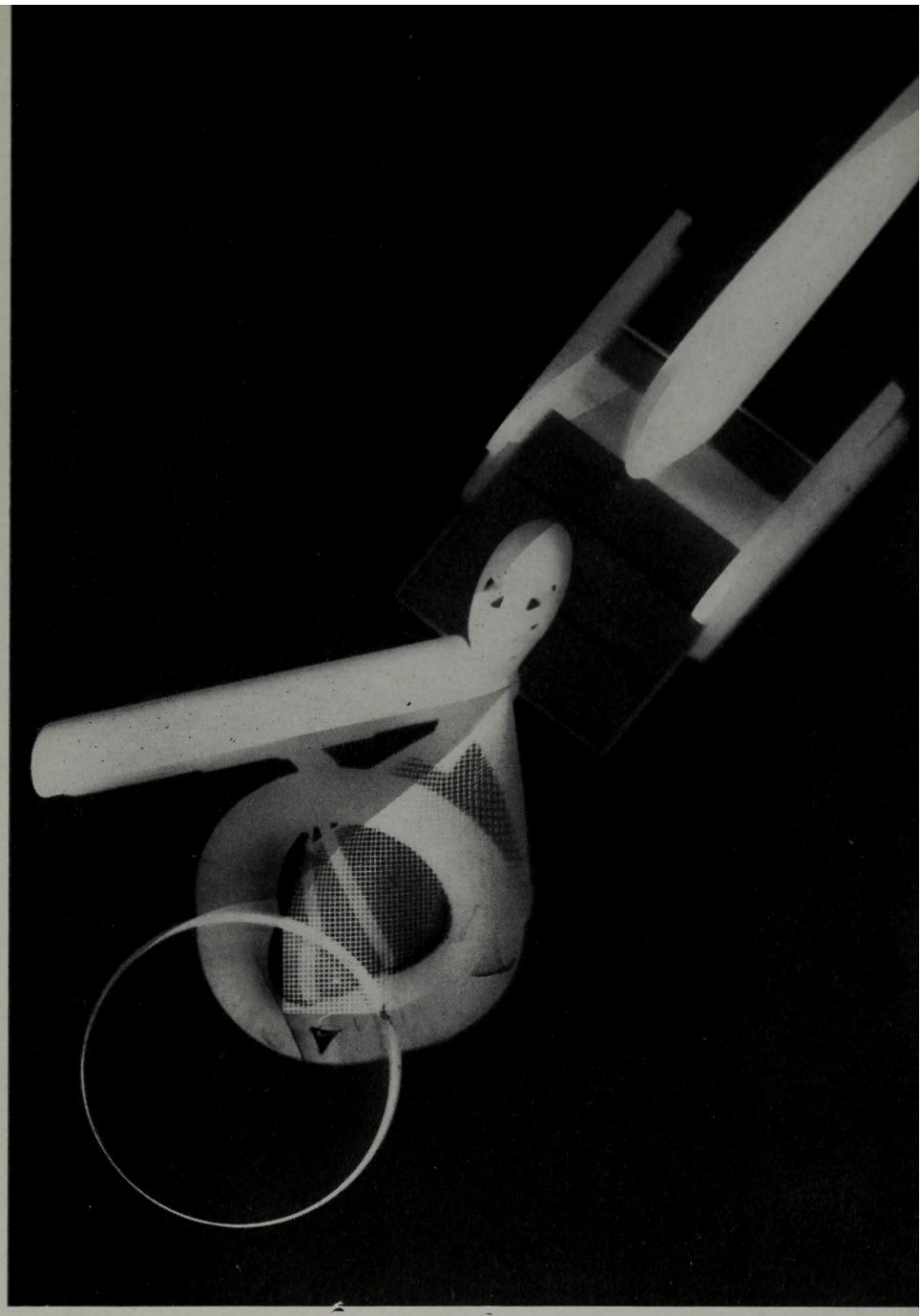


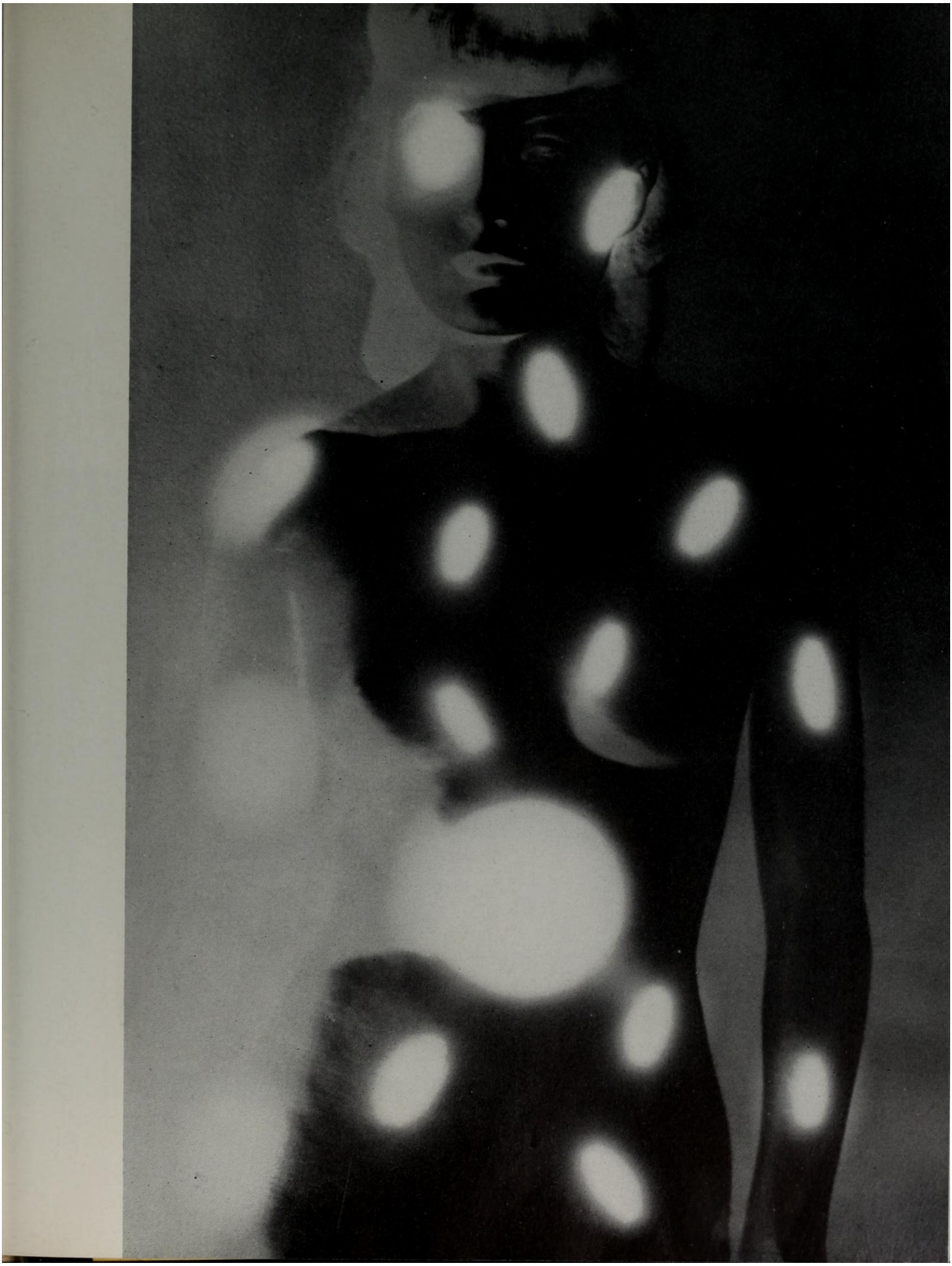
Fig. 244. O L. Moholy-Nagy, 1923
Photogram

◀

Fig. 243. O Gyorgy Kepes, 1941
Photogram

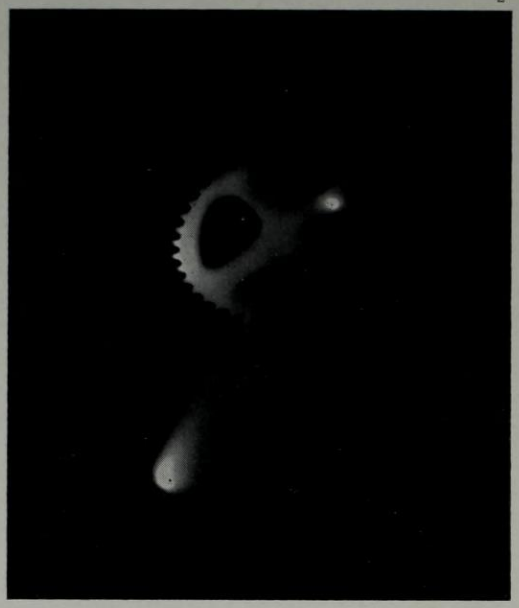
Fig. 245. © L. Moholy-Nagy, 1938
Photogram

Fig. 246. Lester Beall, 1944
Negative with white spots
This picture (from a medical advertisement) shows a great similarity to the photogram



1

2

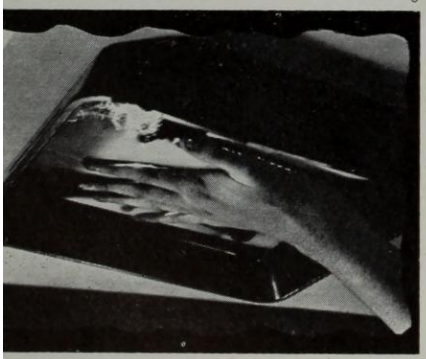


3

4

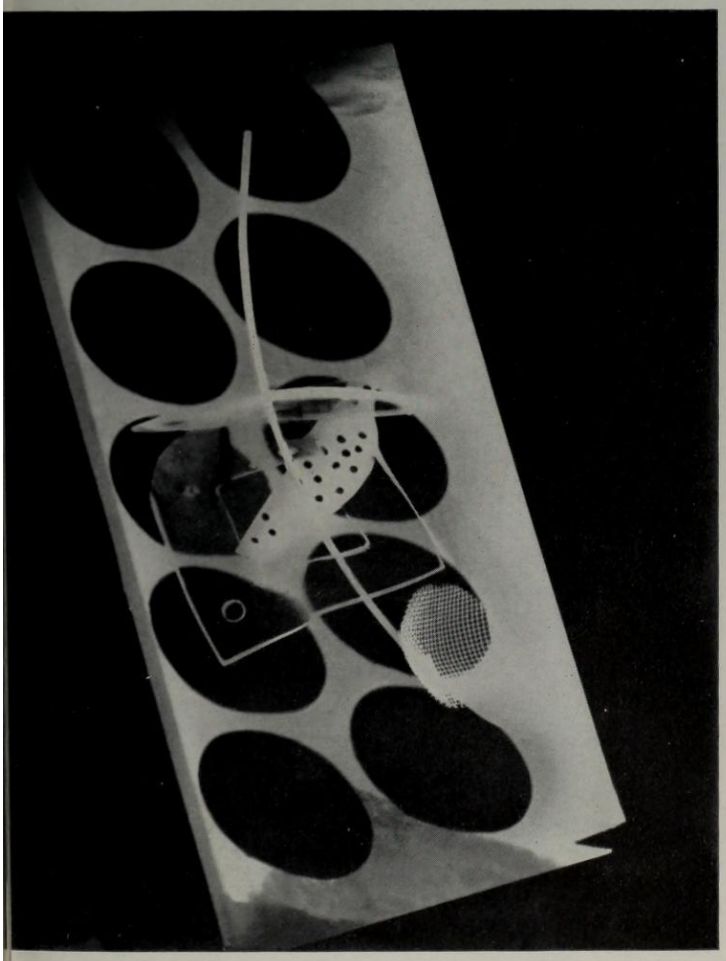
5

6



8

The photogram which originates as a negative where black becomes white and white becomes black, reverses the habitual way of selecting photographic views for their black and white values. By this reversal of customary observation a new hidden world arises out of night scenes, settings in contrasts, glowing with sublime magnificence, a play of radiating light sources enveloping the objects with an aura and giving them fresh potentialities for lyric or dramatic quality.



Dictionary of the photogram

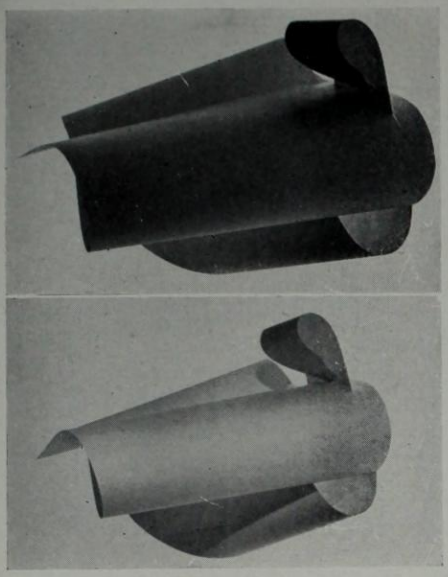
Figs. 247-254

(These examples have been selected by the author for a circulating exhibition on "Light as a Means of Expression", for the Museum of Modern Art in New York)

1. a pine cone laid on light sensitive paper and exposed to flashlight (M-N)
2. an egg beater (M-N)
3. coarsely woven ribbon (M-N)
4. tracing paper, pebbles, shells, string and paper (John Buffalo)
5. a drawing made by a pinpoint flashlight (M-N)
6. two hands on the photo paper in the developer exposed to light. The result is shown underneath as a
7. photogram (Robert Longini)
8. Perforated cardboard and metal, wire mesh, wire, transparent plastic (M-N)

These are some of the elements from which photograms, i.e. light composition with expressive intentions can be made

The enemy of photography is the convention, the fixed rules of the "how-to-do". The salvation of photography comes from the experiment. The experimenter has no preconceived idea about photography. He does not believe that photography is only as it is known today, the exact repetition and rendering of the customary vision. He does not think that the photographic mistakes should be avoided since they are usually "mistakes" only from the routine angle of the historic development. He dares to call "photography" all the results which can be achieved with photographic means with camera or without; all the reaction of the photo sensitive media to chemicals, to light, heat, cold, pressure, etc.



Figs. 255-256. O J. J. Smith, 1940
Light Modulator
Every piece of paper, crumpled or bent, acts as a light modulator. Here are shown two aspects, positive and negative, of the same piece of rolled paper. Every object can be understood also as a photo modulator whether skin, stone, metal—anything which reflects light.

light modulator

A light modulator is the second step in learning the elements of photography.

The function of the light modulator is to catch, reflect and modulate light. A flat surface does not modulate, it only reflects light. But any object with combined concave-convex or wrinkled surfaces may be considered a light modulator since it reflects light with varied intensity depending upon its substance and the way its surfaces are turned toward the light source.

As the rays strike an object some are reflected, others absorbed, others pass through it (if it is transparent). If the substance is translucent, it mainly diffuses the rays.

A human face can be understood as a light modulator. A face contains few straight, flat surfaces. The surfaces are nearly all compound curvatures. Surface, texture and color of a face vary with the person's age, from the skin of a baby to that of an old man with countless degrees of differences between. Then there are the eyes, the beard, the moustache, the hair, the eyebrows and the eyelashes, the lips and the teeth, the rich variations in light and shadow of the ear—all present a problem in light modulation. With all its complexity, the face offers a most adequate study for the modulation of light. As has been noted, however, a portrait is rather a difficult photographic task for a beginner. It is more advisable that the beginner manufacture simple light modulators out of paper, metal sheets, plastics or other materials which can be scored, rolled, twisted, molded or cut to produce various modulating light surfaces. Every addition, every variation—another type of material, shiny, opaque, or transparent—will change the modulating qualities. The variety of modulators is endless. Each light modulator is the product of the individual's own ingenuity, dexterity and interest.

●

Fig. 257. O William Keck, 1940
Feather

One of the photographer's tasks is to identify unmistakably for the spectator the true shape and nature of his object. This can be accomplished by lighting, from one or many angles, or with different combinations of light.

At the beginning of his studies, the light modulator represents for the student the "object." But the task always remains to use the light sources (or move the object or the camera if the light source is fixed) in such a way that the light defining the object immediately communicates the content. The wonder of communication lies in its endless variation. A creative photographer must try to enlarge the habitual scope of vision; create new relationships between known elements; utilize the expressive power of surprise growing out of the potentialities of the photographic means.

A good instrument for this is a "lightbox" made from a carton, two sides of which are perforated so that spotlights, some of them fitted with filters, can be placed at the holes. Objects can be hung on strings stretched within the box. The spotlights can then be arranged to strike the strings and objects in any manner desired. The light box is thus a particularly effective "laboratory" for the study of receding and advancing values of the lit surfaces. These effects produce direct emotional reactions

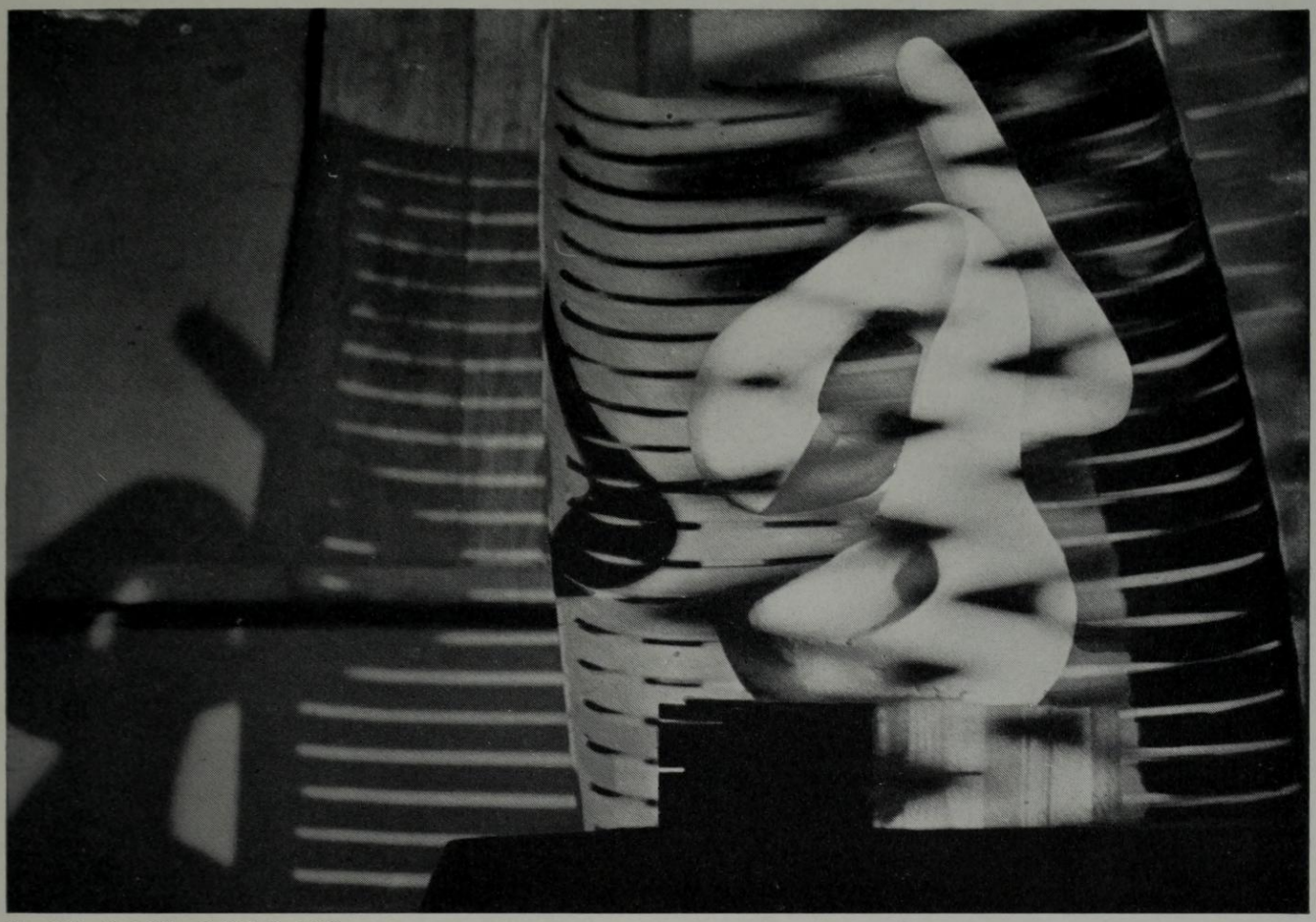
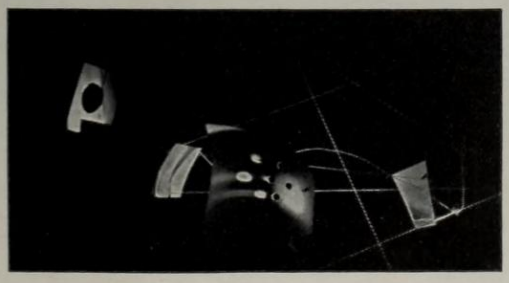


Fig. 258. O Millie Goldsholl, 1945
Light modulator

which can be enlarged upon through the combinations of visual fundamentals, shape, contour, texture, black and white and gray values and color. Thus, one may paint with light as surely as one can paint with oil and pigment.

Fig. 259. O G. Abbott, 1942
Light box exercise



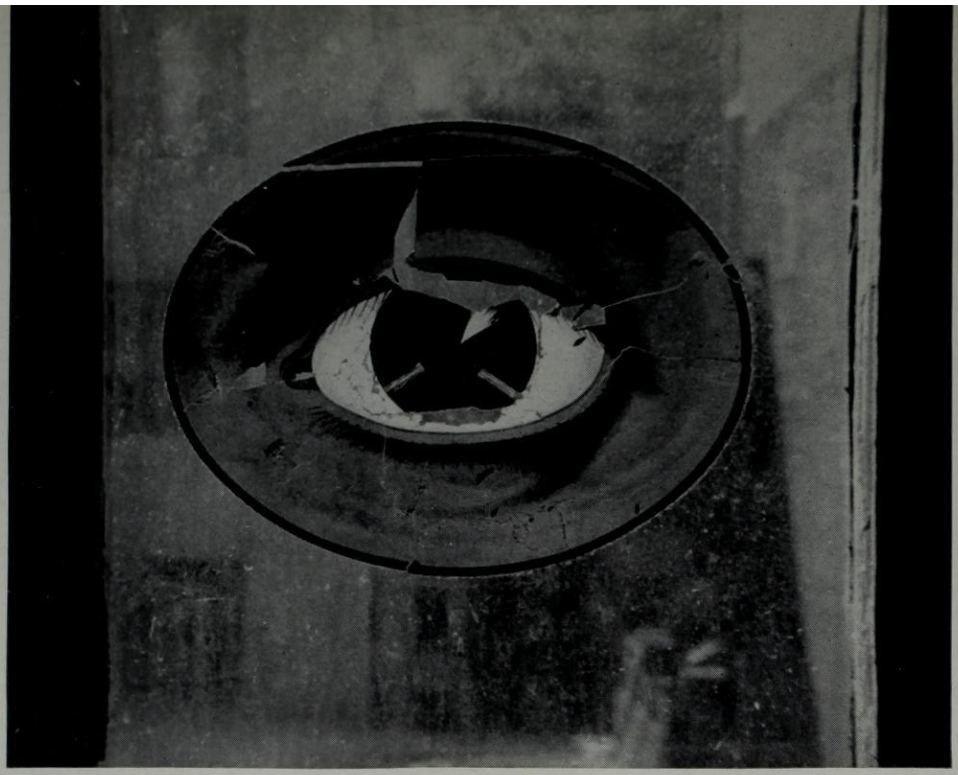


Fig. 260. O Nathan Lerner, 1943

Nathan Lerner, who was the first to make a creative use of the light box and made with it the greatest number of experiments, comments on them as follows:

"Anyone working with light soon discovers that freedom of selection, a necessary factor in the creative activity, is limited unless there is some method of separating the accidental qualities of light from those qualities desired.

For light is more than simply a necessary adjunct to visual functioning, it is a possible medium of expression in itself, if one could only force its bounds and somehow make it reveal itself. Light possesses a tremendous psychological power because it is so deeply immersed in the farthermost recesses of our unconsciousness, and because it is so intimately connected with our space experience as to be almost identical with it. For visible space is lighted space and with light therefore we can evoke space experience.

I felt that if I could create a virtual world of darkness, which I could then develop into a disciplined world of light, I would be approaching the solution of the problem of controlled selection. The achievement was perhaps simpler than the wish would indicate.

I made a box, which was open on one side and with many holes cut into all sides. These holes were used for suspending objects and also served as openings for light to enter. Over these openings, objects (wire screen, etc.) could be placed and projected on the materials inside the box. When desired the front could be covered with glass so that smoke or gas could be introduced into the box. This would enable one to study and photograph light in a purer form, as a beam, solid and beautiful, apart from its bondage to objects. The inside of the box was painted black.

With this simple device a great measure of control over light can be exercised. But aside from its value as a method for experimenting in a new medium, it has a further general value.

For light is one element; material object another, and the relationship of one to the other makes up our visual world. In the light box they become easily understood elements of visual communication. The light box, therefore, has significance for any artist. Working with it can give him a deeper insight into the visual-psychological elements that play an important role in making any picture exciting and meaningful."

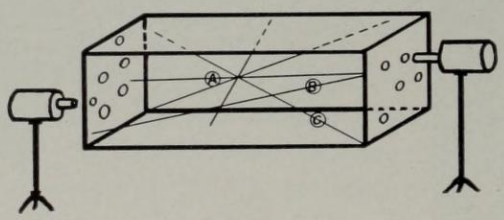


Fig. 260a. O Nathan Lerner, 1938
Diagram for a light box
The manipulation of light can be approached with a "light box", which is made from a cardboard box, the sides of which are perforated so that spotlights—if needed, fitted with filters—can be placed at the holes. Objects A, B, and C, can be hung on strings stretched within the box. The spotlights, touching only the strings and objects, create controlled lighted areas, situations which allow the study of the receding and advancing tone values

Fig. 261. © William Keck, 1939
Reflections and mirroring

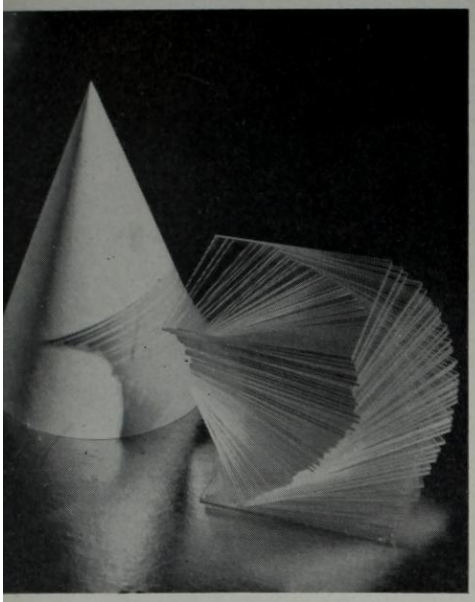


Fig. 262. O Robert Buchbinder, 1939
Light modulator

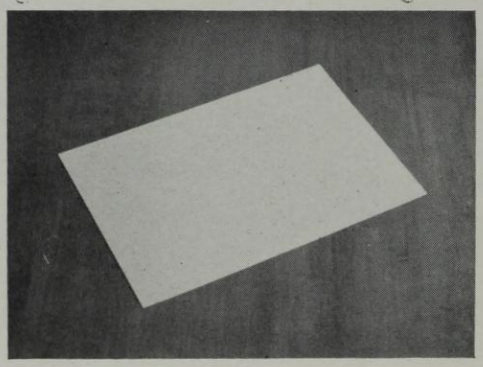
Textures and structures can also be understood as light modulators; similarly macro and microscopic and relief photographs and solarization. After working with the light modulation in all its aspects the student will have no difficulty in photographing any portrait, landscape or industrial scene. Having studied synthetic light modulators in the abstract, separately, the student will know how each type of modulation will be transcribed on the photographic plate, film or paper. There will be many shapes and types of surfaces, space relationships, depth, height, comparative dimensions; interpenetrating surfaces that meet and cut one another; transparencies, mirrorings, etc. By controlling the uses and effects of each individually and in relation to one another in a photograph, he will be able to apply the principle of the light modulator as an element of a broad photographic concept.

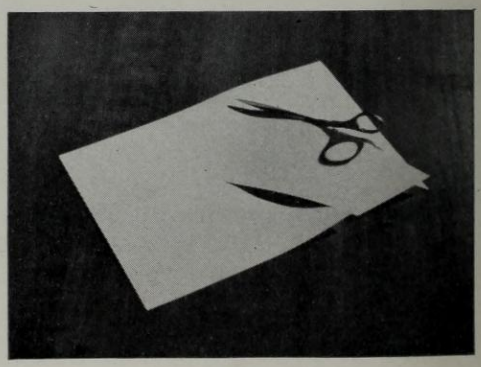
●

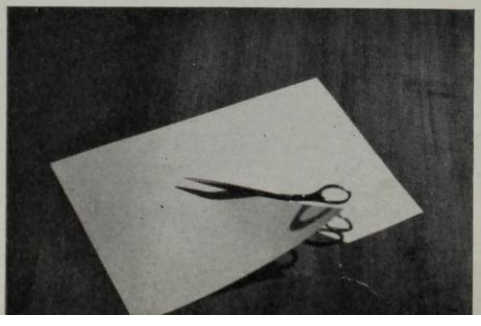
In the interrelated training of the Institute the student's study of light modulators is integral to the rest of his work. He learns to see his own experiments better and more thoroughly; his sculpture, tactile chart, wire work, wood cut, etc., take on new meaning if he also understands them as light modulators. A single object shapes and unfolds itself in the student's own hands; each different experiment is another end which literally constitutes the object anew. He may experience also different revelations from his work if it is rendered differently. In this he has a great variety, as he not only photographs his own productions but at the same time makes freehand and mechanical drawings of them.

Dictionary of the light modulator
Figs. 263-269. O Jean Kendall, 1946

1. a sheet of white paper on a dark background
2. cutting a slit in the paper a number of grey tones occur
3. another cut is made
4. one corner bent, causing a gradual darkening as the paper curves away from the light source
5. the effects of bending up two sides
6. fastening four corners produces more complicated shadows
7. punching holes adds more values







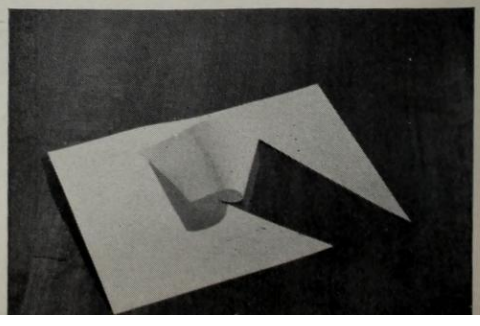
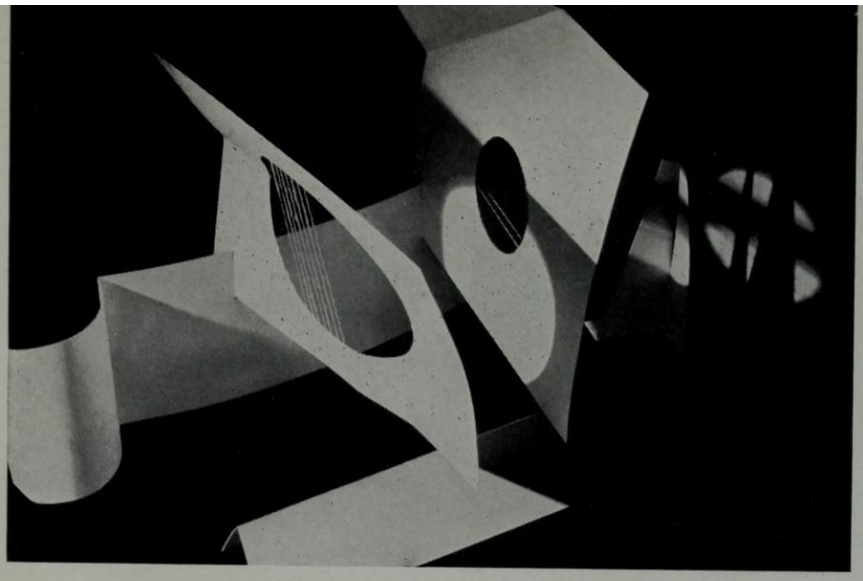


Fig. 270. O L. Cuneo, 1937
Light modulator



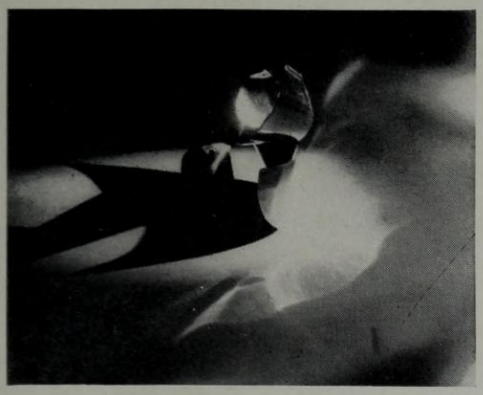


Fig. 271. O Institute of Design, 1939
Light modulator (metal)
Light modulators in metal are most intriguing if placed on gray background on which the white reflections of shiny metal can be well distinguished

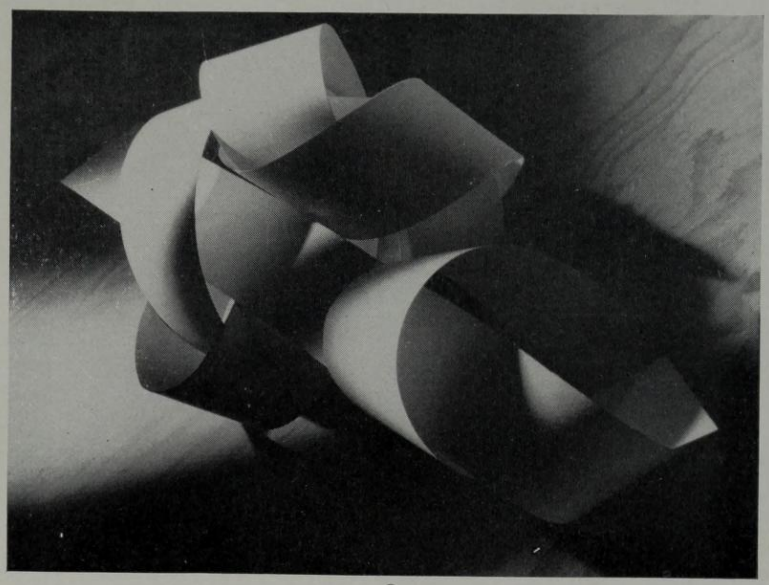
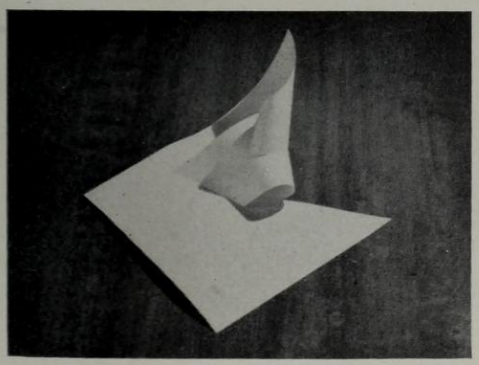
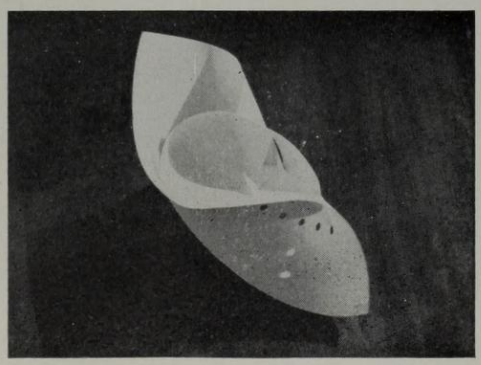
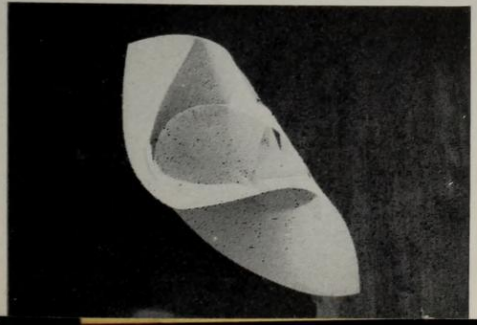


Fig. 272. O Margaret Roth, 1939
Paper modulator contrasted with a flat panel of grained wood







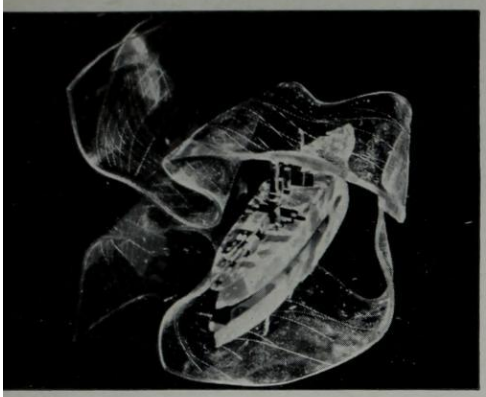


Fig. 273. O Nick Savage, 1943
Transparency on black

other experiments

Photographic experiments may embrace a wide territory: shadow observation of shapes on flat, curved or irregular surfaces, producing less or more emphasized distortions; observation of textures in the form of collages; mirror combinations; positive and negative images; partial enlargement and reduction of suitable subject matters; use of prisms for shifting details of objects, for example, an ear in the place of an eye.

Such experiments can be divided into three sections: light and objects; photographic optics; processing and its manifold combinations. These tasks clearly circumscribed at first can later develop into independent experiments. This is the prerogative of every research worker.

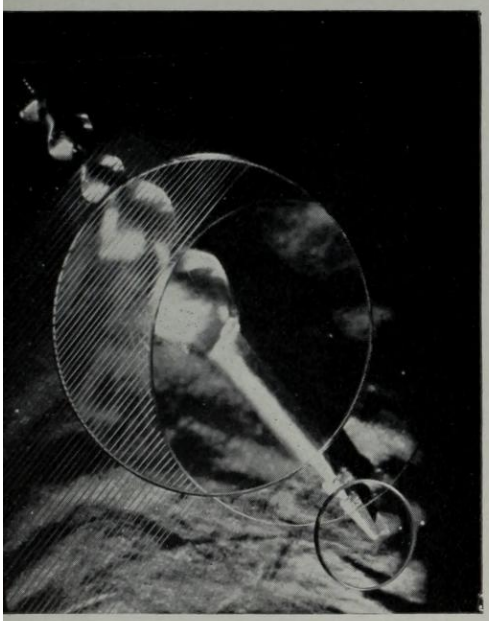


Fig. 274. O Robert Erikson, 1943
Reducing and magnifying

Fig. 275. O Institute of Design, 1941
Face in a multiple mirror

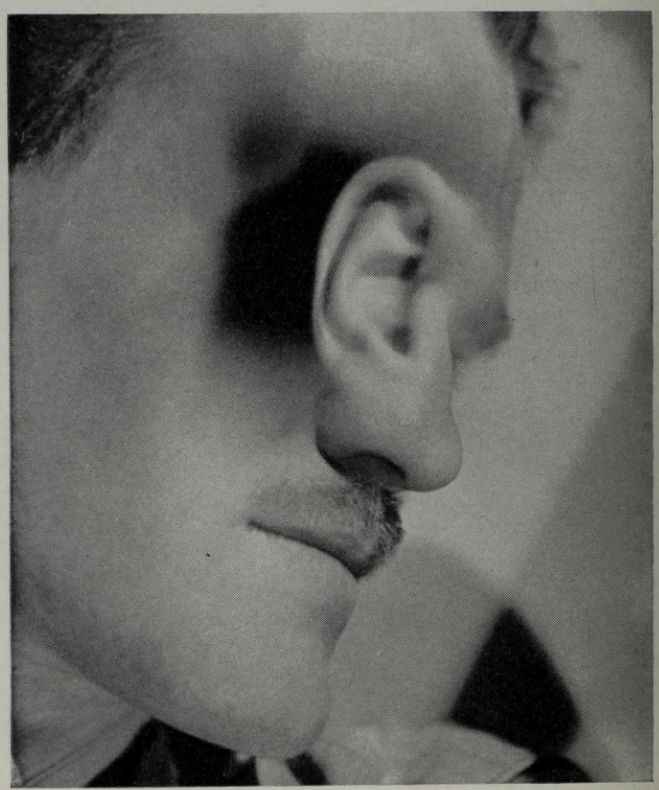
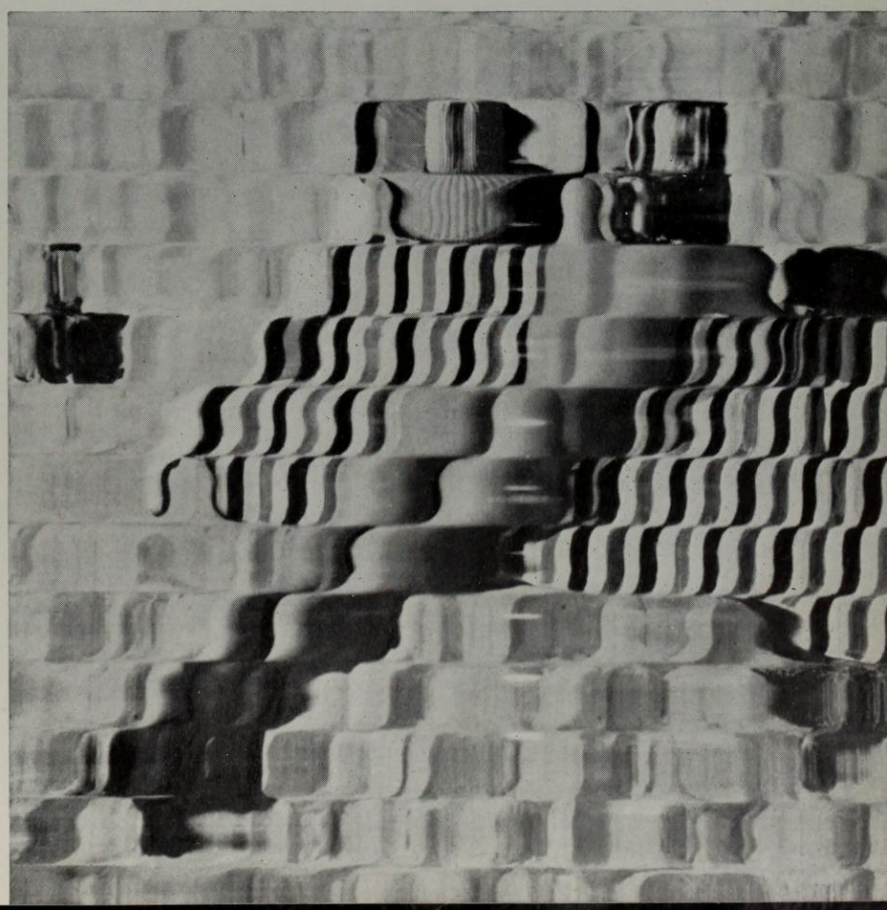


Fig. 276. O George Morris, Jr., 1943
Shifting with prisms
Can you see with your ear? or hear with your eye?

Figs. 277 a, b. Edward Rinker, 1944
Photograph and its distortion behind corrugated glass.



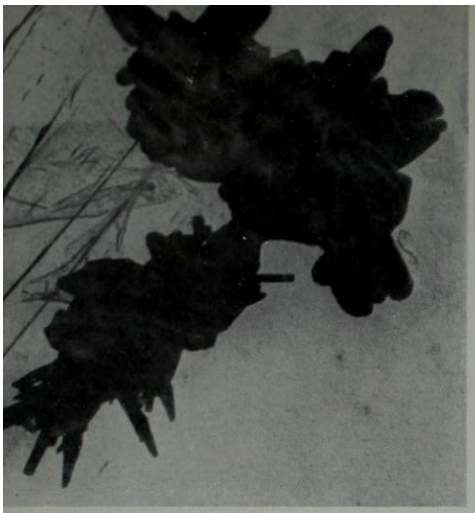


Fig. 278. Electron micrograph, 1940
One minute grain of face powder, enlarged 25,000 times under an RCA electron microscope
The electron microscope uses "particles" of electricity—electrons—instead of rays of light, and magnetic fields instead of glass lenses, to reveal the invisible. It attains direct magnifications of 10,000 to 30,000, with such fine detail that photographic enlargements to 100,000 and even 200,000 times life size are possible. This electron microscope is a good example of the fact that scientific findings may result in new technologies, which in turn may change life as did the lens microscope of Anthony Leeuwenhoek (1632-1723), by giving medical science a new direction

photographic vision

In rendering with the camera one may find visual sensations just as surprising as in the direct records of light evolved by photograms. Such particular developments are the bird, frog and fish-eye views, magnifications, ultra speed shots, reflections, penetrations, superimpositions, solarizations, distortions. Their systematic coordination opens up a new field of visual presentation, an extension of visual possibilities, in which we may expect much further progress. Photography can render, precisely register, the speed of objects or stop motion in a hundredth, thousandth, or millionth of a second. It can "see" through mist, even in the dark, by using infrared emulsion. It can penetrate and record the inside of opaque, solid objects with x-ray photography. In combination with the electron microscope, it can make visible fantastically minute matter. Such scientific and technological advances almost amount to a psychological transformation of our vision,• since the sharpness of the lens and its unerring accuracy

• *Helmholtz used to tell his pupils that if an optician were to succeed in making a human eye and brought it to him for his approval, he would be bound to say: "This is a clumsy piece of work."*

Fig. 279. O Frank Sokolik, 1945
Distortion
A camera was held in front of a corrugated glass plate behind which three persons were standing

Fig. 280. O George Morris, Jr., 1943
Solarization

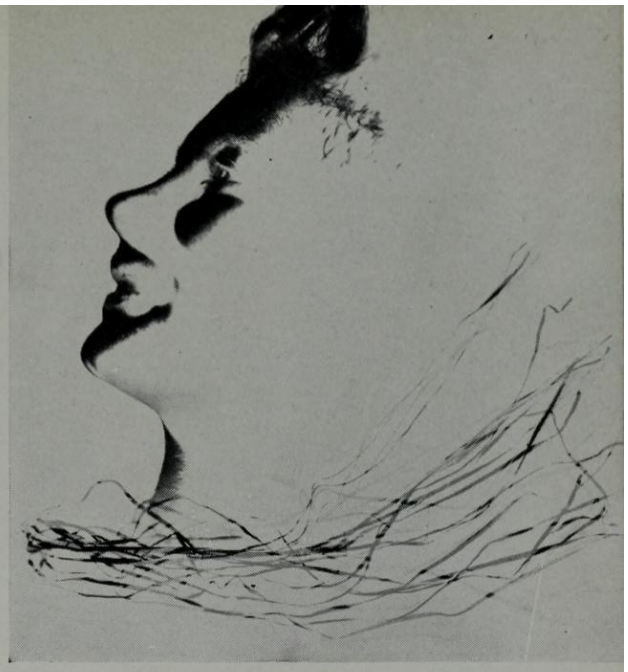


Fig. 281. O Eugene Idaka, 1942
Solarization

These photos show the creative use of "mistakes" a photographer can make and include in his work: light striking negative and producing solarization. To this he could add: heat from the enlarging lamp burning the film; hot water reticulation; condensation frozen in refrigerator causing patterned shrinkage of emulsion; crystallization of hypo, fingerprints, etc.

have now trained our powers of observation to a higher standard of visual perception than ever before. Photography imparts a heightened and increased power of sight in terms of time and space. Even a plain matter-of-fact enumeration of specific photographic techniques enables the student to divine the power latent in these elements.

eight varieties of photographic vision

1. *Abstract seeing* by means of direct records produced by light; the photogram which captures the most delicate gradations of light values, both chiaroscuro and colored.
2. *Exact seeing* by means of camera records; reportage.
3. *Rapid seeing* by means of the fixation of movements in the instantaneous snapshot, stroboscopic photography, an instantaneous photograph with rhythmical interruption of the motion flow.
4. *Slow seeing* by means of fixation of movements spread over a period of time, prolonged time exposures; e.g., the luminous tracks made by the headlights of motorcars passing along a road at night; virtual volume.
5. *Intensified seeing* by means of
   (a) macro and microphotography;
   (b) filter photography which, by chemical variation of the sensitized surface, permits photographic potentialities to be augmented in various ways, ranging from the revelation of far-distant landscapes veiled in haze or fog to exposures in complete darkness—infrared photography;
   (c) bird, frog and fish eye view.
6. *Penetrative seeing* by means of x-rays; radiography.

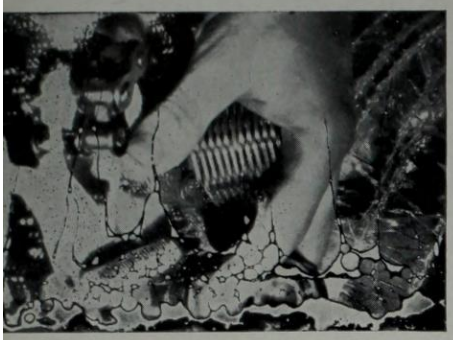


Fig. 282. © James Cross, 1943
Texture produced by dropping oil into the developer.

Fig. 283. © Institute of Design, 1941
Distortion in the ferrotype

7. *Simultaneous seeing* by means of superimpositions; a process of automatic photomontage.
8. *Distorted seeing*—optical jokes that can be automatically produced by
   (a) exposure through a lens fitted with prisms, of reflecting mirrors or the distograph
   (b) mechanical and chemical manipulation of the negative during or after developing, using oil drops, suds, soaps, etc.; lighting, heating or freezing, resulting in distortion, reticulation, solarization, etc.

image sequences; series

There is no more surprising, yet, in its naturalness and organic sequence, simpler form than the photographic series. This is the logical culmination of photography—vision in motion. The series is no longer a "picture" and the canons of pictorial esthetics can only be applied to it mutatis mutandis. Here the single picture loses its separate identity and becomes a part of the assembly; it becomes a structural element of the related whole which is the thing itself. In this sequence of separate but inseparable parts, a photographic series—photographic comics, pamphlets, books—can be either a potent weapon or tender poetry.

But first must come the realization that the knowledge of photography is just as important as that of the alphabet.

The illiterate of the future will be the person ignorant of the use of the camera as well as of the pen.

photogenic versus photocreative

Photography—not only in series but also in single shots—can become the tool of the fantastic, of the dream and the super-real. The desire to penetrate the subconscious and set up a more governable mechanism of inspiration is an eternal human com-

Fig. 284. © Joseph A. Mills, 1942
Reflections
The ferrotype was lit by two spotlights, their reflections cast on the wall and photographed.

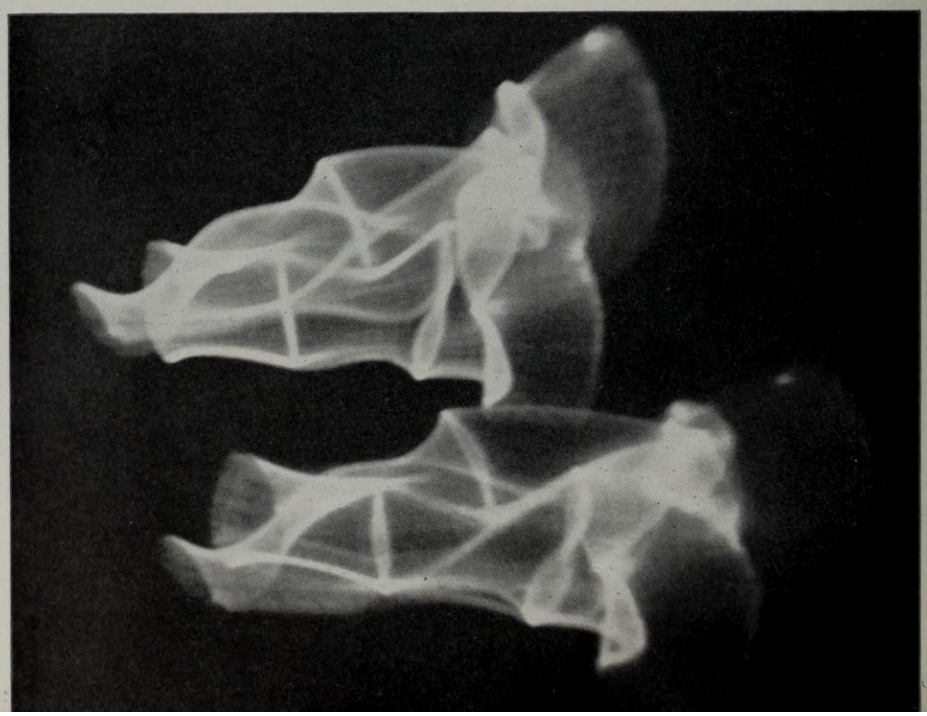


Fig. 285. © Stanley Kazdailis, 1944
Virtual Volume
A long exposure of a revolving wire structure

ponent. Cameraless photography, superimposition, prisms, photomontage, mechanical or chemical distortion, the use of negatives and solarization, are all basic to the technical means of photographic expression. And yet, properly used, they help to create a more complex and imaginary language of photography.

There are indications that with a changing of intellectual attitude the photographer of today is no longer exclusively interested in photogenic (the traditional illusionism plus glamor) renderings, but more in synthetically composed situations.• His attention is shifting to the control of photographic effects rather than on the event itself. He tries to acquire not only a photogenic but a photocreative mind. He will not only select what he finds but he will produce situations, introduce devices so far unused and neglected, which for him contain the necessary qualities of photographic expression. When he reaches a certain level of competence in the use of his tools the artist thus unhindered gropes toward new areas of expression within the realm of his medium.

• *Objects, situations, persons are called "photogenic" if they have the properties for good photographic records. These properties can be of most diverse nature: roundness of shape; richness of texture; transparency; mirroring surface; skeleton structure;—everything which looks good in the photographic print.*

A growing control over the means liberates his creative energies so that they can be concentrated directly on the problems to be expressed. The problems may be of conscious or subconscious nature. They may be determined by motivations behind which only emotional forces stand.

The inspiration to express these emotional forces may come from any layer of existence. The choice of medium is in the artist's hand; he must have the ability to summon artistic coherence out of the means he uses. In this way photography can be used for subconscious "recordings". This sounds paradoxical since photography was developed to serve exact observation and rendering of the immediate reality—the ideal tool of an age devoted to science and reason.

In the 19th century telescopic and microscopic "miracles", x-ray and infrared penetrations were substituted for fantasy and emotional longing. These phenomena, motion and speed, electricity and wireless, seemed to give food enough to the imagination without introducing subconscious automatism. Photography was the golden key opening the door to the wonders of the external universe to everyone. The astonishing records of this period were *objective* representations, though they went in some cases beyond the observation capacity of our eyes as in the high speed, micro-macro, x-ray, infrared and similar types of photography. This was the period of "realism" in photography.

new directions

The new arts opposed the "flattening" simplicity of a reality based upon logical derivation alone, without the acknowledgment of the realm of the psychological space-time. The expressive character of dreams, the automatic writing employed by surrealist authors, with direct impact of words—slang, misspellings and recoined idiomatic expressions—offered an analogy for a new use of the visual means.•

Painters and photographers tried to enlarge the expressive content of their work by fusing the customary with the unexpected and turning what the avant-garde termed the "law of chance"—fortuitous findings—into meaningful results.

superimposition

The mechanical process of double exposure or printing photos over each other was one of the means used to generate imagination and emotional concentration. Superimpositions in simple as well as sophisticated manifestations can "record" dreams or dream-like content. Such superimpositions overcome space and time fixations and unite strange and diverging subjects into new entities. They transpose insignificant singularities into meaningful complexities; banalities into vivid illumination. The transparent quality of the superimpositions often suggest transparency of content as well, revealing unnoticed structural qualities in the object.

Fig. 286. O Arthur Siegel, 1946
Superimposition of two negatives

• *Automatic writing was originally a psychological experiment. It was produced in a kind of self-hypnosis, writing down thoughts occurring without conscious control. It is a variation of the "stream of consciousness" technique in literature.*

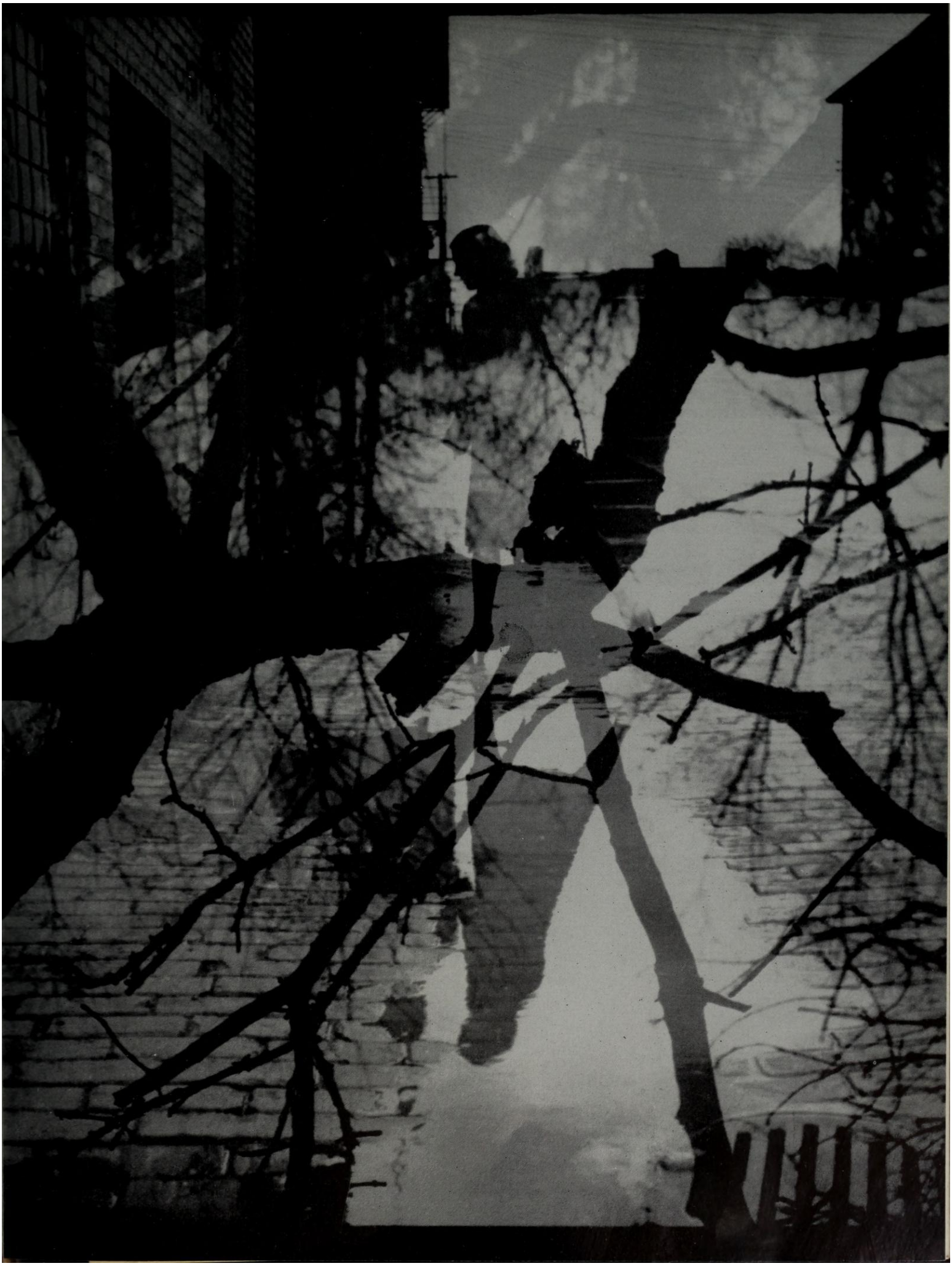


Fig. 287. Raoul Hausmann, 1920
Tatlin at home (photomontage)
Hausmann, the dadaist, was with John Hartfield, Hannah Hoech and George Grosz, one of the first of the "photo monteurs". The photomontage, an assemblage of single photographic illustrations into a new unity, was derived from the "collage" of the cubists. The collage itself was long known at the end of the 18th century as a kind of greeting card and it had a revival in the 1850's

photomontage

Another way of extending the means of photography is offered by the photomontage.

Around 1920 the dadaists, the predecessors of the surrealists, made the first photomontage.• Their mosaics made up of magazine clippings, measuring tapes, catalog illustrations, etc., showed clearly the single elements crudely glued together as were the cubist collages. The dadaists in exhibiting the brutally torn and roughly-cut photographs, showed that they held in contempt historic "beauty" with its illusionistic connotations. Theirs was a "counter war", an emotional pandemonium full of fury and ridicule directed against the imperialism of the first world war and the social shortcomings of their epoch. These photomontages were reminiscent of the first futuristic, *bruitistic* symphonies which combined noise and hubbub into a thundering orchestration.• •

The photomontage later arrived at a more "rationally" organized form somewhat easier to grasp, though still with the interpenetration and fusion of bizarre relationships showing the vicious, funny and witty, the earnest and tragic side of the creature; often the plot against pettiness and inadequacy.

Photomontage—like superimposition—also attempts to develop a technique for the recordings of events occurring on the threshold between dream and consciousness; a tumultuous collision of whimsical detail from which hidden meanings flash; visual poetry with bitter jests and sometimes with blasphemy.

Most photomontages demand a concentrated gymnastic of the eye and brain to speed up the visual digestion and increase the range of associative relationships.

• *Photomontage was known to old photographers who sometimes had to "patch-in" individual photographs into group pictures when circumstances did not allow the shot of the whole group.*

• • *Around 1912 the futurists tried to rejuvenate music. Luigi Russolo composed a futuristic symphony containing only noises ("bruits") produced by electrically-powered noise mechanisms.* *(See also page 292.)*

Fig. 288. O Robert Santmyers, 1944
Photomontage
In the Institute of Design, Chicago, many experiments are made which can be adapted for immediate practical use. This is such an experiment, a combination of a drawing and a photograph. This may have its significance in newspaper illustration and advertising, in printing on absorbent paper which doesn't allow the use of fine halftone cuts

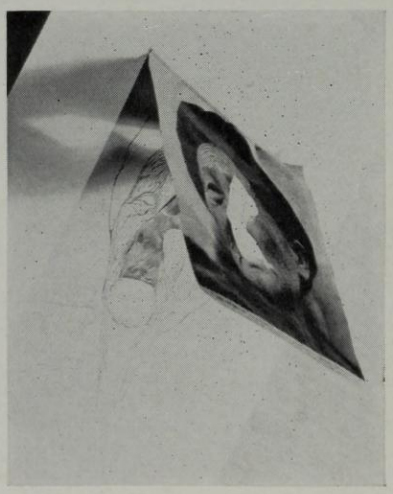
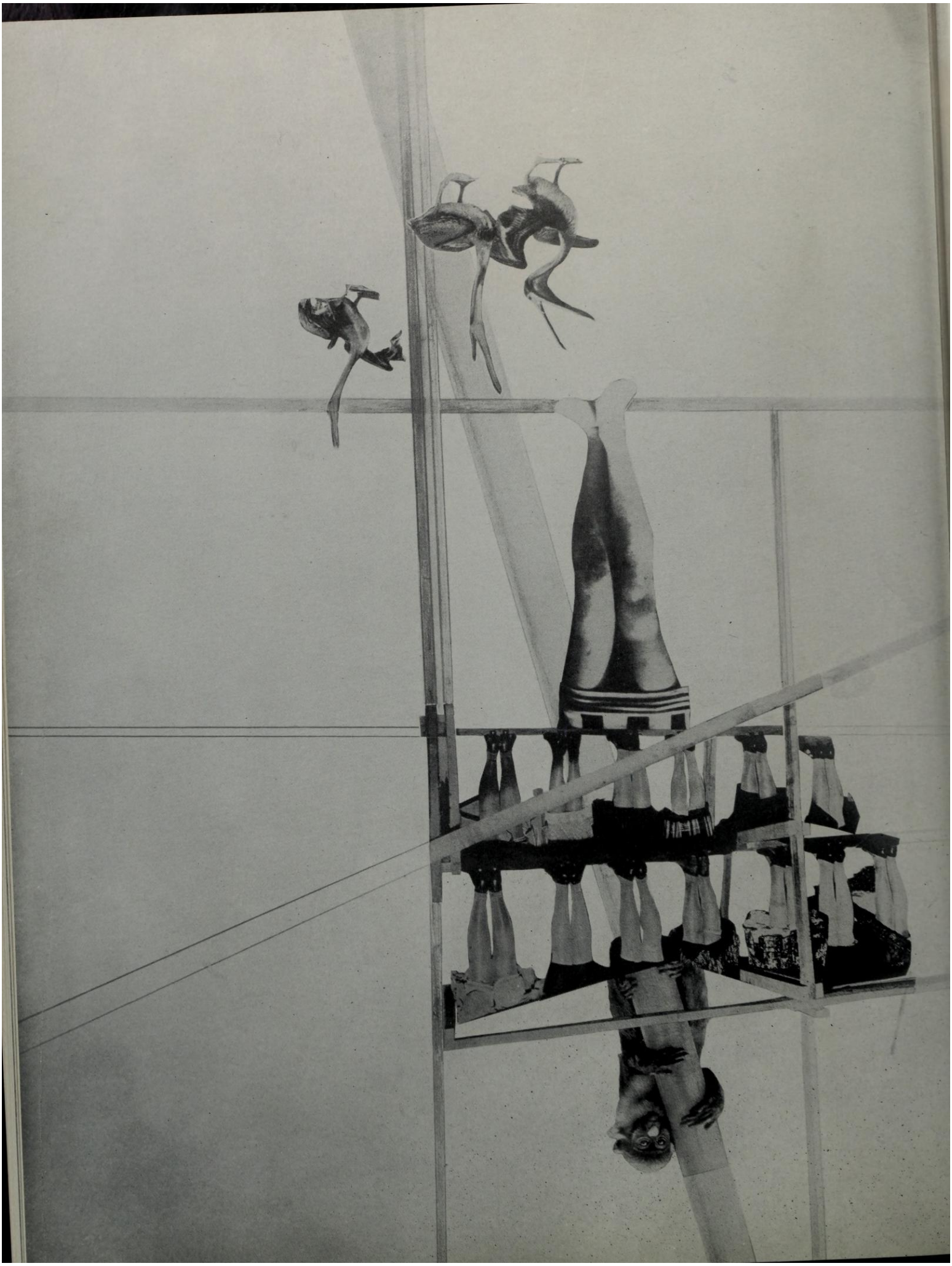


Fig. 289. O L. Moholy-Nagy, 1925
The structure of the world (photomontage)
The photomontage can be dramatic, lyrical; it can be naturalistic, abstract, etc. Here is a satirical montage making fun of the fright of the monkey and the quack-clacking super-geese (pelicans) who discovered the simplicity of the world constructed as a leg show



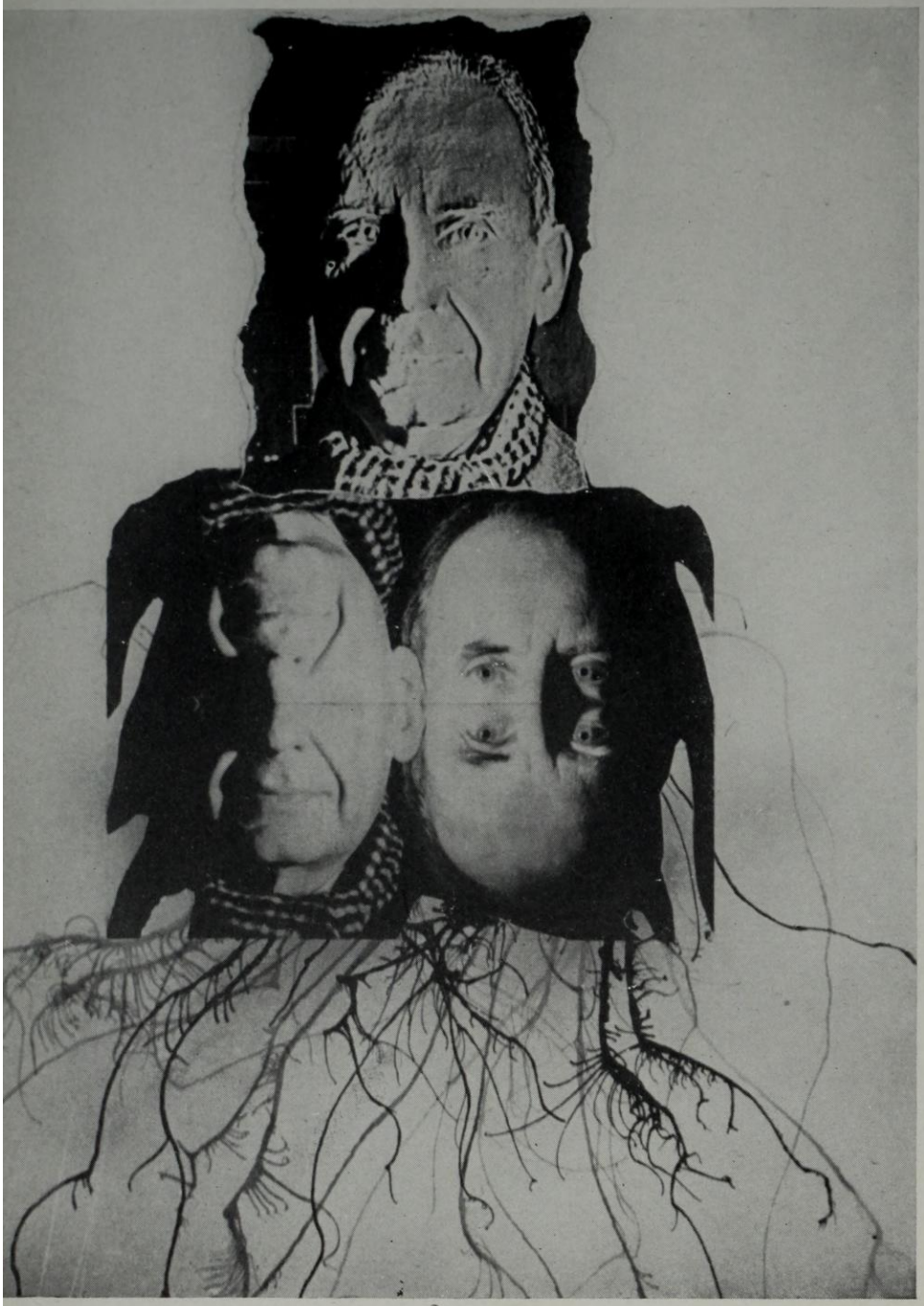


Fig. 290. Xanti Schawinski, 1943
Variation on a theme: the face of Walter Gropius
"I wish you further growth. I hope the roots of your work go deeply into the ground of America." Xanti Schawinski says this with his photomontage to Gropius.
The face on the top appearing in relief is the result of printing a negative and a positive over each other, slightly off register

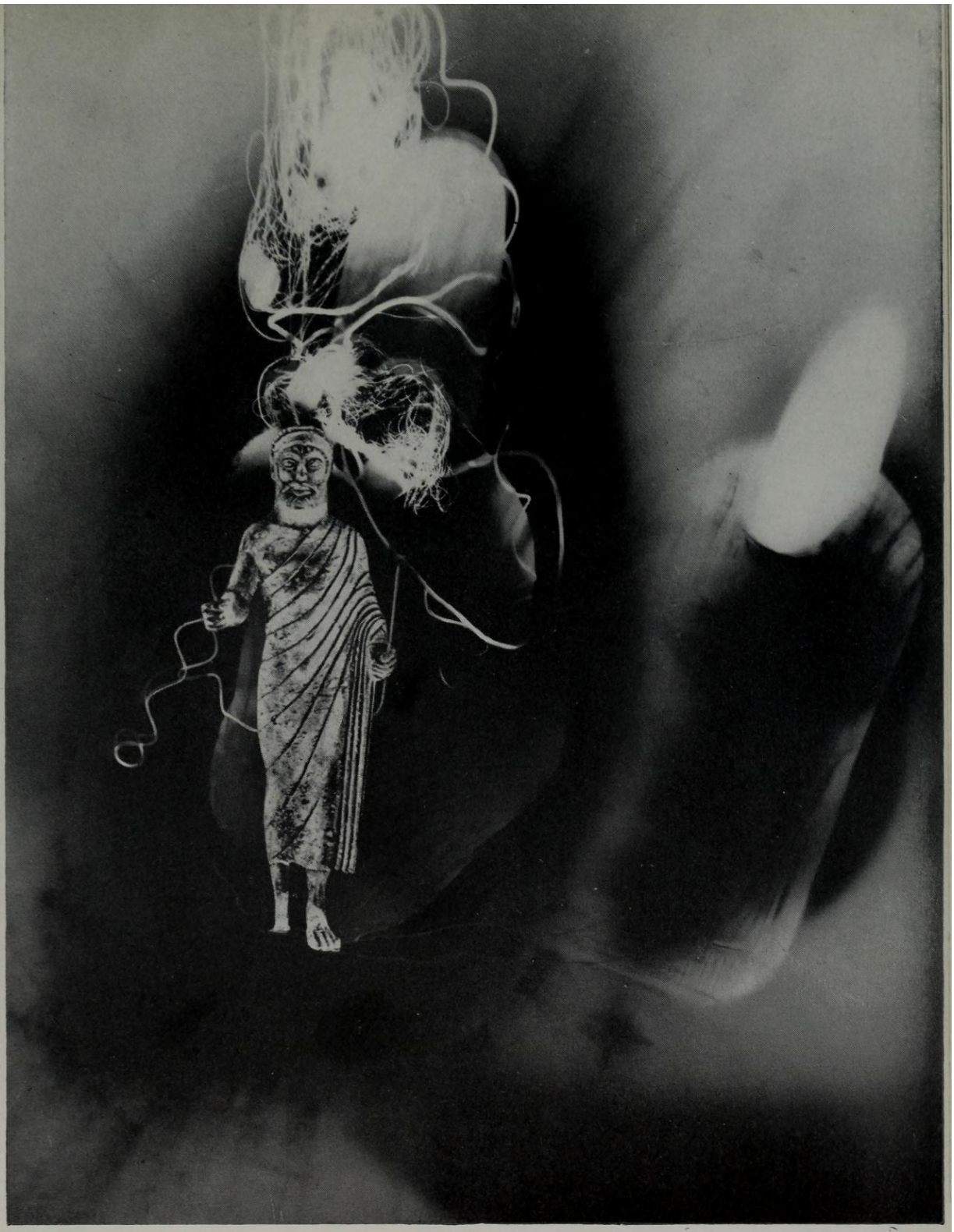


Fig. 291. O L. Moholy-Nagy, 1943
"Zeus has his troubles too"
Photomontage on a photogram background