problems of contemporary art

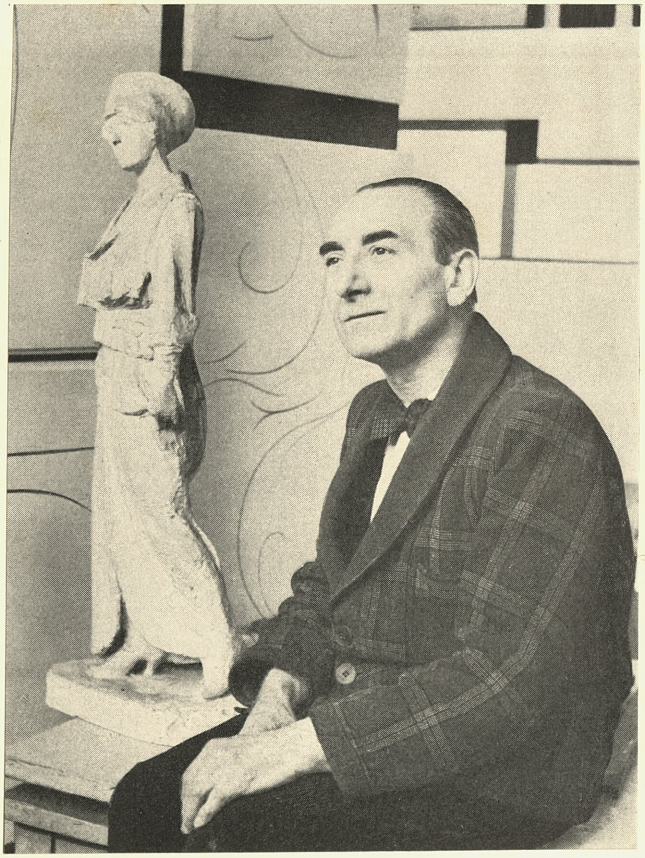
vantongerloo: paintings sculptures reflections

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Problems of Contemporary Art . . . number **5**

Georges Vantongerloo Paintings, Sculptures, Reflections

Βιβλιοθήκη
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ΙΔΡΥΜΑΤΟΣ
ΤΕΧΝΩΝ
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Preface *by* Max Bill

Georges Vantongerloo, painter and sculptor, living in Paris, will be 60 this year. He was born in Antwerp, November 24, 1886, and studied sculpture and architecture at the Antwerp Academy. The First World War led to his going to Holland. At that time Piet Mondrian was working on his "plus-minus" pictures and, under the influence of van der Leck, had just adopted the use of primary colors. Théo van Doesburg called together his painter and architect friends, and in a manifesto they set forth a plan of collaboration which gave its imprint to the first few years of the periodical "De Stijl." It is not unimportant to recall that in 1917, when "De Stijl" became the mouthpiece of a new conception of art, Georges Vantongerloo was the youngest of the three renowned artists. Théo van Doesburg died in 1931 at the age of 48 in Davos; Piet Mondrian, the oldest, was 72 when he died in New York in 1944.

The artistic doctrines advocated in "De Stijl" arose from almost simultaneous, closely related efforts, but represented different personal concepts and interpretations. In order to know the foundation of Vantongerloo's art, to follow the mathematical-artistic trend of his ideas and thereby to acquire an

understanding of his thought and his influence, the most significant of his essays have now been selected by him. These essays were written over a period of thirty years and thus show the change as well as the consistency in his ideas, the continuous development of his basic thinking.

Vantongerloo's thought is a means of following his artistic imagination, which often appears in unexpected shape. Here, as in every work of art, optical-physical expression is at work. One might say that the written formulation of the artist's ideas does not necessarily provide the easiest approach to an understanding of a work of art; the writings of artists are inevitably liable to misinterpretation and misunderstanding. Nevertheless, such writings have always been important documents not only in understanding the individual artist but above all in revealing his problems and his trend of thought in a manner free from outside interpretation.

Vantongerloo in 1924 in Antwerp published under the title "L'Art et son avenir," essays written in Brussels and Menton between 1919 and 1921; since then no collection of his writings has been issued. The present publication endeavors to make good this lacune. Between the years at Menton, when Vantongerloo reinforced the basis of his art by lengthy mathematical studies and today there stand years of search, of synthesis by one of the most original thinkers and artists of our time, whose work has now attained a comprehensive breadth and gives evidence of the highest sensitivity.

Zurich, Summer 1946

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Introductory Note *by* the Author

Art is communicated, suggested to us by sensation.

We have an esthetic sensation of our work, which is directly related to our own value. No two sensations are alike.

Art is infinite and expression is continuous.

The elements: forms, colors, lines, engender an expression, a function.

A work of art unveils the state of the author's soul. Whether the motive of the creation is nature, a philosophical or poetic idea, it is the expression that counts. The subject never participates in the artistic value of a work. The subject is the title of the proposed problem, but it can also be a parasite. The important thing is the solution one gives to the proposed problem. Nature can give us a sensation but it does not belong to art. Moreover, there is never any question of copying.

The intention of the creator is unveiled by his work and it is up to the spectator to be in pitch, otherwise there is no synchronism.

The intention can be noted in my works. It is the rendition of an expression. The solution to be given to the problem of art with its indefinite characteristic (which must not be confused with the solution of the proposed problem. The

subject). It is not the search for an expression, for an ism; it is solely a rendition, a functional value. Essentially, I offer different solutions of a single problem. To be sure, there are several stages, but each is dependent on my individual degree of evolution at a given moment. To express oneself will always be difficult. One must constantly obey the infinite.

In art there are always two problems and therefore two solutions. The problem of the SUBJECT, the manner of envisaging it and resolving it. And the problem of ART, which is the manner of combining functions and of incorporating into them a sensibility, which is individual. And finally, the solution to be given to the problem of ART. On the result of these two problems taken together depends the value of the work of ART. These problems must therefore be resolved with elegance.

In order to avoid a dominant in a work, it is also necessary that the solutions be in harmony and that one not infringe on the other. The sensibility of the author guides this harmony. No conventional rules which would lead to dogma. Each work has its own rules; it is a totality in itself. The same rules encountered in another work would be a tautology resulting, as often happens with artists, in the copying of one's own works.

I see a flower. It gives me a sensation of the beautiful. I wish to paint it. At this moment I see the whole subject — flower — changed. It is no longer the same beauty. Is it the environment, the light? In short, the vision is no longer the same. I attempt then to resolve the problem, the subject flower. In painting it, I strive after composition; the value of one color in relation to another, their harmony. Likewise with the lines. The process passes through my sensibility and the result is a work of artistic . . . or botanical value. I see a work by ~~Nicolas~~ Fouquet. By what am I moved? By the religious subject or by the Art? I am free to believe that it is the religious subject that moves me. But it is only through ART that the GREAT EMOTION can reach me. Then Art is the harmony of relations accompanied by Fouquet's sensibility. It is not an illustration; it is a work of art.

Jean

Consider the work of Cézanne, it has nothing of nature, but everything of art.

The subject can also be philosophical, geometric, etc. But in art it does not remain solely that. It undergoes the transformation that Art imprints on it, and, in this case, the value depends only on the sensibility of the author. It is he who creates the rules of harmony, rules that will be relative to each work. If I declare that there are two problems and two solutions, I do not mean: two opposite solutions. These two problems and these two results fuse into a single result which, in accordance with the high sensibility of the author, gives us the sensation of Art. The subject can also be the conception of space. This conception can be arrived at by way of Euclidean or non-Euclidean geometry. But

if you wish to translate these problems into art, you must not forget to give a soul to this conception.

The subject can also be drawn from physics. But take care to incorporate in it an imponderable, otherwise you will produce only a humorous work. In Art the functions of lines and colors have no agitation about them. Mobility in Art does not flow from a dynamo. In Art everything functions without the intervention of another force independent of the work.

Paris, April 5, 1948

Biographical Note*

Born November 24, 1886, Antwerp, Belgium. Class 1906 military service. Wounded veteran of World War I. Painter, sculptor, architect, writer. Studied at the Beaux Arts of Antwerp and Brussels. His work was acquired by the Belgian State, and in addition to grants from the Ministry of Education he received a pension from the Belgian royal court. Further pensions were granted by her late Royal Highness, the Countess of Flanders and by his late Majesty, King Albert. The Queen of the Netherlands honored him by acquiring one of his works and he was the instructor of Baroness Bentinck, Lady-in-Waiting at the royal court of Holland. From 1931 to 1937 Vice-President of the art group "Abstraction, Création" registered at the Paris Prefecture under no. 168552. From 1917 onward his art concepts tended consistently towards the abstract. He is the promoter of that abstract sculptural form which had a strong influence on modern architecture. Has written a booklet entitled "L'Art et Son Avenir." His abstract paintings and sculptures are to be found in both private and public collections. Participated at the inception of the

* Written by the author.

Dutch magazine, "De Stijl," in 1918. Has designed projects for airports for city centers and urban developments, for which he was awarded a medal by the "Architectes Diplomés par le Gouvernement Français." Correspondence with Mr. Jaspart, Prime Minister in 1929, concerning project made for a bridge for l'Escaut, Antwerp. Articles and reproductions of his work in numerous foreign periodicals for which documentation exists.

EXHIBITIONS:

1922	Exposition Internationale d'Art Moderne, Geneva,
1926	L'Art d'Aujourd'hui, Paris, Brooklyn Museum, New York, Anderson Galleries, New York,
1929	Dalman Gallery, Barcelona, Kunstmuseum, Zurich, Graphisches Kabinett, Munich, Galerie Bonaparte, Paris,
1930	Galerie 23, Paris, International Exhibition, Stockholm, Société des Artistes Indépendants, Bordeaux, Aéronautique et l'Art, Paris, Galerie Wolfsberg, Zurich,
1931	Association Artistique "1940," Paris, Palais des Beaux-Arts, Brussels,
1934	Galerie Abstraction Création, Paris,
1936	Art Mural, Paris, The Museum of Modern Art, New York, "Porza," Paris, Surindépendants, Paris,
1937/39	Kunsthalle, Basel, Galerie Delcourt, Paris, Galerie L'Equipe, Paris,
1939	Kunstnerforbundet, Oslo Museum, Galerie Charpentier, Paris,
1943	Galerie de Berri, Paris, Palace Hotel, Gstaad,
1944	Kunsthalle, Basel,
1946	Réalites Nouvelles, Paris.

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Introductory Reflections

There are two distinct ways of considering things. One is imposed by our evolution and education; the other sees things apart from conventions. The two attitudes are distinct, having nothing in common. The first reasons about and measures things according to accepted standards. It is aware of nothing but the object itself. This method has its conveniences. The second, less practical, examines things from the viewpoint of creativeness. This method is not rigid or inflexible; it gives objects a variable existence; consequently it is unlimited.

One can make an object or reproduce it. One can *reason* about objects. About modes of reproducing them. About one or more *relations* among them. But it is equally possible to imagine the laws of their creation, laws which are capable of engendering an object, one that, however, is not amenable to the rules of measurement employed by man in order to make an object. In general the object is our point of departure. It is also the principal goal we mean to reach. But we could also begin with the infinite, and proceed towards the finite. *A finite object conceived as a whole* (*"l'ensemble d'un fini"*) is a prob-

lem in which the given is known. Only the interpretation varies from individual to individual, and the solution will depend on the greatness and elegance with which the problem is resolved. An object, a finite thing, has dimensions that can be measured, and measurements can be compared. But in such instances, we start with the finite and arrive at the finite. In other words, things are reproduced with greater or lesser sensitivity, and this is what is called Art. An object, seen from a certain angle and under certain conditions, varies in aspect. To translate the impression which this perception makes on us, we always adopt traditional or conventional measurements. This system of measurement is never discussed. On the contrary, it is taken for granted and even perfected. But it is limited. It is eminently suitable as an approach to the object. But are there not other possibilities? Not, of course, for the creation of objects, but for the expression of *values* more directly related to creation. We may consider an object from a certain angle and we may consider creation from a certain angle. In geometry the point is not defined. It has no dimensions. In creation the point must have several dimensions, and must be subject to the laws which guide creation, including those which are unknown to us. Such a point must engender lines other than those to which we are accustomed. The figures engendered by this point must also suggest to us objects other than those we know. We may work from nature, reproducing the spectacle which nature has engendered. But then we do not create a new thing. A point, however, can engender a volume. Then the point serves no longer to measure an object, but to create an object. These two considerations have nothing in common, and must be kept separate.

OF REPRODUCTION

We can reproduce a sound and put into it art — or our idea of the sound. We can also combine sounds artistically, "compose" them; this is conception. We can draw lines, place colors, with art, and we can relate lines and color, with art. We may make a work of art from the given of nature. This remains a question of sensitivity, not of "sentiment." In other words, we express through art, we have a conception. But there is no law against choosing a *subject* that has nothing in common with nature. Then we have a new creation. I do not mean an imagined subject resulting in the bizarre. It must not be the product of dreams. I am speaking of art and not of fraud. It is necessary to engender a subject, not to distort one just for the sake of being funny.

What is it that attracts us in art? Is it not the imponderable? Does the artist not wish to express his sense of the incommensurable? Does the spectator not wish, through the intermediary of a work of art, to feel the incommensurable? The means and the pretext for approaching it is a subject. Primitive peoples had recourse to fetishes. After this stage was superseded, the subject became mythological, then religious. Through the development of science, the subject assumes a character of observation, comparison, reflection. One paints directly from nature not in order to copy, but in an effort to penetrate the mystery of nature through observation and to express the feelings of grandeur received from the phenomenon observed. One does not paint a flower as if illustrating a botany text, as an analysis of the flower, but paints rather the atmosphere and the feeling that the scene releases. One uses colors which *seem* to be improvised, with a view to approaching the incommensurable. As man's knowledge develops, and according to his temperament, geometry comes to seem more qualified, not to produce an *industrial* art, but to reveal the incommensurable. But geometry as we learn it still has an objective aspect. It has its limitations also. Yet it may be said that though the objectivity of the subject has changed in the course of the ages, the tendency of art remains invariable. The potentialities of the sublime are not inherent in the subject, or "object," which, on the contrary, sets a limit to our feelings. The finite subject, or "object," does not sufficiently embrace the infinite, and what we want is to escape from these limits. Euclidean geometry, extremely useful and convenient in daily life, does not offer all the possibilities necessary to express what we feel of the great mystery. The infinite is gauged by other values, more directly related to the incommensurable. The unit of measurement is the infinite. In art the starting point is also the goal. In Euclidean geometry, which I shall call "A Borderline Case," a point has no dimensions. But things, once determined, must have an existence and consequently a dimension. On the other hand, the coordinates X and Y are imposed upon us solely because they are convenient and not because they are indispensable. All this is too rigid for freedom. We must escape.

Three masses, or volumes, are disposed in space in such a way that there is a relation between them (see Fig. 171). For this relation there are several reasons; that is, several factors enter into this relation which tends towards the goal of unity. Hence these relations are not equivalent or proportional. The dimensions of these volumes are not identical and their forms are not similar. Their position and orientation in space engender another relation, and this entire process tends towards a goal, which is *unity*. These relations have still another function. They diminish the weight of the volumes and these volumes

are no longer composed of matter. They now release only relation and unity. Matter has been transformed into a spiritual body. Hence, we can transform any matter whatsoever into a thing that releases a living and spiritual sensation. By this I do not mean that we impose on matter a psychological expression of joy or sadness, or the memory of a story which suggests life to us through imitation and remains an object, but that we create a new entity out of the matter that constitutes the subject. For example: with iron we can make objects, utensils, etc., but we can also, by bending and grinding this iron, transmit to it, make it wed, a form other than that by which it is known, incarnating all the mind and feeling with which we ourselves are impregnated. Within this matter we produce a living unknown. (It is obviously very difficult to express in writing things which belong to the realm of the incommensurable.)

The literary method is deficient, because words encourage interpretation. But let us try. Take a new-born child: if you have seen only the baby and asked its name, you have not been touched by the incommensurable. You have seen a dead man. If you are shocked by the accident that caused his death, you have not been touched by the incommensurable. That is the emotion of wonder aroused in us by the great mystery of creation. When you see the firmament with everything it reveals, are you not profoundly touched by the great question-mark? The same effect may be produced by a work of art. It may without imitation release and embrace the infinite, the incommensurable, by means of a non-objective finite. By non-objective we mean a finite which is not earthbound. There are sculptures of great beauty, but they are earthbound like objects. We are touched and moved by their objective beauty, but they do not surpass certain limits. The objective aspect, having its limits, prevents us from immersing ourselves in the incommensurable. This is what I mean by diminishing the weight of matter and transforming it into a spiritual body. It is a question of putting the incommensurable into a work, in order that the work may release it. Not in the form of an anecdote or imitation but embracing the very laws of the infinite. This same content should be found in painting and in all the arts. The sublime element must be present but not sublimate the subject. Attention must particularly be drawn to the danger in interpreting words. Confusion is inevitable because every individual has his uniqueness (which is called the individual, and defies literary expression). If I say "cause matter to wed a form other than its apparent substance," I do not mean to introduce any form of feeling or sentimentality. No *ism* should be present. Isms are isolations. And the greatest possible number of possibilities must be brought to bear. That is to say, the more characteristics of the infinite can be introduced into a work, the more it will approach the incommensurable. Characteristics that are not mere qualifiers but contents; no dogmas. It must not be concluded that I propose a form of conception

valid for all. Not only can beauty and art manifest themselves in various forms and aspects, but it must be borne in mind that there are many degrees (individual values) which vary according to the talent of the author. I propose only what I think, and you should do the same. Conception is in the singular. A follower merely repeats. Conceptions are infinite in character, and I merely set forth my own.

ON GEOMETRY

I. If a point can move, it ceases to be a point and becomes a volume.

II. A volume (or point) in movement, describes a line or vector in all directions and can engender its own parallel. Example: I place a ball on a rigid plane. It touches the plane only at one point. I incline the plane in such a way that the ball traces a line from the top to the bottom of the plane. When the ball has reached the bottom of the plane, I incline the plane to the right or left, then lift the bottom to the top. If I am adroit, I can make the ball describe a line forming its own parallel.

III. A volume (or point) can describe a circumference around another fixed point without that point being its center. It can also start from a fixed point, describe a circle and return to its point of departure. This circle is not engendered by its center. A practised hand can trace this type of circle.

IV. A volume (or point) can describe a line that engenders a volume (see Fig. 167). Thus the void becomes a volume. This point can describe the contour of a volume but it can also engender a volume in space, or a space-volume.

V. If two simultaneous points, in space and visibly separated, move in the same direction, they will engender two lines which are not constantly parallel, for two lines always have an equidistant segment between them. Hence two parallels may approach one another, may cross or move apart, one of them can turn around the other and yet they may be in part equidistant. Hence a line is a sum of points, the type of which can be established only for a given segment. We are then speaking of a finite in the infinite.

aX = Y is a straight line because this quality is imposed on it by the coordinates X and Y. But if *a* moves in relation to the two fixed points X and Y and I give values to *a*, e.g. *a*.1–*a*.2–*a*.n, it will be *a* that determines the position of X and Y. These fixed points will move in relation to *a*. The points X and Y can be confused, even with *a*, which has an implied value and is not merely a number. *a* can tend towards X and Y. It can also move away from them. The movement of *a* is calculated in terms of 1–2–3–n times its magnitude. *a* is situated at a distance of *a*, n from X and *a*,n from Y. A desired meaning has been given to *a*, and the positions of X and Y will depend on *a*, not that of *a* on X and Y. These few reflections show how great and infinite are the possibilities permitting us to approach the incommensurable. Man is forever finding new ones, for nothing is finite.

Paris, 1945

The reflections which follow must be approached in a different way. There is nothing in common between the two ways, which are distinct. They must be considered as belonging to different frames of reference. The same words, used in the two cases, have a different meaning according to the premises. If we do not adopt the frame of references proper to the proposed method, we risk running into contradictions. For the sake of clarity, we may speak of:

a *finite* frame of reference

an *infinite* frame of reference

As long as we discuss finite things, our systems of measurement, geometry, arithmetic and current language are required. When we speak of the infinite, we often use the same words, but in a different sense. It must not be thought that my reflections imply a strict system. They represent only ways of seeing and imagining things. It is more than probable that other possibilities exist. I am here submitting my own reflections.

Reflections I

All our knowledge of astronomy, physics, etc., the sciences, in short, are based on axioms — for example, the postulate of Euclid — that are indemonstrable. Imagine the consequences of basing our entire evolution on an indemonstrable fact.

We know a great number of elements. We make use of them, we analyze them, and we cannot demonstrate this thing that has served us as a base for an entire edifice of thought.

We are sometimes asked for a proof of art. Is it not fortunate that we can even analyze the plastic quality of a work of art? But art itself (the thing which the work of art releases) involves a sense of the beautiful and varies with individuals. It is thus relative to the state of development of our sense of the beautiful and consequently evades all analysis. But, because the aesthetic value of a work of art escapes us, may we say that it is not art? Are the geometries of Lobachevsky and Riemann any less true than that of Euclid? The fact that we are not accustomed to these systems is not sufficient reason to deny them.

Those who have studied the evolution of man's knowledge are more circumspect in their judgments.

We see then that we may construct a work of art with the given of geometry.

If we consider that man lives in a world under certain conditions evaluated by and therefore relative to his senses and that he has contracted the habit of thinking of the world as with these forms, we can understand how hard it is for him to accept other conditions which are equally possible.

The theorems of Lobachevsky are just as well founded as those of Euclid. There is no need to express art in terms of nature. It can perfectly well be expressed in terms of geometry and the exact sciences.

Let us grant that mathematics is not a product of experience alone and that Euclid's postulate is indemonstrable by Euclid's geometry. Art thus can well be a product of great sensitivity, and even though it has science as a base, it will never be a scientific art, which is a contradiction in terms. Does the knowledge, the science, that has served to establish a work of art, constitute the artistic value of the work? The knowledge may be useful, but in itself it is devoid of artistic value. The wish to reduce art to mathematics is nonsense. To speak of reducing art to mathematics is to express oneself poorly; instead we must say: to arrive at an artistic expression by geometric forms. We speak of a mathematician as we speak of a painter, a sculptor, a musician, etc. But is the thing that the mathematician seeks, finds and states in the form of an equation merely mathematics? Has mathematics discovered the laws of creation, or has it merely served to formulate and record ideas? It is the same in art. Geometry serves to formulate the relations of a new crystal, a creation, a composition.

Man observes the phenomena of nature, and if his reflection is not to remain pure admiration, he is obliged to formulate his observations. He then has recourse to certain methods. But he knows that it is not these methods (mathematics, for example) which have enabled him to make his observation. This he owes to his personal value, which makes him what he is, and distinguishes him from other men. To say that science is still a poor instrument is an ineptitude. It is an instrument that can be all-powerful provided one has the intelligence. Why accuse science of not having given us that of which we have no idea, or have not yet observed? One does not demand ideas from science. Science observes nothing, but we use it to demonstrate our own observation, and to co-ordinate it with other previously demonstrated facts, and to check for certain errors. Science does not tell our fortune, and neither ideas, observation, science, nor the superman can reduce continuity to an absolute and immutable value. The two things are mutually contradictory. Note that the finite and the infinite are not contradictory, nor are they opposites. They are two different things. The finite is for us a convenient quantity by which

to formulate ideas. As for the infinite, — it is the infinite.

What thing may be said to have an absolute existence? Unfortunately we can judge only in relation to ourselves. Our faculties are restricted to our five senses. They are limited. And our visual sphere, our sensory sphere, if I may use this term, is limited. All that we can understand is conventions that we have agreed upon in advance. These conventions are instruments enabling us to demonstrate certain facts, and it is they that permit the demonstration. We have established certain laws, and to establish them, we have made certain formulas. It was one of the conventions, mathematics, for example, that enabled us to arrive at the formulas. Has the law of universal gravitation been established in a manner absolutely true and immutable, or is the law true only in relation to man's senses? Are the calculations usual in this connection compatible with the absolute value of this law? And is our decimal system suitable for an absolute and immutable formulation of the law of universal gravitation? We say that sound is perceptible when there are more than thirty-two vibrations a second, but are we sure of it? And is the second a true second? Why must our second be the sixtieth part of a minute and our minute the sixtieth part of an hour, when the hour is the twenty-fourth part of the duration of the earth's revolution, or the mean solar day? This system is not entirely correct, if only because the true solar day is a little longer than the sidereal day. Moreover, it is not decimal. And yet what a fine convention! What does it matter that it should not be absolute, that it should be true only in relation to man, and that the truths it represents are mere conventions. This does not prevent them from being useful. Has not the square of the hypotenuse enabled us to find the distance to certain stars? This, too, is true only in relation to ourselves, but what does that matter, since it is for ourselves? What does it matter that the meter should not be the true meter, since it serves to formulate ideas. The number ONE is the only number having a value. But this one contains everything: meters, liters, grams, representing distances, volumes, etc. . . .

On the basis of this principle, I may say that I have found the exact space of every color[1] since these spaces emanate from the unit, and according to the conventional means by which I have computed them, there is a relation. I say: if the meter is correct, the color-spaces I have established are also correct. It is true that absolute color does not exist any more than the absolute meter, the absolute second, etc. All these are very relative values. Absolute space does not exist, but there is a relative space, a "space in relation to." If space were absolute, it would be limited, hence finite and measurable. However, space is not measurable, but the space between certain solids is measurable.

1. See author's brochure *L'Art et son Avenir*, 1924.

Sometimes man asks himself: what is the aim of creation (nature)? But at this precise point, he begins to attribute a false importance to man's existence. There is no favoritism. Our role is to propagate our species and create conventions that will help us to meet our needs. There are no other values, and those which we add, by believing that they exist, are purely imaginary and personal. We are not important enough to produce anything other than a perpetual transformation. The circumstances in which we find ourselves guide us, and these circumstances are relative to certain conditions, to certain relative quantities, which cause us to act, succeed, etc. Hence the vanity of the glory we think we must attach to the value of our person. To call all this fatalism is again to give too much importance to our person. But to make certain things intelligible to us, we must create certain conventions; these are our instrument of comprehension. Mathematics is one of our finest instruments. If it does not give us an absolutely exact and immutable picture of things, it is because this in itself would be contrary to continuity, for everything is in process of transformation and nothing can remain in an immutable state. Otherwise, the infinite would be finite. But mathematics does give us an approximate understanding of certain things within the sensory sphere of man. Everything is in a latent state. We might speak of a creative (transforming) nothing.

When I say a "creative nothing," the word nothing is not meant in a negative sense, it is not equal to zero. The meaning of the word NOTHING has been established with precision. Nothing can be determined absolutely, for everything transforms itself. Everything is in a latent state, containing everything, and everything is manifested to our senses under a single aspect, which does not represent its real or absolute value. If we admit that transformation causes us to see different faces of a same thing, we can say that this transformation has constantly created new states and manifested different things. This nothing, which obviously contains everything, but in a latent state, is creative, creating through transformation. An instant before becoming some manifestation visible to our senses, it was still invisible. By transformation a thing that was still nothing (chaos) has become gradually visible. Hence we may speak of a creative nothing, or, more aptly, a transforming nothing. We might even replace these words by an old maxim: Nothing is created, nothing is lost, therefore everything exists. We might say that in our present state of development, we still perceive only a very small number of phenomena; that creation as a whole does not manifest itself entirely to our senses; and that nothing continues constantly to create things. And I am not referring to invisible rays, for they already exist; I am speaking of things that are still in a latent state.

From all this it follows that our intelligence, limited to begin with, is powerless in the presence of things that will not come into being for millions

of years, and that these things cannot be produced until the necessary conditions exist. Only instinct, or intuition, can help us. It is a precursor, a forerunner, if you will. But intuition,[2] a kind of wireless telegraphy, must be materialized; that is, when a sense-organ is touched intuitively, it must decipher the telegram and materialize its intuition through thought. This is the process of all invention and creation. Our mind itself, our intuition, everything results from a perpetual transformation. But intuition cannot sense everything, since facts that will originate from their relation to a number of related facts cannot be anticipated when they are too far removed from our present intuition.

Absolute weight does not exist, since a spring scale does not function uniformly on the entire earth's surface but reacts more strongly as we approach the poles. If the distance from the center of the earth to the poles is less than the distance from the center to the equator, it is because the rotation of the earth affects the equator differently from the poles. Hence we may conclude that weight does not exist, but that the earth possesses a certain attraction relative to its rotation.

The closer we come to the poles, the slower seems the motion of the sun in relation to an observer. This is because at the poles the rotary motion of the earth is less rapid than at the equator, and consequently the earth is exposed for a longer time to the sun. Hence there is a slowing down towards the poles, resulting from the rotation of the earth, and if the simple pendulum which marks the seconds is shorter at the equator than at the poles, it is because the rotation that weighs upon it becomes an attraction.

It remains none the less true that two molecules of matter attract one another in direct proportion to their mass and in inverse proportion to the square of the distance between them. But this truth is not due to inert mass. It is rather the movement acquired from a force X that gives bodies the power of mutual attraction in accordance with this law. Therefore we ought to say: Two molecules of matter, because of their acquired movement or force, attract one another in direct proportion to their mass and in inverse proportion to the square of the distance between them. Without an acquired force, nothing can act. When a material point moves, or when its movement is modified, whether as to direction or speed, these movements can be due to one or several causes which are outside the material point to which it is sensitive.

According to Archimedes, the straight line is the shortest distance between two points. Space is not geometrical, and I am sure that Euclid was just as much aware of this as the non-Euclideans. Euclid knew that his geometry was an instrument and that there is no geometry in nature. Man creates geometry *a priori* fix certain points which he situates in space. Forward, backward, to

2. "Intuition" is employed here in order to formulate certain ideas.

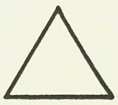
the left, to the right, up and down, were the first geometrical conceptions. Points in space present themselves to our senses objectively *a priori,* and to determine them a method is needed. Euclid's geometry is a useful method for determining things to which we are accustomed. Moreover, it is not possible to establish a non-Euclidean geometry and speculate about objects without having recourse to Euclidean geometry, that is without accepting the three dimensions. Non-Euclidean geometry says that the sum of the three angles of a triangle is not equal to two right angles, but to calculate them it makes use of Euclidean geometry. Euclid's right angle is *well defined,* for the area of a convex triangle and a concave triangle, divided by two, is equal to that of a triangle the sum of whose angles is equal to two right angles.



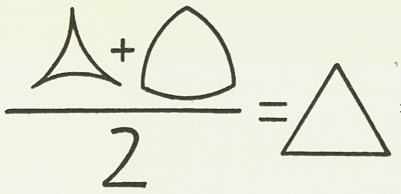
$$r\frac{h}{2} - \left(\frac{\pi r^2}{2} - 3r\frac{h}{2}\right) = 5.004825 \quad (r = 5.25\ h = 4.60)$$



$$r\frac{h}{2} + \left(\frac{\pi r^2}{2} - 3r\frac{h}{2}\right) = 19.145175$$



$$r\frac{h}{2} = 12.975$$



$$= \frac{5.004825 + 19.145175}{2} = 12.975$$

The word space-time is a convention useful for formulating ideas and facilitating certain algebraic operations by introducing into them unknowns having a conventional value, whether in meters, seconds, wave-lengths, velocity, etc. which are themselves conventions useful for the formulation of ideas.

I see a natural phenomenon. To verify it, I must determine certain facts relating to it in a given time at a given moment. If I have no means of measurement, I have no point of comparison. Likewise, to evaluate its position in space, i.e. in relation to, at such and such a distance from, I always require a unit of measurement.

But have I thus determined space and time, and may I take for an absolute a conception which has helped me to formulate ideas? If the word dimension signifies magnitude, we are entitled to call time a fourth dimension. But in

geometry the word dimension is particularly associated with the measurement of distance, and the measurement of duration with the word time. It is true that a distance can have a duration, but then a fifth dimension is introduced. This is duration multiplied by velocity. The distance from Paris to Lyon is 512 km. How much time is required to cover this distance? Here time is a function of velocity, for according to whether this distance is covered on foot, by rail or by plane, the distance will have changed as well as the time. All this means that there is nothing absolute and immutable, and in the nature of things this is fortunate, for if there were, the infinite would be finite and there would be no continuity.

We must not seek to exceed the capacity of our senses. Concerning what is too close or too remote, we can perceive nothing, and we enter into vague and imaginary suppositions. Our means of measurement suffice amply for the understanding of what is intelligible to man. As everything is mortal, let us not seek the absolute. When an idea is well coordinated with our means of measurement and of reflection, we may admit it. But what good would it do mankind to learn that the earth had acquired a movement accelerated by X times the duration of our twenty-four hours and that this acceleration drew with it all observable data? (In other words, if the earth turned four times faster, our watches would take on a velocity proportional to the new velocity of the earth.) No one has ever been capable, and no one ever will be capable, of saying that such a phenomenon has not occurred or will not occur, since by it everything would be proportionately transformed. Or shall we fix the words *time* and *space* as absolute values?

I might perfectly well construct a geometry that would be non-Euclidean, non-Lobachevskian or non-Riemannian, and these systems would not be inconsistent. They might all have a certain importance and utility. But none would be capable of proving the absolute value of *time* and *space*.

A dynamo performs 125 revolutions per second. On a disc set in motion by the dynamo, there is a square, situated at a distance of 6 centimeters from the center of the disc. When the disc performs a revolution, the square covers a distance of 37.699 cm. When a point visible to a man when motionless assumes a certain velocity, that of the dynamo for example, or 125 revolutions per second, this same point, now covering 47 meters per second, will disappear. But as seen by a camera with a shutter operating at the rate of $\frac{1}{10}$ second, this same point will leave a circular track and seem to be lengthened. Hence velocity and repose exist only in relation to an observer, according to whether his system is suited to seeing the moving object in repose or in movement. This phenomenon can be classified in optics, for it is only apparent phenomena that have no real existence.

Two points in motion in relation to man's sense of sight tend to approach

each other, and they combine into one when their movements accelerate to a velocity such as 125 revolutions per second. A bar in motion is distorted, in fact all objects are seen by man in an aspect differing from their real form. We cannot judge an object, neither its velocity nor its state of rest, neither its form nor even its actual existence. Everything is in motion, and motion transforms. Motion exists in relation to other motions, or rather in relation to movements as a whole. These movements are interpreted as being in repose when the system perceiving them is in the desired conditions, that is, is moving at a necessary velocity.

All this corresponds to a segment of the infinite that becomes finite when the *relations* add up to ONE. Unless $\frac{\infty}{\infty}=1$, nothing is visible. If we perceive certain phenomena, it is because our senses are in the necessary conditions of velocity. I do not even speak of the angle or the aspect assumed by the phenomenon when it is perceived by our senses, for the phenomenon seems to vary according to the interpretation.

I say that a material point moving at a velocity surpassing a certain velocity of our sense, disappears. But on the other hand, the velocity of light is 300,000 km. per second. At this velocity, a material point disappears from our perception, and yet we are convinced of the existence of light. I say "convinced of," for light reveals itself on the surface it occupies. Material points, phenomena, become visible to our senses through the light which reveals them. We do not see light itself, but only the surfaces it illumines, and when these surfaces stand in the necessary relation to the velocity of our senses, we perceive them through the light which reveals them. Hence, though light has a velocity of 300,000 km. per second, we are aware of it; our senses do not perceive the light itself, but the surfaces it occupies. Hence we cannot establish a unit of measurement or comparison, and consequently we cannot absolutely define anything, and all we can say is that the things that seeem to exist, exist only in relation to a ratio of velocity, a ratio between the velocity of the object or phenomenon and our perception. But since light is the original and indispensable condition for disclosing the relation between these two relations, we can say with Einstein that light is our basis for determining space and time.

Things are visible through the intermediary of light, provided their velocity within universal motion stands in a suitable relation to the velocity of our senses. This relation is the only condition required for light to render things visible to an observer. Hence light is not relative to the velocity of our senses. Light permits us to draw certain conclusions; this is all we can do; but without light, relations cannot be ascertained. But the fact that a thing is manifested to our senses does not enable us to determine its existence. Optic phenomena, contractions, prevent us from determining the form of an object.

Nothing is true except under certain conditions. Other conditions make the problem improbable and even insoluble.

Menton, 1925

Reflections II

Objective art is a creation of the ratio, $\frac{\infty}{\infty}=1$. To create means to materialize, hence to arrive at ONE.

To demonstrate this axiom, let us first show the nature of a ratio. "We call ratio between two magnitudes of the same kind the number which measures the first when the second is taken as a unit."

Let us take as an example, several numbers: 1, 2, 3, 4, 5. These numbers can continue to infinity, and their ratio is equal to: 1/1, 1/2, 1/3, 1/4, 1/5. The numbers can continue to infinity, i.e. the last term, $n = \infty$. But since the first term must obviously be something, since it exists, we may call it 1, while the last term. being indeterminate, is equal to the infinite ∞.

Hence $\frac{1}{\infty}=\infty$ and consequently $\infty \times \infty = 1$ and $\frac{\infty}{\infty}=1$.

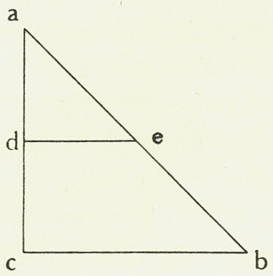
The infinite creates and creates things in infinite series. Hence created things contain the infinite, and the ratio of the infinite to the infinite is equal to creation. The first term of the infinite is obviously equal to the infinite, ∞. There is eternity before the present and eternity after the present, and their ratio is equal to creation. Eternity thus contains two infinites, spirit and matter. Nothing exists except in ratio to something else, taken as a point of comparison. Hence, since the ratio of the numbers 1, 2, 3, 4, 5, n is 1/1, 1/2, 1/3, 1/4, 1/5, $1/n$, the infinite and its materialization can be written as $\frac{1}{\infty}=\infty$. For the ratio of the infinite to the infinite is one — $\frac{\infty}{\infty}=1$. This ONE which emanates from the infinite contains the infinite and can be written in the form: $1=\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}\cdots+\frac{1}{n}$. The sum tends toward 1 but never attains it. Up to 1/16, the sum equals 15/16, or $\left(\frac{n-1}{n}\right)$. Let us take the progression $1=\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{\infty}$ and draw up the sum, which will be the ratio of the finite and the infinite. We shall have $\frac{\infty-1}{\infty}$ which resolves into $\frac{\infty}{\infty}=1$, that is to say, the sum is equal to $\frac{\infty}{\infty}-1=\frac{\infty-1}{\infty}=\frac{\infty}{\infty}-1$. Thus nature propagates itself perpetually without ever being definite or finite, and emanates from the infinite; $\frac{1}{\infty}=\infty$ and $\infty \times \infty = 1$ hence $\frac{\infty}{\infty}=1$. As to the progression $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+$

$\frac{1}{16}=1$ we must add to it a last term equal to the last term, i.e. $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{61}+\frac{1}{16}+\frac{1}{16}$. But we have seen that no two things are identical. On the other hand, to have 1 would be to determine a thing which is in perpetual transformation. Thus we may say that 1 emanates from 1; infinite, because on the one hand the sum equals $\frac{\infty-1}{\infty}$ and on the other hand $1=\frac{\infty-1+1}{\infty}$ Q.E.D.

The first term is always equal to 1 and we can even say that this first term emanates from the infinite, hence $1=\infty$.

$1=\frac{\infty-1}{\infty}$	$\infty=\infty-1$	$\infty-\infty=1$	
$\frac{1}{\infty}=\infty$	$\infty\times\infty=1$	$\frac{1}{\infty}=\frac{\infty\times\infty}{\infty}$	$\frac{1-(\infty\times\infty)}{\infty}=0$
$\infty\left(\frac{\infty}{\infty}\right)=\frac{1}{\infty}$	$\frac{\infty}{\infty}=\frac{\frac{1}{\infty}}{\frac{\infty}{1}}$	$\frac{\infty}{\infty}=\frac{1}{\infty\times\infty}=1$	

Art is a creation of ratios and not solely of proportions. When there is equality between two ratios, there is proportion. Thus a proportion is the consequence of a ratio. The ratio ⅔ stands in proportion to ¾, ⅘, ⅚, etc. . . . The ratio is the principle. The circle, the square, the triangle, etc. are units and have their ratio. For the circle $\pi\times r^2=S$, while for the triangle: $B\times\frac{h}{2}=S$ (S = surface = area). These geometric forms have their proportions:



$$\frac{\pi}{2}=\frac{2\pi}{4}\times\frac{c}{2}=\frac{2c}{4}$$

$$\frac{ad}{de}=\frac{dc}{cb}$$

"In every proportion the sum of the antecedents is to their difference as the sum of the consequents is to their difference. This is the proportional mean."

The geometric mean of two or more numbers is the square root of their product. 4 x 9 = 36. $\sqrt{36}=6$. 6 is the geometric mean; 2 x 3 x 6 = 36. $\sqrt{36}=6$. The arithmetic mean of two or more numbers is the result obtained

by adding the numbers and dividing the sum by their number: $\frac{4+6+8}{3}=6$, $\frac{4+6+8+10}{4}=\frac{28}{4}=7$, the arithmetic mean. In objective plastic art the ratio is sought and proportions are used in order to realize certain operations. But all these proportions must *be determined in relation* to a unit agreed upon in advance. For example, a color occupies a certain place and a certain surface in relation to another color. A surface, a volume, in relation to another surface, another volume. All these *relations* must find a proper place in reference to the form in which one is composing and which is taken as a unit. An example is the pyramid of Cheops. The circle is its principle of unity. The creation of the pyramid, "a new crystal," is the composition which constitutes its art. From the relations of the proportional elements of the circle arise the proportions of the pyramid. It is not a work of sculpture since it is not a ratio of volumes, but the pyramid is a pure crystal. If it were a sculpture, there would be a ratio of volumes. In order to have a ratio of volumes, there must be at least two volumes.

The word relativity as it has been introduced into scientific usage in the last few years belongs to the domain of physics. This relativity is the relativity of "space-time."

Plane relativity has two dimensions. Volume relativity has three dimensions and space-time relativity has these three dimensions plus a fourth which is that of time (velocity).

Hence when we speak of relativity, we must always make it clear which relativity we mean. The word relative, taken scientifically, always implies space-time relativity. Then we must immediately indicate the frame of reference, i.e. in relation to whom and in relation to what. The fourth dimension is a co-ordinate represented by the symbol T, introduced into the equation. Non-Euclidean geometry does not speak of a fourth dimension but of a fourth co-ordinate, which is T. I refer here to the ideas of Henri Poincaré who says in his book, *Des fondements de la géométrie:* "The geometry of Euclid is no more true than that of Lobachevsky or of Riemann, it is simply more convenient, especially when applied to the structure of natural solids which in their movements behave more or less like the ideal solids considered by Euclid. Nothing excludes the possibility that new discoveries like that of Lorentz' contraction will lead us to prefer one of the two non-Euclidean systems for the mathematical treatment of physical problems. This is what has actually occurred in the theory of relativity."

As a result of this, we are not concerned with a fourth movement, that of a solid in space.

Menton, 1925

Reflections III

Reflection has always been a characteristic of man. Since the most remote times, I might even say since man's origin, he has always reflected and observed. If his evolution has been slow, it is because he has never had a pure means of formulating his observations. That is why our ancestors had to proceed by word of mouth, from élite to élite. The ancient masters repeated from generation to generation the laws that they had been able to observe. If these laws are almost entirely unknown to us, it is because the masters did not consider it necessary to converse with their inferiors who would have understood nothing; at a later stage, social evolution brought about a mingling of classes, and the masters, thrown into the mass, abstained from communicating their ideas which since then have been regarded as subjective. Likewise the masses with whom we are constantly rubbing elbows are entirely unaware of our special studies. We communicate only with the rare persons who are interested. On the other hand, the organization of society has produced learned institutes, and, since each is specialized, its members are almost entirely ignorant of the work being done by the others. All this by way of saying that our ancestors, especially the Egyptians, the Greeks, the mediaeval peoples, communicated from pupil to pupil, except for the rare occasions when they put into writing the laws which they were able to formulate. Hence the golden number, almost entirely unknown to us, which was nearly always transmitted verbally. This doctrine was not secret, but the initiated never thought of mentioning it to the ignorant. At the Académie des Beaux-Arts, the professor of landscape painting taught that a third of the picture must be taken as the horizon, in order to give a sense of repose. Vinçotte, my teacher, told me that Rude had said to Carpeaux: We are the masons of art. Michelangelo said: For a sculpture to be good, it must be thrown down from a mountain. Everything that breaks is superfluous. The Greeks said: Seven and a half heads to a human body. In the Middle Ages it was said: Two superimposed squares always give a pleasant proportion. I might cite a great number of these maxims, all of which may be considered as golden numbers.

But all these observations made by our masters are intuitive (arrived at by feeling). It was their sense of the beautiful that led them to repeat certain truths of which they had become convinced. But these truths were based on geometry and our masters could express them only in the form of maxims. The precepts of art can be better expressed by gestures than by words. The mediocre artist puts his thoughts into exclamations: What a composition! what a palette! that's beautiful! . . . True artists use maxims, often somewhat summary and rough. Rodin said: Whatever is coming forward, you must draw it forward; whatever recedes, you must make it recede. This is a strange remark, which means only: Place one volume in relation to another. It refers to

the apparent displacement of volumes, a volume near to us in relation to another which is far from us.

No division of a geometric form can in itself be repellent to our senses. Elementary geometrical forms, as used in mediaeval cathedrals, for example, do not repel us. But artistic composition in the Middle Ages was an elaboration of a geometric form. It was not the creation of a new crystal. The application of these divisions to a work of art does not constitute a creation embodying unity. The application of the golden section to our architecture therefore loses its justification. The principle of unity consists in finding the elements of some geometrical form or algebraic equation and creating a new geometrical form which has the elementary form as the basis of its unity.

Clearly the important thing here is to know how to create. Creation is not a formula but a principle. The greater one's knowledge of geometry, the greater one's possibilities of creative invention. The gift of creation depends on the individual. It is not means that create, but means do enable the artist to create, and the utility of means varies with the artist's talent. Mathematics creates nothing. It establishes and formulates the idea once conceived. Once the idea has been conceived and established, we may consider the result as the formula of the idea. But since in art every work is a new idea, a new conception and manifestation of unity, the word formula loses its value and only a principle is involved. As this principle has unity as a basis, we may say that it is universal, immutable, infinite, eternal; in a word, it is unity, and every work of art must strive towards unity.

People have often tried to annihilate me with the word *intuition,* accusing me of wishing to create a purely *mathematical* art. These two words are devoid of sense. When I use these words, what is their meaning? What is the only meaning with which we should invest them? I believe that the word *intuition* has always been used loosely. I should first insist on a precise definition of this word. At most it has been given a meaning comparable to "instinct." I prefer to associate it with the word *unknown.* As soon as we know, we speak of the conscious. Instinct is attributed to the animal, and we speak of intuition in man because the human being possesses a greater refinement of the senses. I say that neither instinct nor intuition exists without experience. Animals, with their kind of life, achieve a more precise instinct through experience. Examples are useless. We have only to compare the instinct of self-preservation, the sense of danger, etc., in a young dog or other animal, with that of the mature dog or other animal. The same is true of intuition. A child suspects nothing, and it is only the experience he has acquired which enables him to know or, let us say, intuit things.

I have heard intuition compared to something divine. Here I am inclined to ask for a definition of God. To me He is a force, an infinite in all respects, and comprises all categories of reflection which speak to us of the unknown. I

believe that the infinite is in all things (the infinite is the unknown). A force, a miraculous force, let us say, exists in all things, and it exists the more for being unknown to us. A grain of sand can be the cause of an "unknown" phenomenon. Before we knew the nature of a microbe, a molecule, an atom, they belonged to the unknown and had the power of God for us simple mortals. Can we attribute our knowledge of the atom to intuition? I believe that this would be a profound error. I hold that the word intuition is without meaning, for the simple reason that intuition does not exist. It does not even pertain to the unknown. We say that we have intuition of a thing when we have hit on the idea of a thing. There is no effect without cause. Otherwise nothing would be relative, and it is inadmissible to believe that a thing can come into being without some cause. In my opinion we should say that our accumulated observations make us believe that we have an intuition of the existence of things. Newton observed a fact: the apple falling from the tree. That was the effect of a cause, for it was the cause, the something that made the apple fall that gave him the idea of universal gravitation. The falling apple is consequently the motive that set Newton to reflecting. Such reflection is dependent on accumulated experience. It is not due to divine providence.

We speak of probability; the probability of an event is defined by the ratio of the number of possibilities favorable to the event to the total number of possibilities. Newton therefore required a certain number of scientific facts before the idea of gravitation became possible. The idea came only through an observable fact. In this I see nothing intuitive. We have simply the effect of a cause. A fact observed and reflected upon by a brain whose instruments or knowledge, whether scientific or otherwise, are abundant, can give rise to the idea of some new knowledge. It is from the shock of ideas that light arises. A cause does not always have the same effect. It obviously depends on the number of favorable possibilities. The number of these is not the same for a peasant and for a man of learning. The cases will be of a different nature, and those that may be possible for the one will not be so for the other. The total number of possible cases is therefore relative to the number of favorable cases. Thus we may say that a conception is due to a state of synchronism. The execution or materialization of a conception will be the more perfect as the creator commits fewer errors. The errors will be relative to his knowledge and experience. A true painter, a genius, does not create a work of art without a knowledge of painting. When this genius puts a certain blue beside a certain red, he feels the quality of each color, in relation to the other, to be in harmony or disharmony, because gradually his aesthetic sense has developed, and in every case that arises he is either shocked or satisfied. Let us admit that he is unaware of the reasons, but can we deduce from this that intuition alone has led him to act? If a person without knowledge of any sort were suddenly to create something, then the word "intuition" would tend to have a meaning. If I

am walking in the city and I take the first street to the right rather than the left, without any reason that I know of, I believe that chance is guiding me rather than any intuition. We call chance an event that occurs without our having brought about its cause. But the cause exists, hence the word chance must be discarded. But in relation to ourselves, who are unaware of the causes, we call it chance; and it is because we are unaware of the causes of certain events that we refer to these causes as intuition.

To say that I wish to create a purely mathematical art is as absurd as to say that anyone creates by pure intuition. Mathematics is only the means, the instrument, used as one uses hammer and chisel to cut marble. Is it the hammer and chisel which create? No! It is brain, thought, will and ability which cause the hammer to act. I use mathematics as I use the meter, for the values I seek will be closer than if I sought them by pure guess work. If I need a meter of cloth, it is easier to measure it than to trust to my judgment. Mathematics helps us understand the relations existing between geometric forms. The new art, being abstract in the positive sense of the word, is created by abstract forms and means.

The principle of unity consists in the laws that emanate from unity.

The laws of unity are not directly perceptible to our senses and we have recourse to abstract means to form an idea of them. Thus Newton established the law of universal gravitation by the equation which is its expression. Gravitation in itself, taken as an absolute, does not exist. But for our limited senses, the law of gravitation, as established by Newton, is sufficient.

In studying cathedrals, we shall see that the principle underlying their construction is invariably geometrical. But their principle was limited to geometric form; that is, artists used geometric forms, but with the aim of elaborating them in accordance with the elements proper to geometric form alone. Thus the artists of this period did not create a new form. Their method resulted only in elaborating a geometric form. Here we are not discussing beauty, but plastic art.

The value of the principle resides precisely in the creation of new forms of a geometric type. This principle transforms a geometric figure into another form, equally geometrical, but for the realization of an aesthetic aim. A given primary form and its elements are the basis of the development. But through the transformation towards an aesthetic aim, the primary forms and their elements cease to be visible. In such a work even the original principles do not appear. Consider the problem of the pyramid of Cheops, a solution of which may be found in the inscribed and circumscribed squares of a circle. The Egyptians, in certain of their works, came closest to the new conception. In Europe it was the mediaeval period which came closest.

Let us consider the cathedral windows, for example, the rose-window in the

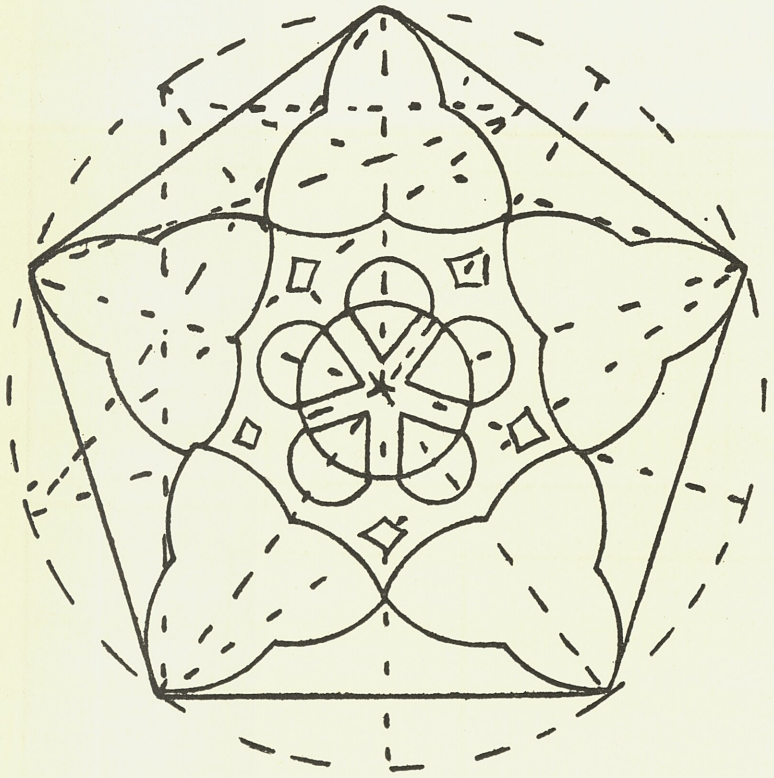


Fig. 1

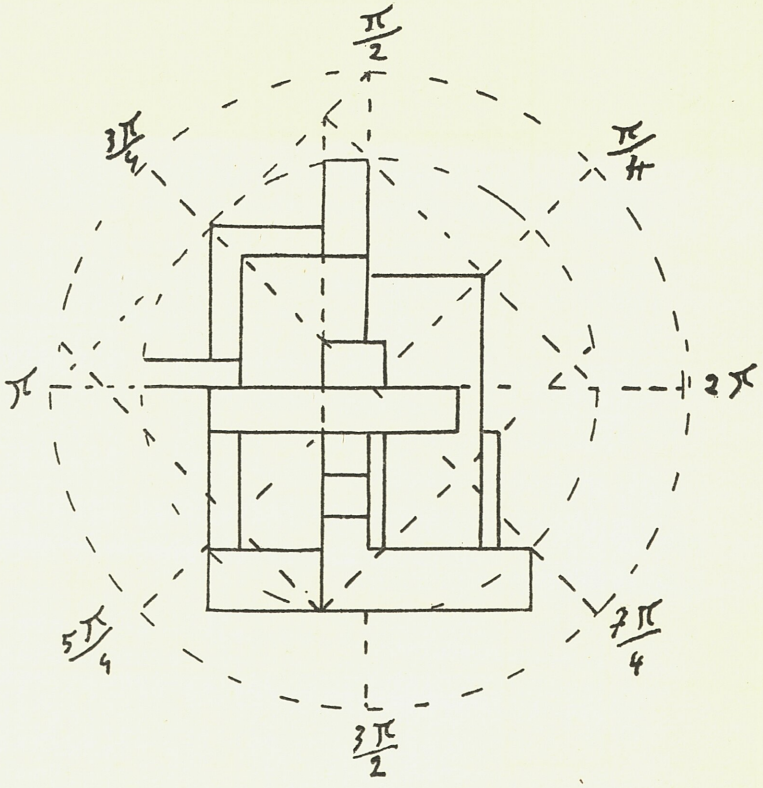


Fig. 2

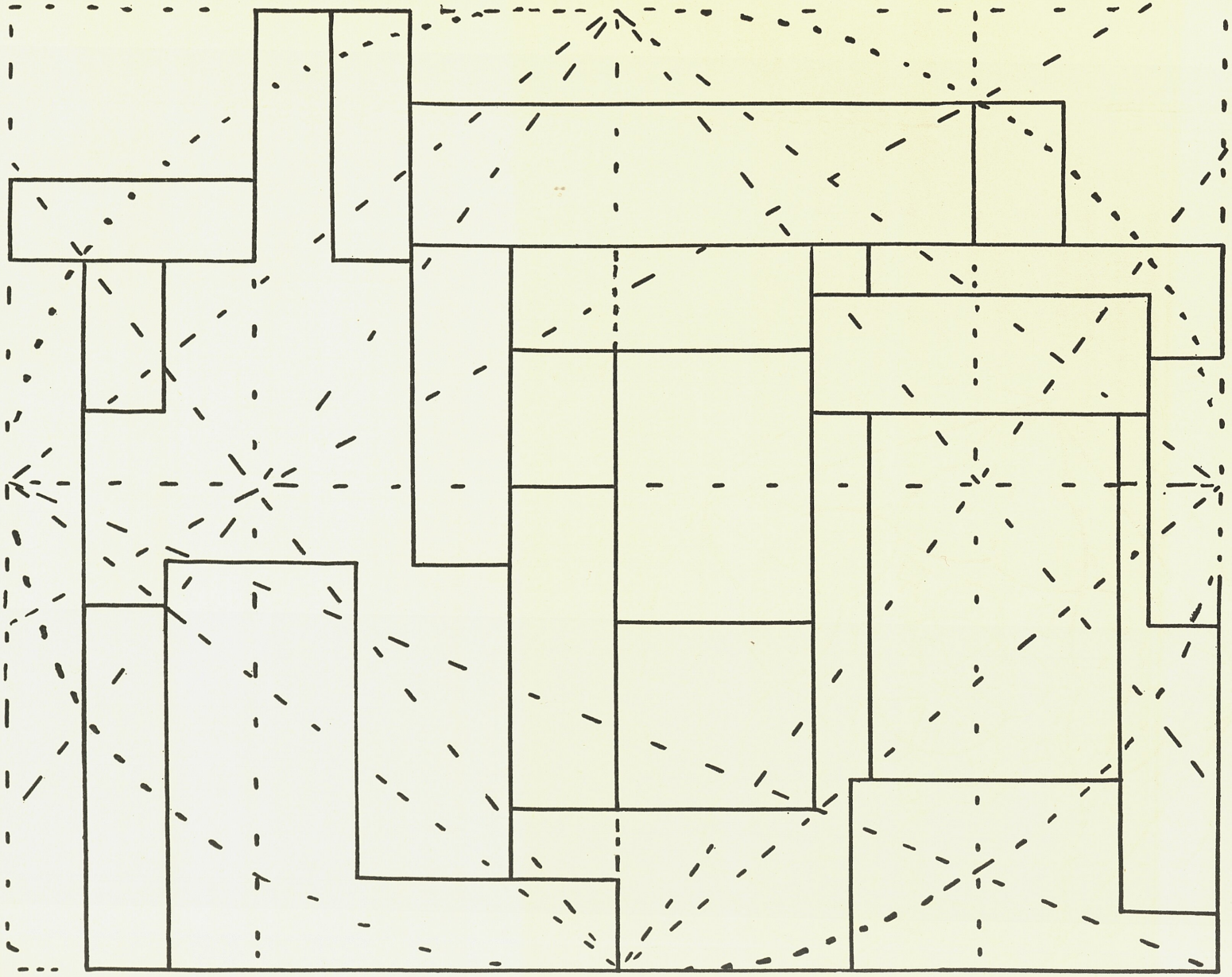


Fig. 3

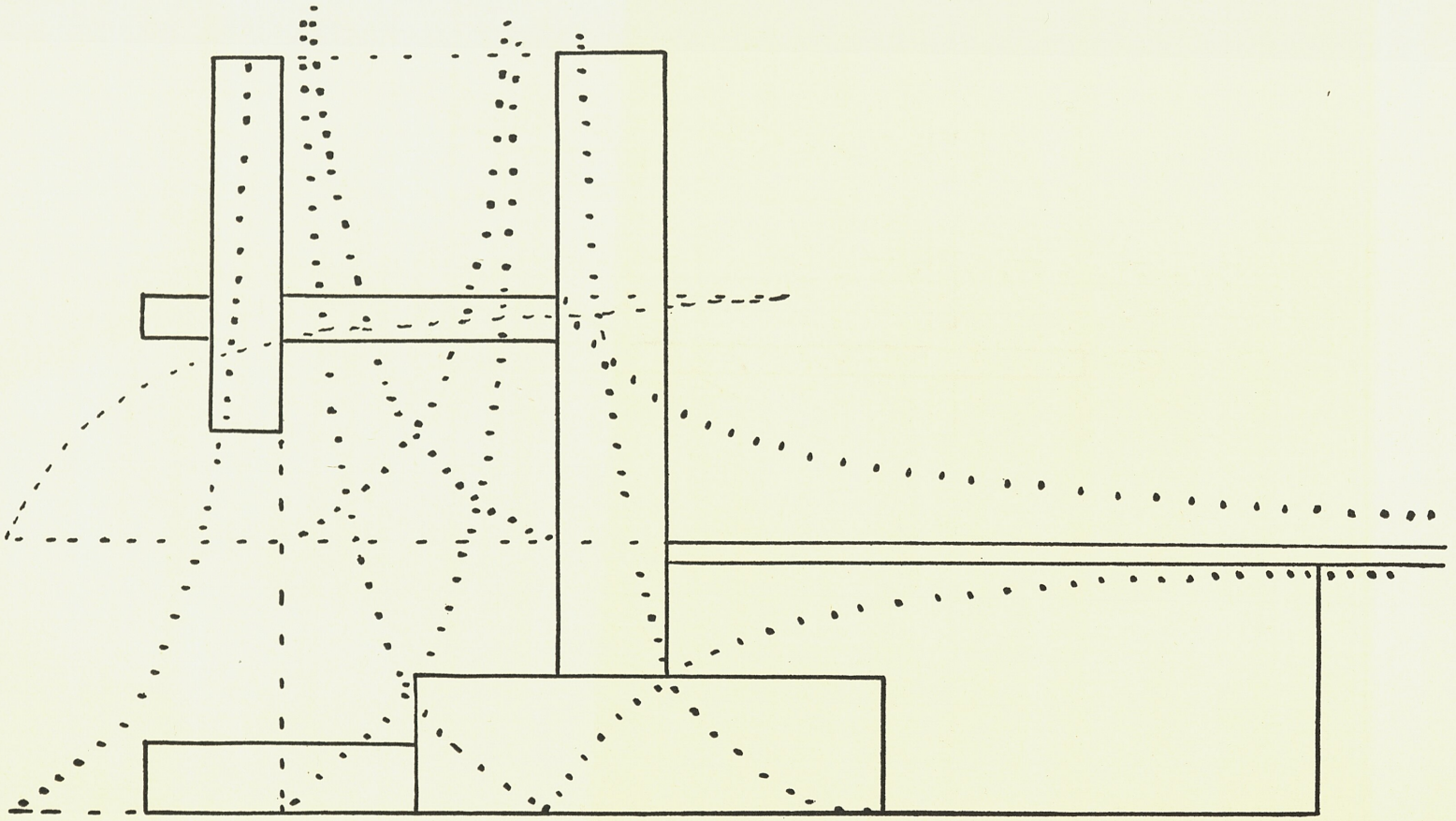
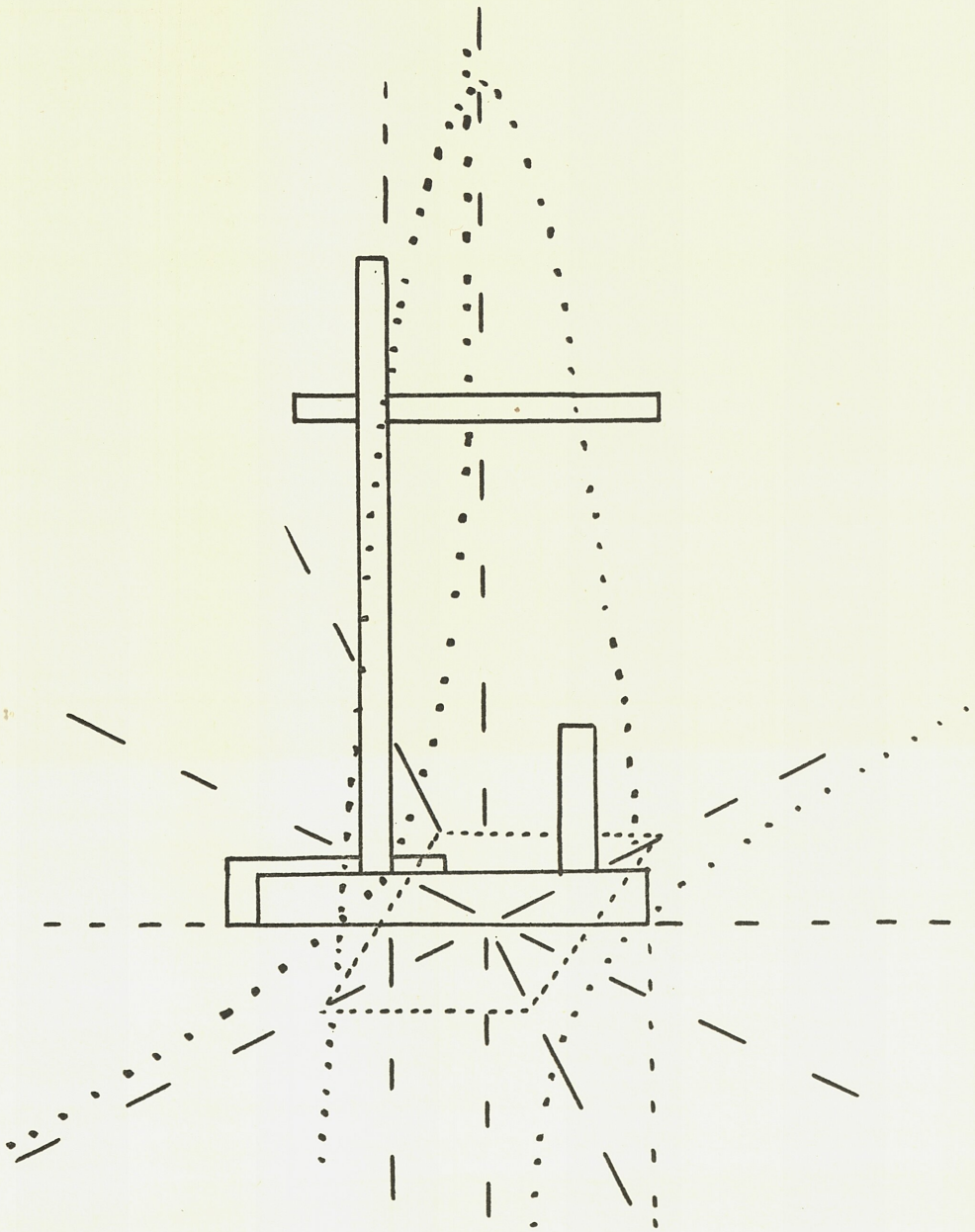


Fig. 4

Fig. 5



cathedral of Amiens (Fig. 1). We may judge that it is a composition based on the elaboration of a geometric form. Now look at the sketches: composition emanating from the inscribed and circumscribed squares of a circle (Fig. 2); composition emanating from the ellipsoid (Fig. 3); $XY = K$ (Fig. 4); and $Y = -aX^2 + bX + c$ (Fig. 5). The reader may judge by a comparative study of the mediaeval period and of the principles of the new plasticity.

From this study it would be found that the art of the Middle Ages consists in composition in a geometric form and no more, and that this composition consists solely in elaborating a geometric form. The new *plasticity,* on the contrary, composes with identical elements and creates a new form with aesthetic effect. It transforms the primary form into another form (object), for an aesthetic aim.

The principle of Unity is not a formula. It is a composition which permits the infinite to create. It is a constructive truth. Such work no longer has proportions. Proportion was demanded in the art of yesterday. The Greeks spoke to us of proportion. In the new art we speak of relations: relation within the work and in relation to Unity, and according to the Euclidean system of measurement.

An aesthetic unity is a construction whose parts stand in a determined relation to one another and together form a unity, all of which gives us aesthetic feeling. I say aesthetic feeling, because it is possible to construct a whole, the relation of whose parts does not yield artistic plasticity. A machine, for example, may be beautiful but it can never be artistically beautiful in any absolute sense, because its plasticity is mechanical and not artistic. A machine must answer to the demands of mechanical plasticity. If this were not so, we might admire a machine, even when its functioning left something to be desired. The conclusion is that the imitation machine, imitation object, etc., is as contrary to artistic plasticity as is imitation nature.

A work of art, on the other hand, is beautiful in itself and can achieve its maximum efficacy when it is artistically plastic.

This plasticity can only be a means which we will call abstract; all its parasitic characteristics are eliminated. No trace of anything else whatsoever can be included in it. In other words, an abstract instrument is needed. Also, the elements constituting the construction of the work must stand in a determined relation. For a relation to exist between them, the artist must choose the abstract form which permits the creation of a relation. All abstract means do not permit this, and consequently certain means may be harmful to the aesthetic unity.

Menton, 1926

Reflections IV

This study consists in a confrontation of two elements, to wit, nature and the abstract.

What importance must be given to nature and what importance to the abstract?

This study aims at finding the role of each, and at formulating an attitude towards them from the point of view of art. We shall have to conclude that, where the arts are in question, we must not only abandon nature entirely, but absolutely ignore it, since nature lies completely outside the sphere of art.

We shall verify the truth of this statement, and for this we shall use an analytical method, then we shall effect a synthesis.

Preliminary:

Creative imagination is often confused with reproductive imagination. The mistake is even made of confusing it with the imagination that creates monsters and chimeras. This is the imagination of fantasy.

Creative imagination is a special faculty.

Reproductive imagination, which attempts to assimilate itself to creative imagination, is in a way a parasite.

This latter type is an aberration, which mistakes one thing for another. It has led certain painters to attempt to reproduce movement, psychological ideas, physics. They aimed, in short, at realizing abstractions, believing that in this way they could assimilate themselves to what is called abstract art.

Creators resolve problems.

Reproducers seek to prove theorems.

We know that problems, once solved, enter into the category of theorems and never again become problems, since a solution has been found. The merit lies in the finding of a solution. But the logic of logic is the illogical; that, no doubt, is why those who put forward the solution have most chance of benefiting from it.

False judgments are innumerable. Without exaggeration we may say that 999 out of 1,000 judgments are false. This is due to a lack of reasoning, and, above all, of logical reasoning. This lack of logical reasoning comes from weakness, the cause of the poor use of our faculties.

Knowledge, consciousness, is a fruit of the abstract. It leads upward, while the road of nature causes us to turn in a circle. Why does nature make us turn in a circle? And why does the abstract road lead us upward?

Nature owes its eternity to its perpetual transformation. But this movement is periodic, hence monotonous, though never identical. The seasons, for example, succeed one another and this succession is repeated regularly. Day

and night succeed one another repeatedly, never identically but always similarly. To speak only of that nature which surrounds us, we see that it reproduces itself without end. A grain of wheat engenders another grain of wheat. A man engenders another man. Each species the same species, with all its variations, but changing nothing. These are local, not artistic, beauties. The abstract road owes its eternity to evolution, and if man had preferred to substitute the path of nature, we should still be running about naked and sleeping in the open. Our houses, our clothes, our writing, like all evolution, are the fruits of our spirit which was able to realize itself by taking the path of the abstract. The meter, the second, mathematics, etc., are abstractions that have enabled us to develop materially. Our conception would be sterile if we did not know how to materialize what we feel. And we can only realize our feelings, or conceptions, through abstractions.

From this it follows:

1. That our conception remains sterile if we do not materialize it.

2. That when the materialization of our thought proves absurd on examination, it must be rejected. But before rejecting it, we must make sure that we have not introduced foreign bodies into the examination, and that we have consistently preserved a line and a basis of reasoning befitting the subject we are examining.

3. When the materialization of our thought withstands an appropriate examination and is co-ordinated with other facts already examined, we must accept its validity, until we have proof to the contrary.

The difficulty rests precisely in the selection of a basis for our reasoning and in the elimination of foreign bodies. Moreover, the line of reasoning must be preserved intact. We must be suspicious of education, false conventions, prejudices, habits, nationality, all of which may influence judgment. As this is usually the case and man almost always reasons on false bases, development is slow and the precursor is misjudged by his own epoch.

False Bases of Reasoning

In modern art, a large number of extremely gifted artists have reasoned on a false basis. Some believed that a work of art should be like a machine, like a ship. Others introduced the facts of optics: for example, on the basis of the distortion of lines in nature, they distorted the objects they painted. Others wished to reproduce physical facts, like movement. All these considerations have moved away from plastic principles. Why produce an imitation of a machine, of a boat, of nature, of appearance, of motion? This is an error in discernment.

Should an architect be reproached for using mathematical knowledge in

his work, for measuring a meter, etc.? Of course not. He derived his conception from the greatness of his spirit. But to execute, to materialize his conception, he had to verify, co-ordinate, calculate. The general prerequisites are therefore greatness of spirit and great knowledge.

The spirit by itself leads us to fumble around the conception.

Science by itself is capable of application and nothing more. What we need is great ideas which we submit to a rigorous examination in order to eliminate any revery which might lead to utopianism. If we do not verify our ideas, we run the risk of marking time; our development may come to a standstill, we may be imprisoned in a circle from which there is no issue since we have no point of reference. What would be left to us of Euclid's knowledge if he had not established it with his geometry? And where would our development be if Euclid had not materialized his thought?

Euclid's geometry does not give us a ready-made formula for all the problems and laws of nature, but it enables us, by supplying us with an instrument, to solve certain problems. Euclid teaches us that the square of the hypotenuse equals the sum of the squares of the other two sides of the right triangle. And if he had not told us this, someone else would have had to tell us. If no one had told us, our civilization would have remained at a standstill, hence much closer to nature – doubtless to the great joy of those who see the world in terms of nature.

Nature as we see it today has ceased to be the nature of former times. Our civilization has already given it an abstract character. If we wish to get a better idea of nature, we have only to think of the virgin forests. Here we see nature and natural sentiments for what they are. Conceive of yourself in the jungle. It would not be long before the bush swallowed you up. Good-bye civilization. A civilization based on money is far less vile than the beauties of untrammelled nature, where the strong is completely dominant. There, if you are not the strongest, you must succumb miserably. No quarter is given. This simple demonstration, familiar and uncontested, shows on how false a base human reasoning often rests. Man knows that the wilderness is the plague, and yet he idealizes it. He regards an ideal fantasy as eternal. He takes the false for the true. He knows that he cannot prove his contention. He is sure of the contrary and even so, he does not admit it. He ought to give thanks to knowledge and science; he owes everything to what can be proved, and he prefers the vague and imaginary – and that is not all. What kind of imaginary! He condemns reflection. And he loves quasi-intelligence, quasi-science, the halfway, everything that is really pestiferous, whether in art or science. He loves culturism, because it does not throw light on his ignorance. Either he misunderstands science and gives it an importance that it does not have or he misconstrues reflection and endows it with an ideal value. These errors obviously

turn against him, as the lie turns against the liar. Man is the first victim of his flights of fancy. He takes the shadow for the substance, and his first error is in discernment. His second error is that he deviates, without perceiving it, from his line of reasoning. He goes from one excess to another.

Creation is composed of two elements: spirit and matter. As for spirit, considered as the energy of thought, the spark of all things and by nature indefinable, we can accord it no other attribute than that of *spirit*. That which constitutes the intrinsic value of a work of art, of *art,* of an invention, a creation, a scientific discovery, is nothing other than *spirit*.

The materialization of thought (the thing dictated by the mind) is only a transmission. The value of the transmission depends on the value of the intermediary. A maximum of discernment gives a minimum of error.

Hence there are two things: a spirit of genius and a limited spirit. For the spirit is dependent on the mentality of the individual, and consequently on the manner in which he expresses himself in the language proper to the expression of a given thought. For example: any attempt to translate a physical conception into an artistic, pictorial or sculptural language is a basic error. The desire to determine a thought belonging to the domain of physics by a simulacrum is an error of choice or of impotence. The number of possible errors is infinite, but we shall explain only the first two.

A writer had the misfortune to say: "I love the movement which displaces the line." This phrase would lose none of its value if changed to: "I hate the movement which displaces the line." And it is not even as good as the phrase: "I love the heat which makes the kettle boil." Such phrases are sometimes, not always, pleasing in writing, but any attempt to introduce them into painting or sculpture is pure basic error, just as much as imitated movement, mythology, history, etc. But, as we have said, though an error of language may be present in the translation, this error may be introduced with genius. The second error, due to poor judgment or impotence, would be in physics what the imitation of nature, the optical phenomenon, is in pictorial art. If Newton, to determine his idea of universal gravitation, had taken an apple attached to a string and let it fall every time he wanted to furnish proof of the mutual attraction of bodies, could this operation be called physics? No, because it is not expressed in the language proper to physics. Yet the idea of gravitation is good. Here we confront not the error of a genius, but a genius who expresses himself badly, because he fails to use the language proper to his conception.

In physics it is rare to encounter such gross mistakes. But in art it is frequent. Have attempts not been made to translate sound into painting? Have artists not given us imitations of movement, imitations of nature, imitation expression, imitation joy, sorrow and every other feeling? All of which has

nothing in common with the *plastic* principles proper to each art. I will agree that some artists have been able to produce art *via* a motif, such as descent from the Cross, etc. But they could have expressed their artistic qualities without the use of any such motif, merely by virtue of the plasticity inherent in their conception. The artistic conception would then have enjoyed the maximum of its proper expression. Each element would have had a clearly defined value. For example, we are agreed that a work of art must not necessarily be a fragment of nature. It can assume another form. But suppose that its form suggests all sorts of images: for instance, a line suggests a human body; a form suggests an expression; an expression suggests any feeling you can think of; and finally a work seems to offer you food and drink. Although such a work seems to be a manifestation of the spirit, it is not realized in a plastic medium proper to art. Such a work possesses multiple values, and no value has any relation to any other. One of the values may be psychological, another anatomical, another the subject itself, all these belong to a single element which stands in no determined relation to the other elements with which it is supposed to form the unity of the work. All this is too much in the realm of the typical, and not enough in the domain of art. To incorporate fragments of objects and figures, with abstract lines and forms or with abstracted nature, is likewise an error in discernment. Such efforts always remain in the realm of the typical.

Is it necessary to look either at nature or an object to form an artistic conception?

Can one compose directly on a surface (painting) or in space (sculpture)?

If things in nature remind us of anything other than a plastic value, they disturb their manifestation in the plastic sphere and must be rejected as impure, leading to "meanings" outside of the plastic.

If I paint a woman, the artistic value of my work may be very great, and yet one will be able to say that the woman is beautiful or ugly. She is young or old. She is blonde or brunette. She is laughing or not laughing. She is in this or that attitude. Aside from her artistic value, she expresses such and such a feeling. On the other hand, the statements stand in no relation to one another. Each quality stands by itself. From this we can only conclude that they not only do not form part of the work, but that they mar its intrinsic artistic value. If I paint geometric forms and incorporate in them objects or fragments of nature, I again mar the artistic value of my work, though it may be great.

If I paint a problem in physics, I shall violate the plastic principle as much as if I had painted a story. Neither stories nor physics have any qualities bearing on painting or sculpture. Writers, especially novelists, have attempted this method in the belief that by it they might produce art. Physics in literature

becomes bad fiction. What can be more absurd than the phrase "I love the movement that displaces the line"? It is not physics, it is a sentence devoid of meaning. Actually the word movement implies the movement *of* some thing. We may correct the sentence as much as we like, it will never become intelligible. If we say: I love the movement of the line displacing itself, we may just as well say: I love the movement of the automobile displacing itself. Here we have a flagrant example of an error in formulation and discernment together. Even if the author meant to say that through movement everything is displaced, and even if the thing is not in movement, but the observer moves, the thing itself will seem to move. As for distortion, it is the result of an optic phenomenon occasioned by a succession of given movements; our eye registers only at a given rate of speed and sees only successive parts of motion. Hence there is a delay between instants, and distortion will be greater as the speed increases. We may say that if a line is in movement, it will appear to our eyes as a certain number of tangents, and will appear as a polygon, the number of whose sides will vary according to the velocity and to the inclination of the line in relation to the observer. In other words, it is a phenomenon of optics. But our sentence does not say all this and apparently has no intention of saying it. What, then, remains of the sentence?

And to think that artists, even talented ones, have taken it seriously and even used it as a basis for composition! This was pure squandering of talent. The absurdity killed artistic qualities. I have seen a work by a talented artist, intended as a materialization of this sentence. The artist's ignorance was such that he attributed the chief importance of his work to the sentence, though actually, realization of the sentence detracted from the artistic value of his work. Here again we have an error in discernment. It is not exclusively the bourgeois who is touched by a woman's beauty — in short, by a subject that appeals to him — in a work of art. Even artists are caught in the snare. To produce pure art, it is not enough to work abstractly. It is possible to produce an abstract work and fall into the same errors as in producing a naturalistic work. The *sine qua non* is real abstraction; as long as the artist is guilty of an error in discernment in his handling of the plastic, he can only turn in a vicious circle.

Art can be created out of anything whatsoever, by any method whatsoever. Everything depends on the degree of genius. But anything whatsoever is not the most desirable material, and any method whatsoever does not imply precision.

Menton, 1927

Reflections V

We know that nature owes its eternity to a perpetual transformation, and that evolution is a construction whose abstract means constitute the infinite.

The abstract has been the source of man's evolution. Without abstract means, evolution is not possible.

If we wish to put an observation to use, we must formulate it, must put it into an abstract form, in order to control it by comparing it with facts previously observed, verified and co-ordinated. The most purely abstract instrument at our disposal is geometry, or mathematics. Mathematics is after all nothing but a product of the mind, composed of facts which have been verified, compared and deduced. No geometric form has anything in common with nature. It is not true in relation to nature. Independent, a thing in itself, it has no analogy with nature. They are two completely distinct things. There are abstract values which we have borrowed from and combined with nature: these are relative abstract values such as the meter, the second, gravitation, the spectrum, vibrations, etc.

The meter and the second are also used as instruments in commerce and industry. That is to say, they are indispensable conventions.

Gravitation, the spectrum, vibrations are physical and chemical instruments.

If I were to say that a meter is the ten-millionth part of a quarter of the terrestrial meridian passing through Paris, I should not have stated that the meter is an absolute abstract value.

No geometric form is conceivable unless the relations attributed to the form are constant. A square is not a square unless its four sides as well as its angles are equal. The circumference of a circle is equidistant from the center. The second is a division of the mean day. There is a sidereal day as well as a solar day.

Weights and measures, like a kilowatt, are combinations.

The spectrum is a phenomenon of identity, whose elements are repeated in proportion and within the phenomenon of vibration.

Which of these facts should we retain and how shall we utilize them to produce an evolution by way of the abstract?

The problem is too vast for us to give all solutions. However, we may test some of them.

We know that vibrations, from the smallest perceptible to our senses (which we have fixed at 16 vib.) to the largest vibration imaginable, present the phenomenon of a cycle repeated always in the same proportion. Harmonics may serve as an illustration of this. Every cycle is infinitely divisible, but physics has characteristically broken it down into seven intervals, consisting either of

5 tones and 2 half-tones or of 12 half-tones. Obviously each 7-tone cycle not only is divisible into 12 half-tones, it could be divided *ad infinitum*. This has been done with the light cycle. The light spectrum is divisible *ad infinitum*. This phenomenon emanates from the infinite, and every interval of rest, or fixed number, is an infinity, continuous in itself. Its extension, or space filled, can only be relative and is infinitely divisible. Hence the spaces of colors are finite, once a relation has been found. If to a light unit I attribute a relative length, for example, 25 cm., with red on one side of the finite and violet on the other, and subdivide it into 7 relative parts (each representing a color), then in order to find the space of each color, I must find the point between each color, that is, I must find the point between each of the 7 relative parts. It follows that the spaces will vary in size depending on whether I divide the unit of length (25 cm.) into 7 parts (colors or tones) or into 12 parts (half-tones). And if I compare the spaces of the 7 colors emanating from the unit of length, 25 cm., divided into 7 relative parts, with the 7 colors emanating from the division of the unit of length, 25 cm., into 12 half-tones, their size will not be proportional; this proves that everything is infinite and nothing is finite. If we speak of the finite, we must postulate the relations we have taken as a basis. Hence the space of a color is relative to its neighboring color, according to the total number of divisions of which it is a part. Thus the finite is relative, and the infinite can only be infinite.

In a space of 25 cm., divided into 12 relative parts:

red = 3.132 yellow = 1.996 blue = 2.804

Same space divided into 7 relative parts:

red = 4.556 yellow = 3.880 blue = 5.594

Same unit of space divided into 3 relative parts:

red = 11.060 yellow = 6.349 blue = 10.335

Reduced by a rule of three, we have:

parts	red	yellow	blue
12	9.27	6.30	8.84
7	8.68	5.80	10.57
3	9.271	5.522	8.954

Thus the color spaces will have a relative width in relation to other colors, and will be relative to the number of divisions.

But what are vibrations? Should we call them abstract or natural? We cannot properly call them natural. But it would be just as false to call them purely abstract. Actually they are a phenomenon which man discovered in nature. He has been able to observe that vibratory phenomena are a kind of skeleton structure to creation, that without this skeleton, nature would lose its balance. Is the skeleton abstract, or is it natural? Optically speaking, it is not what is

presented to our senses. We have succeeded in isolating a phenomenon in nature. We have had recourse to physical and abstract means in order to establish its laws and make it intelligible. We have co-ordinated it with other knowledge, and figures have enabled us to symbolize its behavior. Seven tones, 12 half-tones, intervals, thirds, fifths, major, minor have enabled us to analyze music, and musicians have used them to construct a harmony. This harmony finds its unit in the base of 7 tones — a method used by musicians up to our day.

But are we obliged to accept the unit in order to express ourselves in the plastic medium of music? It is evident that the scale provides all the elements hitherto employed in harmony; true, the rules have been modified from time to time, but never with a freedom exceeding the genius of a period. It is certain that we will never be able to create a sound that cannot be catalogued among the 7 tones of the scale even if its pitch seems strange. A sound will always be a sound, and must find its place in a scale, however fractional the interval.

The spectrum can be used in an abstract way, so that the activity of the natural phenomenon is no longer present. Then it becomes a new crystal, entirely a product of the mind, and our highly developed sensitivity. It can lead to a new mathematics. Then perhaps a new type of notation will be needed to express it. Our present musical instruments are tuned to an octave scale. But a means has already been found of producing music by alternating currents. Might this new means of producing sounds not permit a harmony of sounds different from that to which we are accustomed?

As I have said, a sound, whatever it may be, can always be catalogued in the scale. Its pitch merely differs from the customary pitches. But here I wish particularly to speak of producing a new harmony of sounds outside the register to which our musical instruments are tuned. This would inevitably create a new harmony and aesthetic conceptions in which creative genius would enjoy greater freedom.

The use of alternating currents of suitable frequencies may lead to a new harmony. The danger to be feared is that the inventors of this electrical instrument will tune their new instrument to already existing instruments, making no change in the musical medium. Composers of genius should collaborate with inventors.

I am only putting forward an idea — the creation of a new musical medium is the business of composers. It is they who have always anticipated progress in physics. Modern composers already feel hampered by the old harmony which prevents them from giving free rein to their conceptions. Musicians today are departing from old forms, but they are still restricted by the old harmony.

In pictorial and sculptural art, plastic means have made an enormous step

forward, thanks to the aesthetic use of geometry.

In mechanics, we may say that physical laws have been transformed into energy. The Greeks made no use of simultaneous sounds. Their music was entirely homophonic.

The Middle Ages developed a harmony which is still in use.

Why should we preserve the notation and bars handed down by the Middle Ages? Why are musicians obliged to imprison themselves in a predetermined harmony? To express an aesthetic feeling in music, a harmony is needed which makes it possible to create a unit free from the old restrictions.

Admitting that the scale resembles a geometric form, we might divide it like any geometric figure, as, for example, a square when divided by diagonals, a circle by its radius, and we should have the 7-tone or 12-half-tone scale. These are symmetrical divisions or specific relations. The relations of lines in a geometric form, the four sides of a square, the diagonal or hypotenuse of two sides of a square, π for the circle, etc., are like the intervals in music (thirds, fifths, inverted chords, etc.), though remaining always a subdivision of a given unit. This explains how, in the Middle Ages, it was possible to elaborate on a geometric form without creating a new crystal, or a new geometric form with plastic proportions. I have given numerous examples of this for pictorial and sculptural art at various periods. It goes without saying that it is more in the province of the musician to show us a work created in the musical medium.

The 7-tone scale might be considered as a special geometry, the intervals of which represent different solutions to a problem. To compose with existing solutions of the problem (as musicians have done hitherto) is to give only the geometric relations of a composition. Hence it is not a new crystal. It is a juxtaposition and combination of solutions of a primary form. The primary form — circle, square, rectangle, ellipse, hypotenuse, etc. — like the 7 tones of the scale, the third, fourth, etc., constitute only the base of a unit. By means of this unit, a new crystal must be created, a new form which no longer resembles the original form.

The old musical idiom is a geometry, many of whose forms have been revealed to us. We now know this geometry. It is as beautiful as that of Euclid. Now, with these forms, which in themselves are very beautiful, a work must be created which is plastically beautiful and not merely geometrically beautiful, like the rose-window in Amiens Cathedral. We must emerge from this primary form which remains apparent, and produce a new work which emanates from the primary form.

It may be said that up to the present time the prismatic interval has been used by our composers, as prismatic forms have been used in cubism. The prismatic form and the prismatic interval, even the harmonics which do not present a regular interval taken as a proportion (though harmonics are interrelated), do not constitute an absolutely abstract medium. Only primary

forms remain. The relations of a geometric form, of a musical interval, are always the relations of a primary form and not of an artistic creation. The juxtaposition and the combination of these primary forms lead us to cubism; they do not constitute an absolutely pure and abstract plastic medium.

It is true that even a work created in an absolutely plastic medium will always have a geometric form or an interval. But the form will no longer be primary, and the interval will no longer be indicated in the scale. It will be a new crystal, of an entirely artistic nature. Obviously a musical work, entirely composed in an absolutely pure plastic medium, could not be played on instruments which are based on the old interval. New instruments would be needed; I believe that electricity might provide them by means of alternating current.

Paris, 1929

Reflections VI

By moving I obtain the feeling of existing and of space, as well as of time. If I could not move and if I had no means of noting the motion of things around me, there would be no instrument that would reveal to me the possibility of the existence of space, and I should have no need of one. Since man moves, the concept of space is inherent in him. Our senses imply the notion. Without our senses, it is obvious that we should not need it. We need space in order to situate objects. Space, which is indispensable to us (though we cannot define it), is inseparable from life. We cannot conceive of existence without space. Space, time and the beautiful exist for us because we really need them. We cannot define what they are, but we cannot do without them. In daily life, of course, we do not especially notice space, time and the beautiful, but we do feel that if one of them were to vanish, we could not live. It is of no importance whether or not the beautiful exists, the significant thing is that our senses create a need for it. If, for example, everything were ugly, it would not shock us, provided we had no sense of the beautiful. Life is neither beautiful nor ugly. But without the sense of the beautiful, man would pass through life like an automaton. All human ambition arises from man's sense of the beautiful, which in turn is relative to the individual man's development. Slight as it may be, without this need for the beautiful, man would not be human. We are always seeking the beautiful, sometimes even mistakenly: we can always imagine it, and we never miss an occasion to grasp it, since the beautiful fills a need. And so, art takes its place in life, just like time and space.

Art has no dimension; by nature it is like time and space. To determine

space, one is obliged to take a point of reference; and in relation to a volume, situated in space, one is able to determine the relation of another volume. This done, one can also determine time. Volumes, in relation to one another, imply the notion of space, and the distances separating volumes from one another imply the notion of time. For the notion of *art,* we can determine only an aesthetic feeling. We obtain the notion of art through a so-called work of art. A work of art is one of the numerous solutions of what we represent as art. A work of art never contains all possible solutions. Aesthetic is our name for the form a solution has taken. And we call the feeling we receive from this form, *art.* The aesthetic is an ideal form of harmony. We know what we mean by the word "aesthetic," but we cannot define it. Reason can give us no more insight into art than into time and space. We can only establish relations that give us an image of art, time or space: relations in reference to the aesthetic, relations in reference to duration, relations in reference to distance. There is no law against establishing definitions in art, but for lack of a unit of measurement they are never valid. All we can do is to understand the relations which give us aesthetic feeling and which we finally call *art.*

If, with me, you acknowledge that art is not accessible to reason, and that artistic feeling can be aroused only by plastic means, then you implicitly admit that reason can at most illuminate the plastic element in art, i.e., the purest means of rendering its idea. Just as volume suggests space, it is the plastic work which suggests art.

One is tempted to inquire whether evolution really exists, and, if so, in what way it manifests itself. Life, as an absolute value, even if it manifests itself in different aspects, does not evolve; it owes its eternity to a perpetual transformation. This transformation is only a constant repetition of life, in which no degree of evolution is perceptible. We may designate life as *one.* Since life does not evolve, it is only the *mode* of living that can evolve. That is to say, only the means can evolve, including the organizations which man creates. In proportion as the means increase, the number of possibilities increases, and it is precisely this increase in the number of possibilities that we call evolution. Our equipment increases and gives us greater possibilities. The possibilities of lighting, communication, industrial possibilities, all these evolve. Hence if we can designate life as *one,* two becomes mere repetition, as well as four, eight, sixteen, etc. The larger I make this "*one*" the greater number of means I shall be able to muster. Between four and eight, I have five and seven, since six is a repetition of three. Thus evolution consists in the addition of new prime numbers and in possible combinations of numbers. These combinations extend to the infinite, and hence there is no stop to evolution.

By tradition we combine the past and the present, creating a stop to evolution. Tradition prevents the present from being what it should be. Our civiliza-

tion is the dupe of tradition and does not express the present as it should be. We believe in the possibility of an evolution in our civilization, and fail to see that our civilization is obsolete. We construct evolution on the base of an obsolete civilization. Our civilization is not adequate to our present, that is, to our means of evolution. Hence the conflict that occurs in men who are receptive to the present and to evolution, while they are bound to traditional civilization. And in those who are traditionalists pure and simple. As long as man is not conscious of the gap, his mode of life will be full of difficulties. We must revise our mode of life completely, transferring it entirely to the present, divesting ourselves of all tradition and keeping our minds open to evolution. It is possible by tradition to perfect a given point in evolution, but never to change its essence. And while the point is being perfected, evolution is stopped. This perfecting has a value only for a relatively brief duration, and, if we persist in it, we fall back into tradition.

Comprehension in general is partial. It is plain that, though nature has given life to all living things, all have not received the same capacity for comprehension. Comprehension is a thing that must evolve, and if it is in the least marred by tradition, it can present obstacles to evolution.

Tradition exists throughout our entire civilization. In every domain man suffers from it. Tradition in art has for a long time been an obstacle to the evolution of an art such as we should have in the present. Until now art has always manifested itself in a primitive manner and within a primitive civilization. It is not surprising that our manifestations of art should still be primitive, since we are living in a primitive civilization. Art is still dedicated to conventional values, and by this very fact is prevented from being what it should be in the present. Everything is still imaginary. Likewise, our streets, our cities, our dwellings, etc. still denote an old civilization. Our dwellings are not organized for a society that looks toward the future. All this is only individual, private property. To gain a livelihood, man must have recourse to servitude and exploitation. The instances of free labor are rare. To work for the pleasure of working requires either private means or the sacrifice of social position. Our social life does not tolerate free work. Those who engage in it are outlawed. Our houses still connote property or servitude. That is one of the greatest difficulties encountered by architects in creating a house befitting the present. Only a new basis of civilization, adequate to the present, created by progress, can create the need for a new dwelling. We may ask: is it the architect who will create a new society or is it the new society that will create the dwelling? For my part I am certain that architecture will never give us a new society. Architecture merely creates comfort for the old society, the perfecting of the bathroom, running water, central heating, etc. Our living conditions, created by all these improvements, should make it clear to the old society that

with all its comforts it remains exceedingly retarded; it must change its social base.

Science, art and architecture only permit society to note the stage of evolution it has reached, they do not enable it to change its base. The need is for a different type of organization. We must revise our social base; a new base, adequate to the present as it ought to be, will automatically engender the dwelling directly related to our social evolution. The old dwelling, this vestige of an obsolete civilization, with its drawing-room, its dining-room, its boudoir, its family heirlooms, etc., offers no indication of a society with a perspective on the future. It is no longer possible to build on the base of our present society. It is only possible to perfect the old things. We can make repairs and devise variations, but nothing which might bring out a real sense of life. Our morality must conform to logic. But instead it has lost all meaning — in fact, it has never had a meaning. We must learn to distinguish between that which is a direct function of nature and that which belongs to civilization. Nature, whose aim is propagation, is entirely without morality, it has no concern with morality, and does not evolve. It varies. Only the spirit evolves; morality is at its base. The error of our civilization is the failure to distinguish between these things. It wishes to correlate them, but also to remain tied to nature. Nature plays tricks on us.

Yet I know that we are "nature," and that for better or worse we are endowed with a human spirit. But how are we to navigate in this double current? We must distinguish one from the other: they are distinct. In art, an attempt has been made to yoke nature with the spirit. Nature has been interpreted, and spirit has degenerated: the result has been "artiness." A merely decorative value. Our civilization teems with "artiness." But already we see art disengaging itself from a quasi-philosophical artiness to become more and more a science and form *one* with a new society. (Do not confuse this with utilitarian art.) But the field of action for the artist is not yet open. The artist is still condemned to exhibit art as an object; art is still part of the old organization. But since this organization cannot persist forever, it must one day cede its place to an organization better adapted to the present. Art, science, work will form a single organization, and this organization will be able to call itself social. Art up to now has not only been in a state of servitude, but its works represent a real mixed salad. In them we find everything: nature, literature, physics, mechanics, etc., and every possible combination at once. It is not surprising that this salad should have engendered Surrealism. The greatest absurdities, the most incoherent objects, painted or pasted together, are considered to be art. And there is no relation between the elements employed. A painter turns out an amputated leg, a flower, and a drawer in the belly of a woman, and everyone calls it modern.

Like man, art has always been in a state of servitude. Since the remotest antiquity, it has been in the service of all religions; then of monarchs, and finally of every merchant and business man. The new era will perhaps give art to society. And society is everybody. It is anonymous, it has no owner. It has only workers and owners of brains. Society will bring forth a work of pleasure, that will be a source of intelligence instead of dullness. This new era will permit us to carry on our evolution, while our present civilization leads us into a blind alley. In our civilization one solution contradicts another, instead of confirming it or complementing it. And whatever is done in this outmoded system, everything will serve to fatigue man, since the base is not in relation to the product of our brain. Servitude, exploration, the I, the ego are signs of the old civilization. The new era will be under the sign of the anonymous. All work will be for the benefit of society. And society is everybody. Such a society will have no politics, no nationality, and hence no frontiers. It will have only workers of the spirit and the hand. Reason will be dominant. There will be healthy sentiment and generosity, and not this languid sentimentalism, which creates only a fanaticism for the profit of its partisans.

These reflections will remain utopian as long as man, from birth to death, retains his prejudices and all the ceremonies in which they are dressed.

Paris, 1930

Reflections VI

Those who in nature see only appearance are led to mystery — worship. Knowledge unveils the mystery; today men of science are agreed that the imitation of nature does not lead us far. Examples are numerous: a modern airplane is far from being an imitation of a large bird. It is the very contrary. And consider the prospect of perfecting the automobile which substitutes rubber tires for the articulated legs of animal motion. Worship of nature and the manifestation of human sentiments lead to the bankruptcy of social life. All this is soporific incense.

The straight line, the square and the rectangle, as these elements have been used by the majority of artists, including some of the most famed, are emblems of vanity, a vestige of an obsolete society encouraging mystification. The straight line and the vertical can be just as bourgeois and anti-universal as a portrait of Lenin, a prosperous business man, a monarch or anyone else. The straight line can be used to express only one's own egocentric ego, in a manner equivalent to worship. Many painters commit this error, and nearly all modern architects exploit the straight line. The conception of the vertical as an absolute value, impersonal, semi-religious, directly social, anti-theo-

sophical has not been understood. By religious I mean any idea of a faith or image, whether of king, chief, genius, proletarian, etc. The social system adopted by all nations is based on the encouragement of mystery and the vague, the worship of some imaginary magnitude. Only science is capable of penetrating the mystery. But let us take good care not to worship a man of science, for worship is atrophy.

Alas, evolution progresses on crutches, and if I speak of airplanes and birds, it is not to say that the airplane was created all at once. All modern automatic machines owe their origin to the automaton with the human face, a brutish image, articulated and moved by some ingenious device. In a certain measure the automaton produced by the primitive mechanics of the 18th century can be compared to naturalistic art, while the modern automatic machine may be likened to so-called abstract art. But it was not the machine that inspired in the artist the idea of an abstract art. It was solely his conception of universality and of the plasticity most suited to its expression. The abstract was least conducive to confusion and worship. We all know that the machine is an object that replaces man's muscle and primitive tools. It presents analogies with the human being, but not in its outward form. The automatic hammer replaces the automaton-blacksmith. In ancient times articulated statues were used to influence the minds of the faithful. Later, Hero of Alexandria taught physics by means of objects that reproduced the simple movements of human forms. In the 18th century, it became the fashion to build clocks with droll figures which executed rudimentary human movements. But the automaton was not always a mere source of amusement. Scientists like Descartes and Helmholtz took an interest in them. The automata of Vaucanson and Jaquet-Droz, could write any desired sentence. This work, as well as the "Draftsman" by Henri-Louis Jaquet-Droz, the son, and the "Musician," on which father and son collaborated, still function and may be seen at the Neuchâtel museum. Are not our typewriters, phonographs, airplanes, etc., the result of the researches of Jaquet-Droz, father and son, of Abbé Mical and Leonardo da Vinci?

Much progress is based on their researches and findings. We might cite numerous contributors to progress, who have brought us to the point of constructing machines that no longer simulate human beings but perform the various actions of men, replacing many workers; their actions are in direct relation to the laws that created them. It is in a similar manner that the abstract artist recognizes nature and stands in a direct relation to society. He no longer engages in idolatry, and if today he is still obliged to take refuge in a studio and paint on canvas, it is the fault of our social system. The artist has a much vaster field of action, but the social organization of today does not permit him to express himself completely. Certain artists have already rid themselves of the subject and of everything which is anti-art, and for this society as a

whole does not forgive them. But the artist will be in full action only when society itself is divested of appearance and has acquired a universal basis. When we see the Palais de Versailles, we are reminded of *domination* and of *capital*, which did everything to produce an effect of the *sumptuous*. The Champs-Elysées represents the exploitation of capital (despite the absurd phrase, *"faire fructifier le capital"*). In the rue de la Boëtie, we have on the one hand the antiques, genuine or fake, which help to keep society jogging along in its old rut. This bric-a-brac, useful for turning the clock backward, is bought and sold. On the other hand, we have the picture dealers who dictate the sales value of art. Through publicity, they dictate the value of the artist. For all ideas are false in our society and ignorance is to blame; ignorance is the body that nourishes the most parasites.

Plastic art *undergoes* social evolution and its élan has always been obstructed by the lag in social evolution.

It has often been stated erroneously that art is a reflection of society. Art always anticipates social evolution. But the regime under which it lives prevents it from giving free rein to its expression, from expressing itself entirely.

Every regime reaches its apogee and decomposes, and the art which the regime had harnessed to its service, escapes. Thus art liberates itself more and more from the servitude imposed upon it by the social regime.

We say that every social system takes art for its servant. The consequence of this was, formerly, to combine the arts (architecture, sculpture, the pictorial arts): not to combine them in unity, but to make them a greater force in the service of the regime. This seemed a marriage, protected by state patronage. But in reality this union was only a liaison, resulting from the social system, not an alliance for the sake of plastic values.

As the social system lost its power, the arts became separate from one another, and plastic art became particularly isolated. This proves that art is not a reflection of society. Art, freed from the yoke of the social system, became the servant of the ensuing system (transition from the feudal to the bourgeois). Today, the arts tend to unite. But they can unite only in reference to the values which make them into a homogeneous whole; only thus can they really justify their existence. Unhappily, this epoch does not permit the artist to express himself entirely. Perhaps a new social system will. In the feudal age, the arts, architecture, painting and sculpture, were juxtaposed. One rested on the other. Architecture was camouflaged with painting, and sculpture was tossed on top. The feudal regime had all the prerequisites for creating the fresco. The painting which it drove to its extreme for the benefit of the nobles, died with feudalism.

The struggle of society put an end to the concubinage of the plastic arts. I say concubinage because there was no union, and I say "the plastic arts" because they were always separated.

With the bourgeois regime, easel painting, ornamental architecture and candle-stick sculpture were to attain their greatest height. Art was turned into currency. Art, which in the feudal period served to glorify the overlord, became an object of commerce. Escaping from the feudal regime, art threw itself into the arms of the bourgeois regime. It shows a tendency to free itself, but will it achieve its independence, its true value as a plastic art?

The role of art in social life is the same as that of everything which partakes of evolution. Society is at first refractory, then it seeks to assimilate the evolution into its social system, but it is never able to grasp its full implications.

Art throws off the yoke of a social system and often reflects only the errors of an epoch. It was not because the Pope commissioned Michelangelo to paint the Sistine Chapel that the work reflects the epoch. The history of Henry IV of France does not constitute the value of a work of art. The history alone belongs to the epoch. The artistic value remains ART. Thus it is not surprising that art should tend more and more towards the abstract and should throw off the yoke of the social system. The nobles and monarchs took art into their service to consolidate their power. But they were not able to capture art. They merely recorded their mistake. Art escaped and their mistake remained.

Bourgeois society permitted the development of easel painting, the negotiable object. But this is not the aim of art. It is the desire and obligation of art to be free.

Concluding Remark

Since my earliest childhood, I have been sensitive to the beauty, the grandeur, of what is called *space*.

Up to 1917 I was a sculptor and painter. Space was chief among my concerns, as can be observed in my works. The *words* painting and sculpture are labels to designate forms of art in which, at any cost, the memory of nature must be mingled. That is the aspect of true painting, true sculpture. From 1917 to 1938 I pursued my desire to render perceptible (visible in a work) the beauty of space, or what has been designated as the *abstract*. In this work, the artistic element was not questioned, *but!!!* all sculptors and painters did not accept the abstract as true sculpture and true painting. To tell the truth, these words are labels which do not greatly concern me.

From 1938 to 1946, still pursuing this conception, I have escaped more and more from labels. I am free. That is my right, and yours too. Art expresses itself freely and I hope that no one will look for a new label to pin on my conception, on pretext that it is a new art — like the cinema.

Painting and sculpture have always had a *dominant,* which has been called

period, "ism," Gothic, Renaissance, luminism, impressionism, expressionism, cubism, etc. But art, which we cannot define since it presents no means of measurement, appears very strongly to belong to the infinite. A dominant, by the very fact of imposing itself, shatters harmony, and a relation is always harmonious. The infinite contains spirit and matter, light, expression, etc., *but* it puts none of these characteristics in the foreground. Dominants obtrude. All the characteristics of the infinite are perceptible, but not theatrically visible. They must all exist discreetly as though they did not exist. When we feel our stomach, our feet, our head, nothing is right. Everything must function unobtrusively.

Hence I am free, just like everybody else. I have rights and no duty. The word duty is another fine signboard for exploitation. It is the police. We have only rights and no duty, but we owe respect to others. Respect for the liberty and rights of others. The word duty is a dominant. Respect is the height of sensibility. There is nothing revolutionary in this idea. At most it is evolutionary. I respect everyone without distinction and I try to be and remain myself. Go thou and do likewise. This is no criticism, but these sentiments, which have always been with me, even when I was not conscious of them, have been confirmed by observation. One need only open one's eyes and remain simple to perceive their truth.

Let me try to express myself.

There is water, there is fire: two sacred elements, held in veneration by our ancestors.

When coal was first discovered, its nature was not understood. Since then it has been analyzed and a large number of derivatives have been extracted from it.

Fruits are sweet. Sugar has been extracted from sugar cane and beets. Sugar has been concentrated. It is not a new product but a new form, or the presentation of sugar in a new form. But sugar has also been extracted from coal, i.e. saccharine, another new form, an imitation sugar. I am not speaking of nutritive value.

Air has been analyzed and found to be a mixture of several gases. Chief among these numerous gases are oxygen and nitrogen. But the air also has other ingredients.

Continuing to penetrate the mysteries of creation, scientists have found the atom. An extraordinary power, capable of providing us with light and heat and of driving our machines.

If sugar and saccharine are not creations, the atom and radium are sources of energy. I am trying to show the difference between reproduction and creation. Of course an example is never identical with the thing itself and things must be approached through sensitivity rather than understanding.

In former times, mysteries were deified. Hence the totemism of the Egyptians, the mythology of the Greeks, in which all the forces of countries and peoples, objective nature, the analysis of nature and of movement, are reproductions and not creations.

Totemism, mythology, divinities are imaginary. Hence fetishist art.

The analysis of nature and movement are reproductions. The drama is reconstituted. Hence "objective" art.

Radium and the atom are sources of power. They engender. Hence "creative" art.

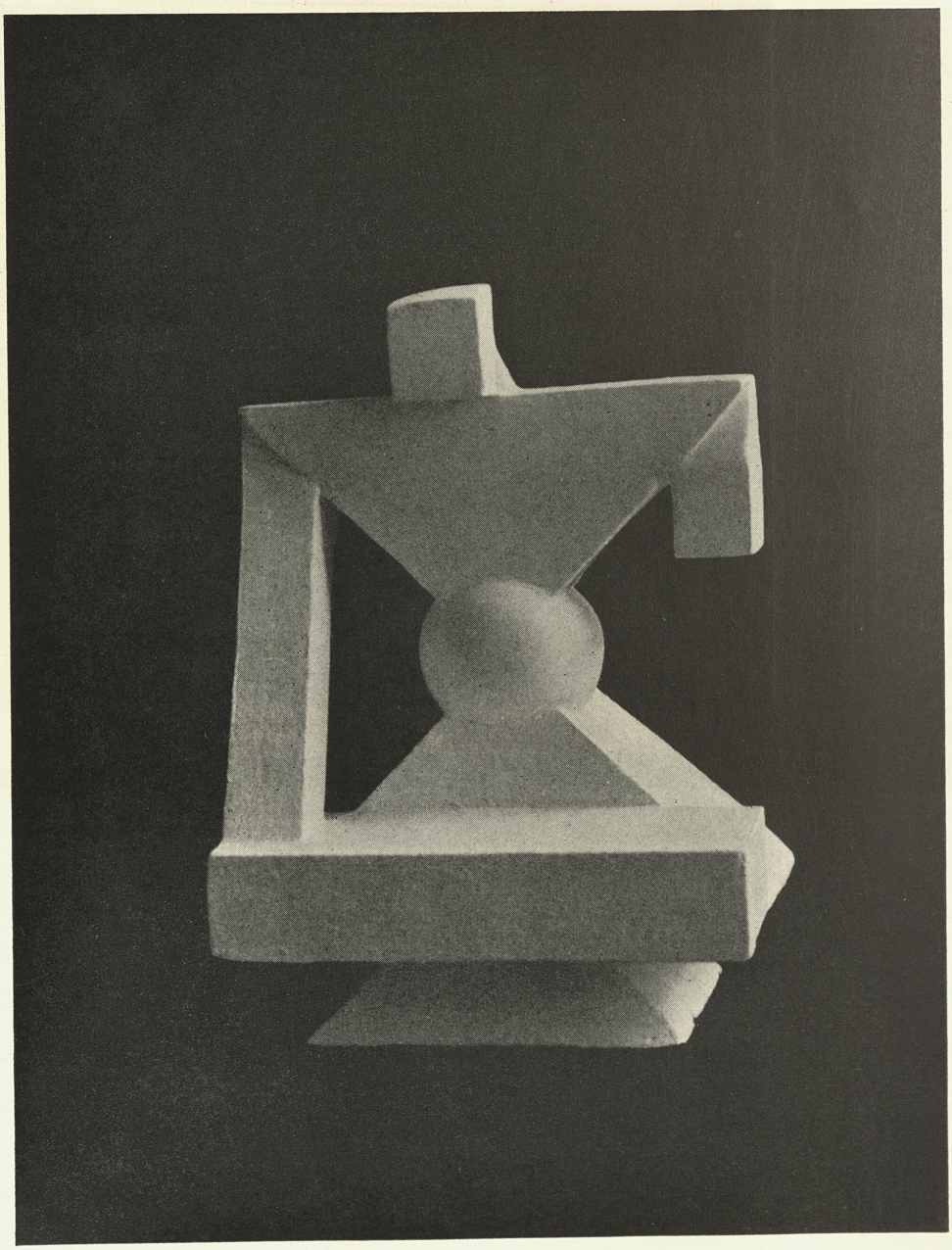
I repeat that these comparisons are not meant literally. I cite them only as an approach to the idea of the diverse forms of artistic expression through the centuries and down to our own time.

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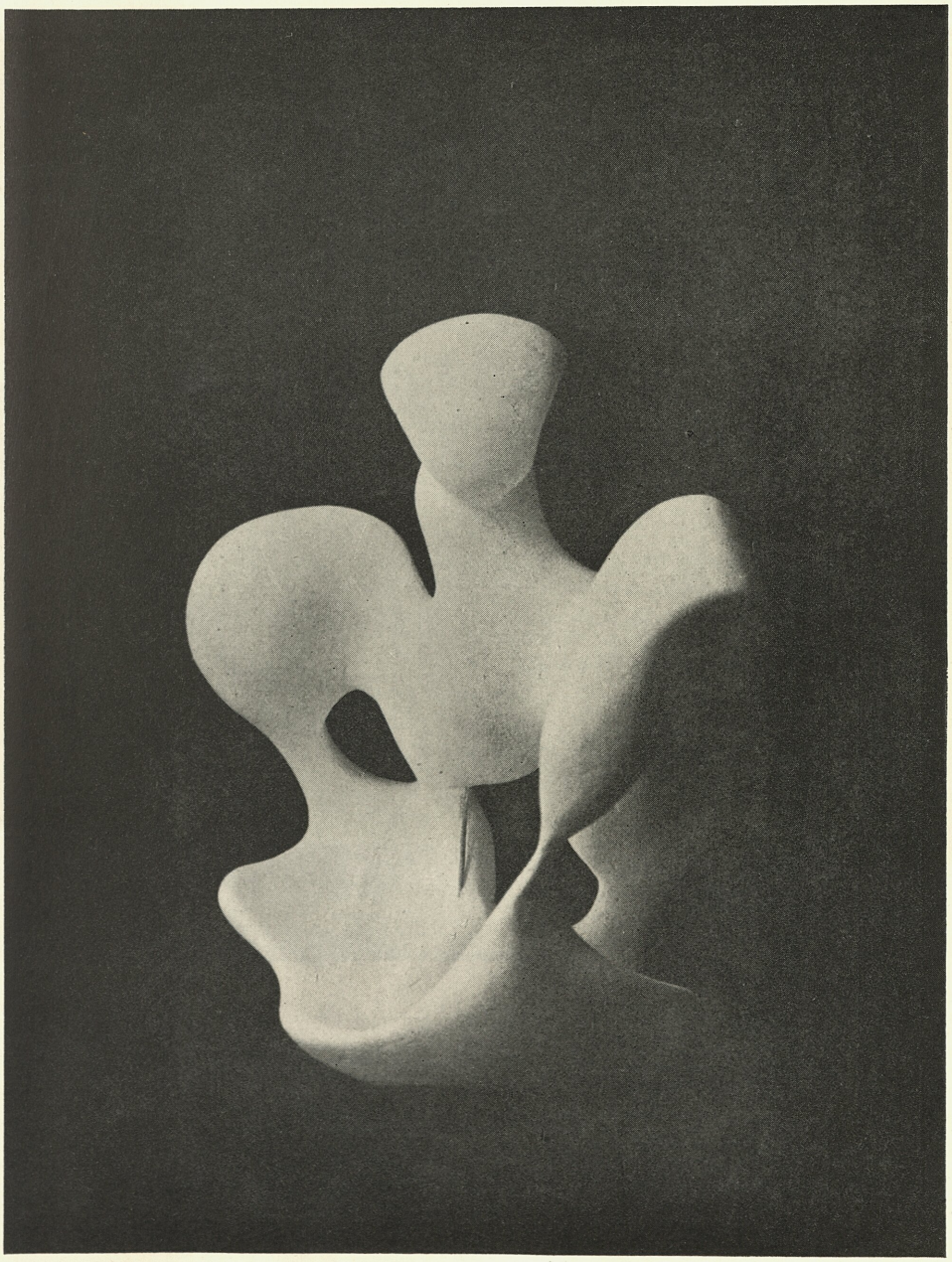


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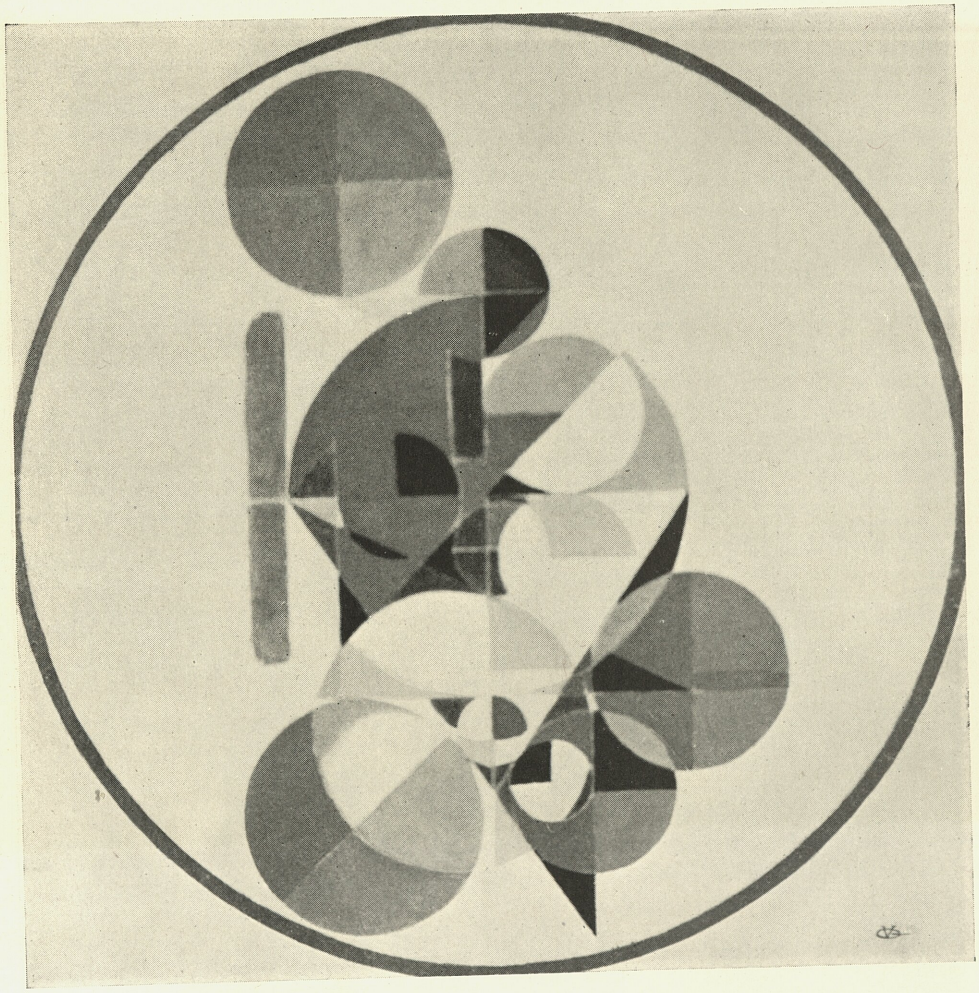




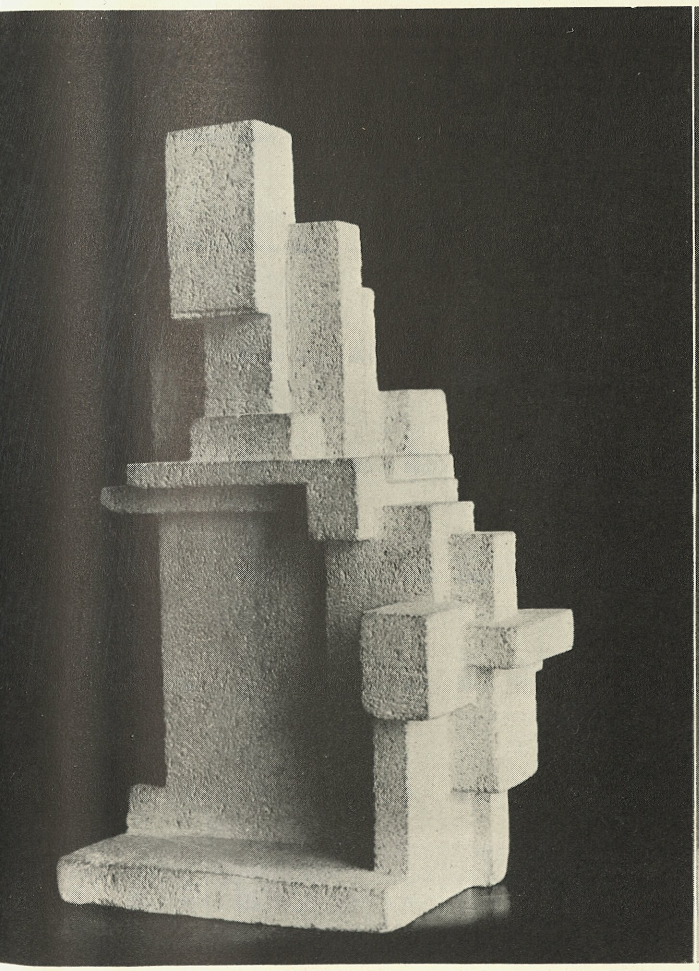
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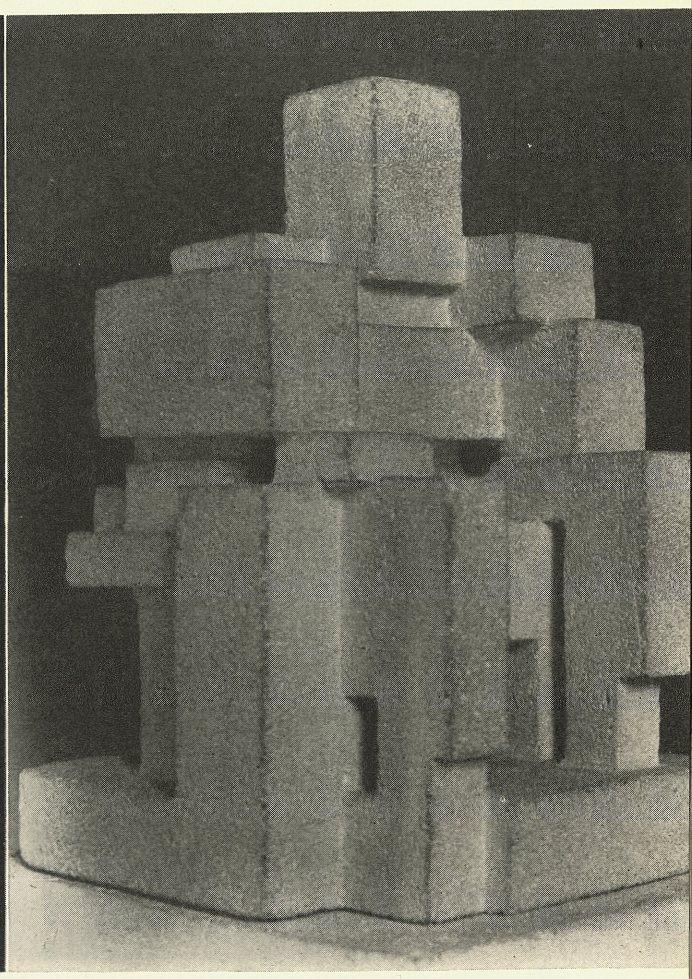
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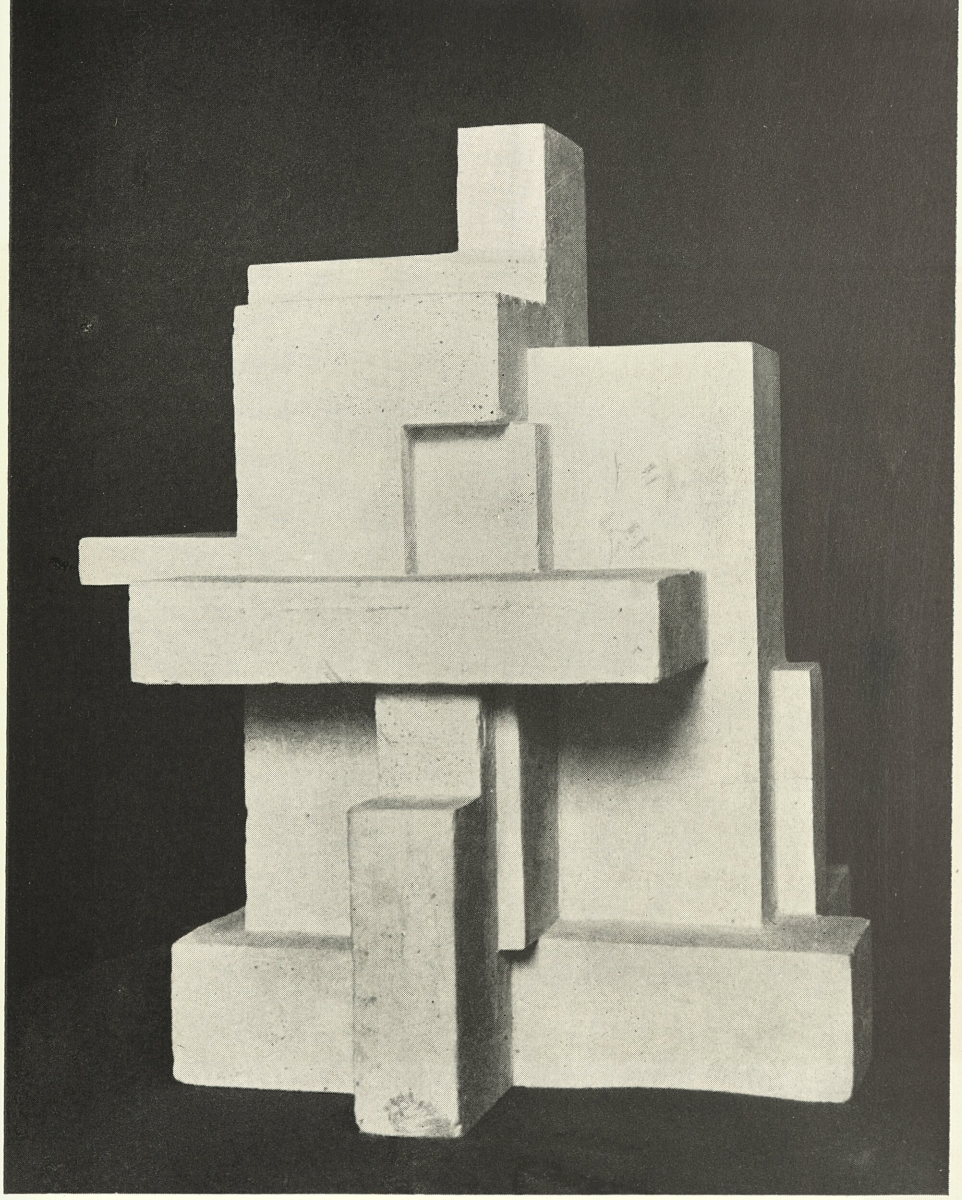


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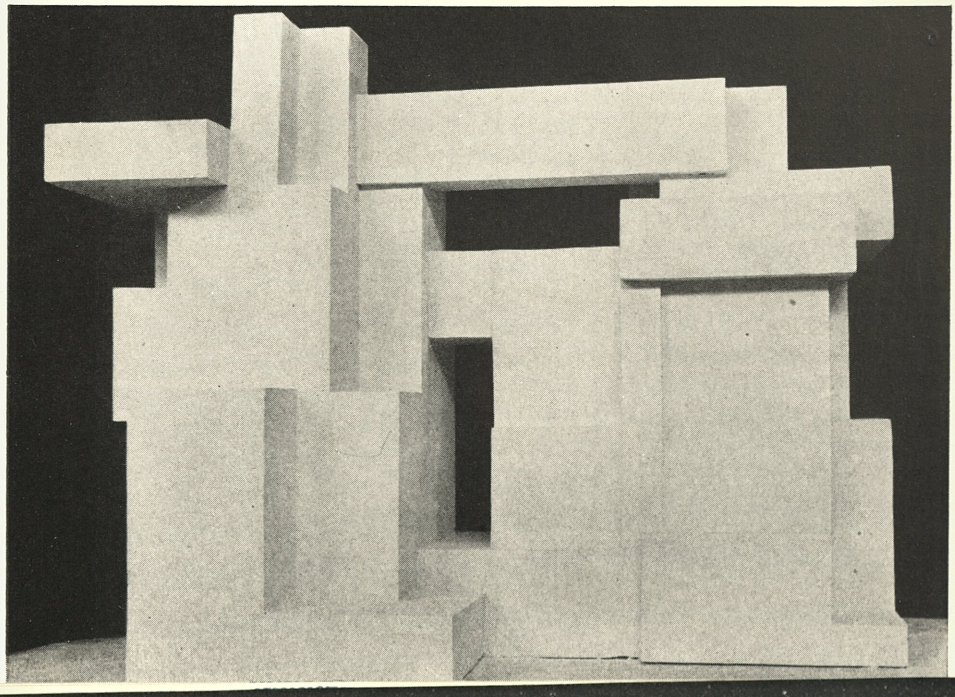


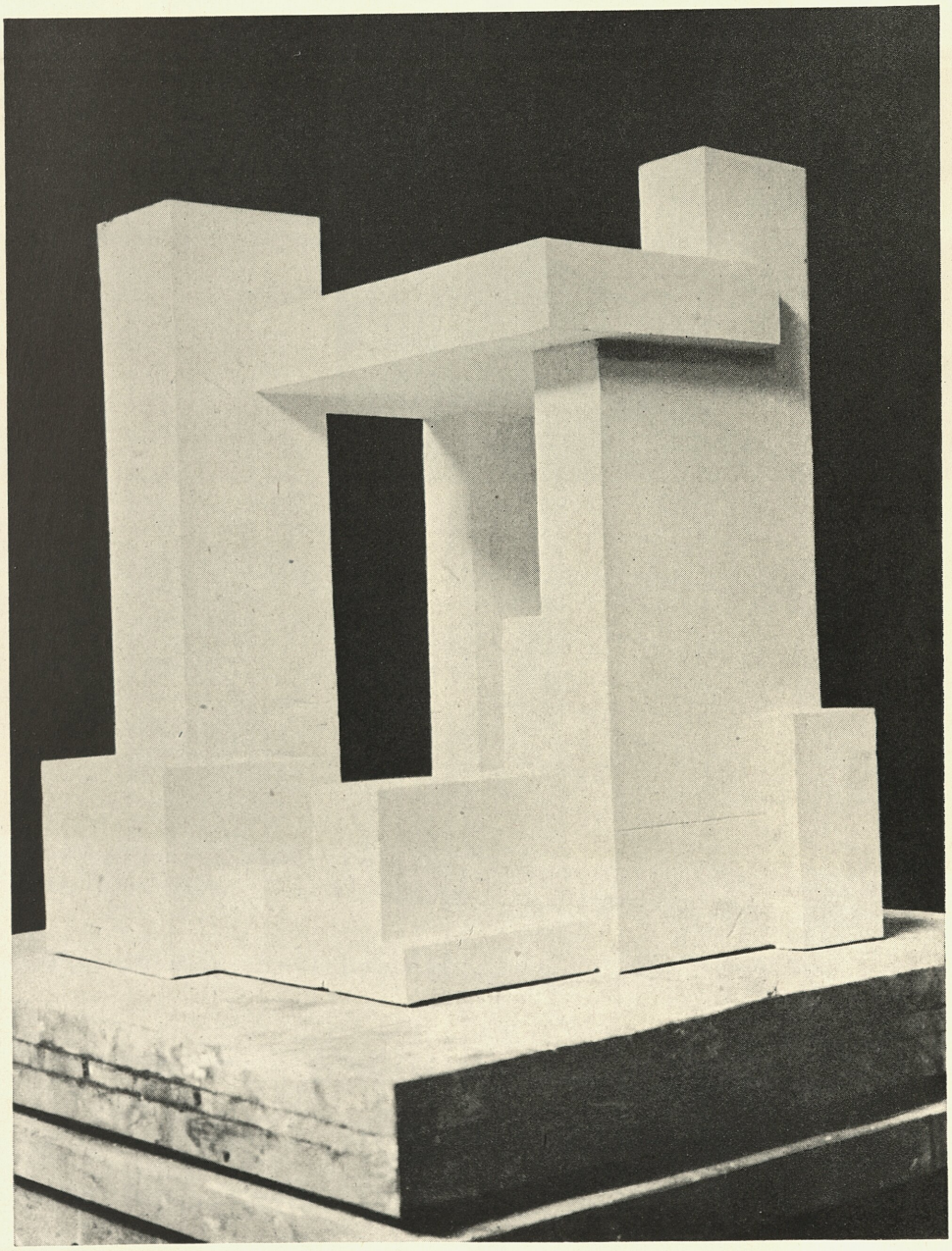
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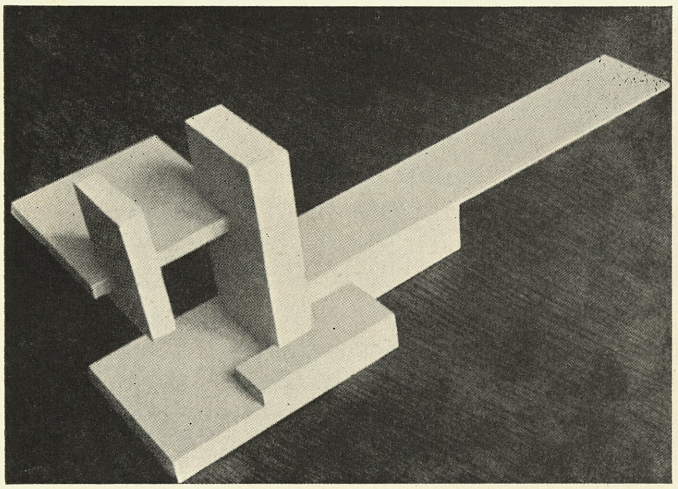


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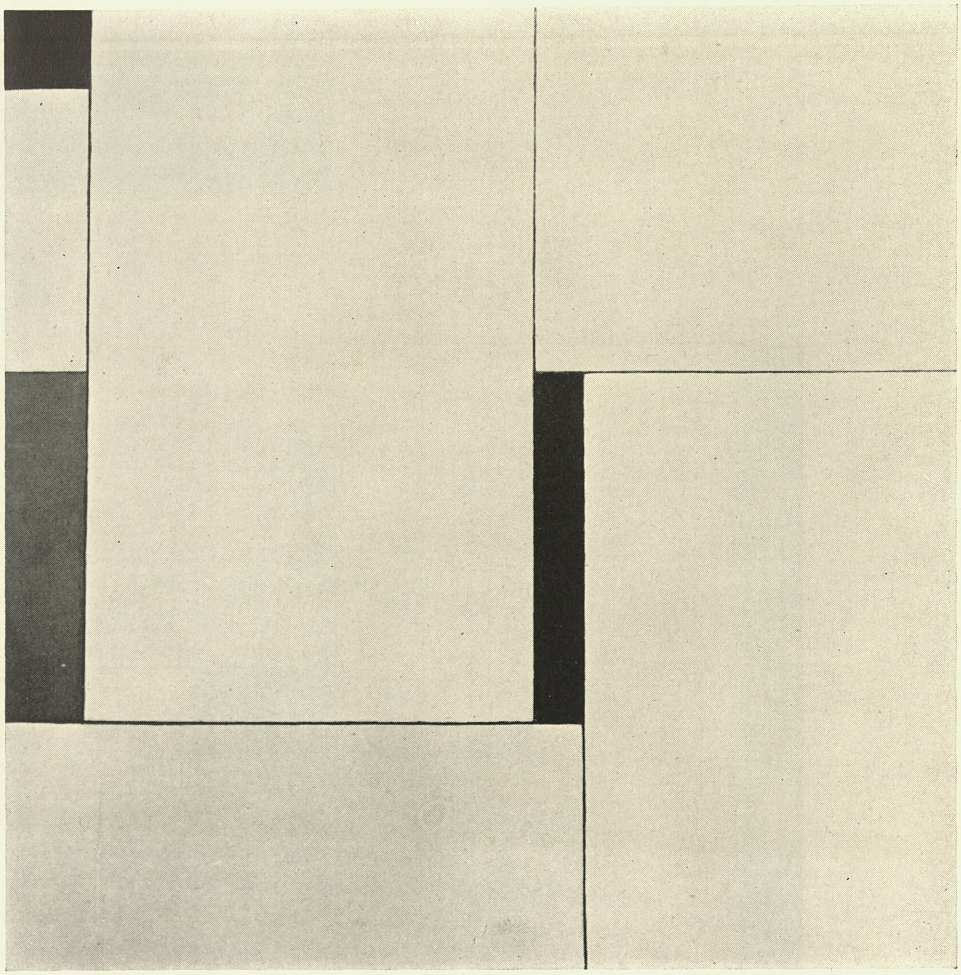


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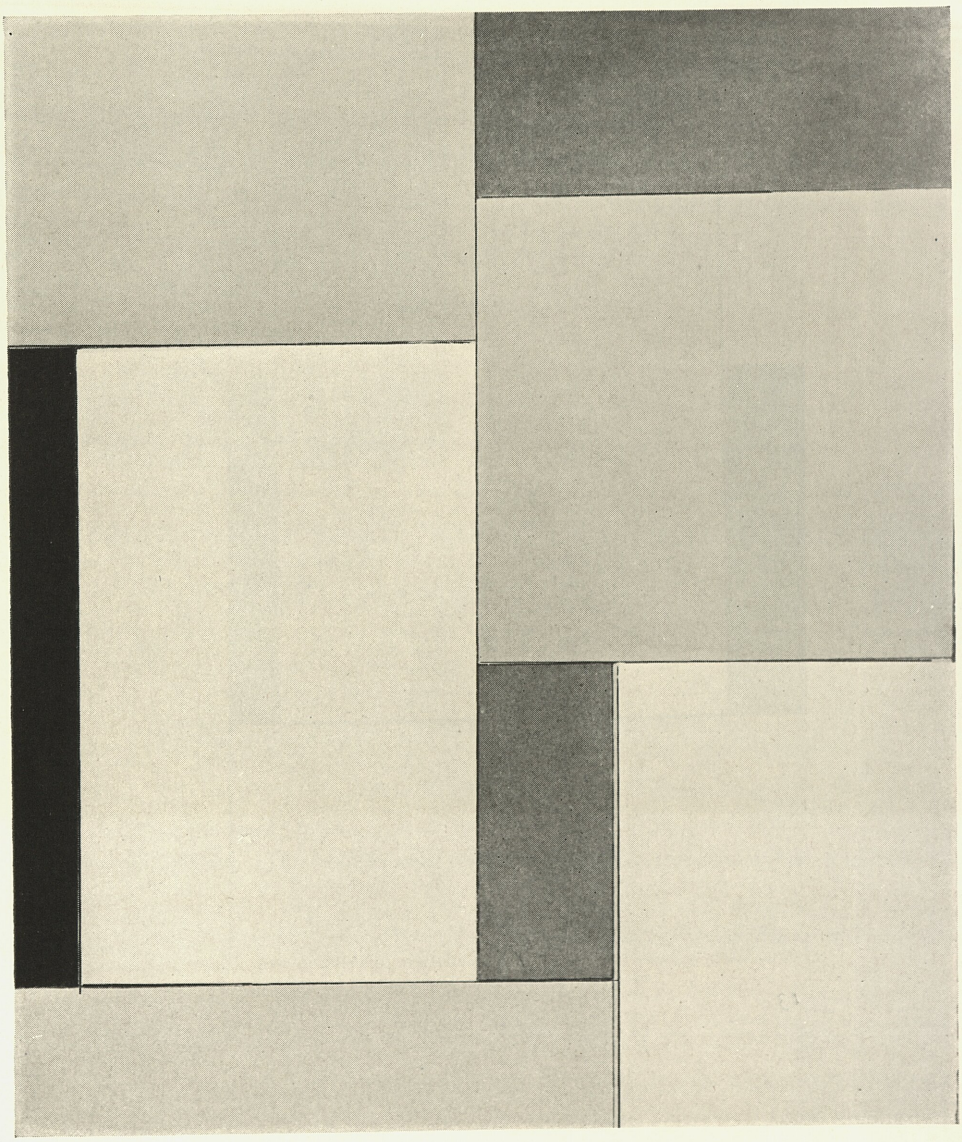


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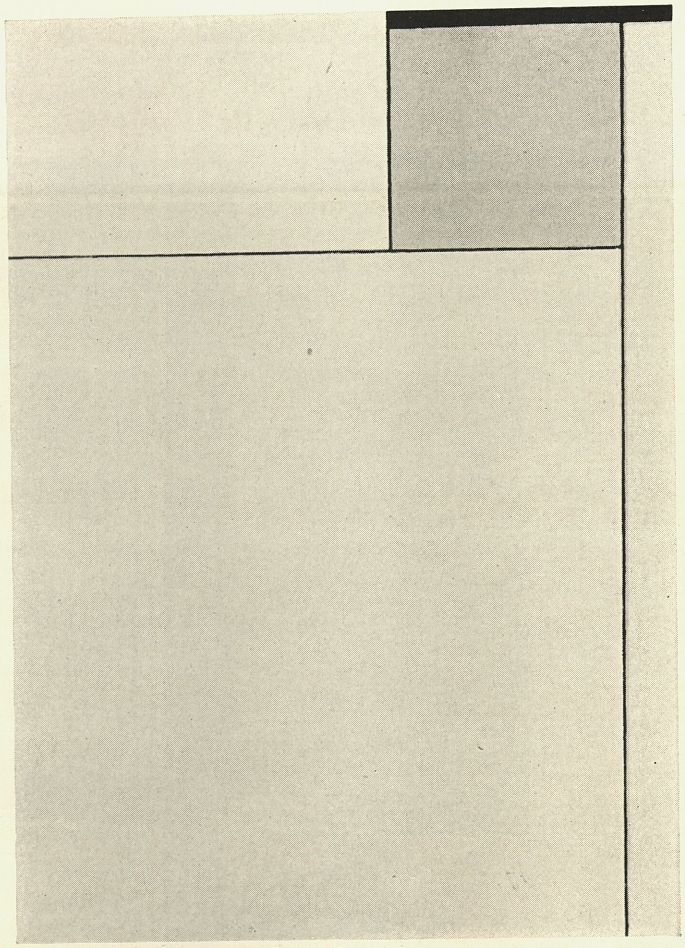
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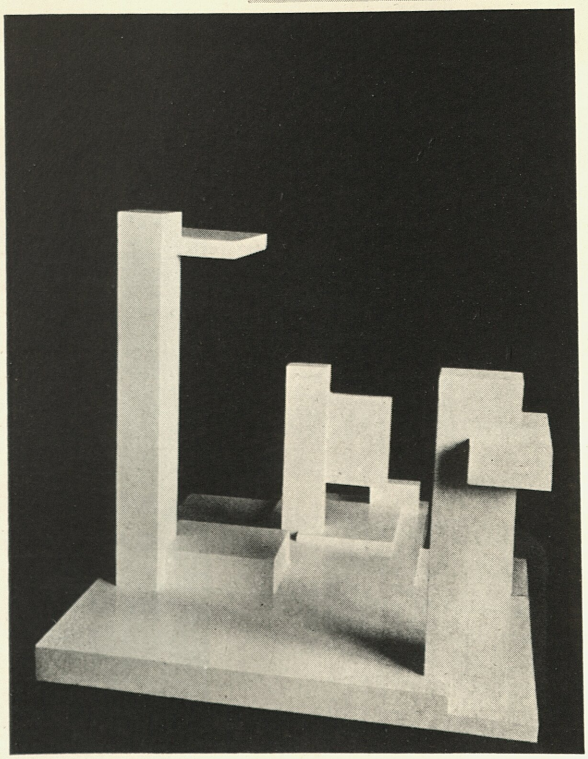


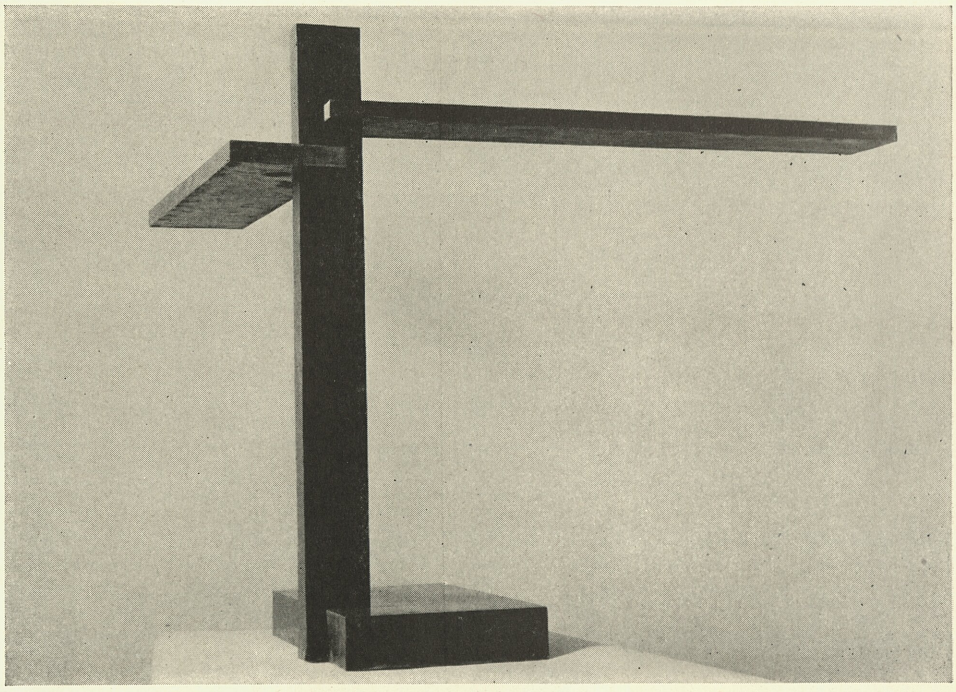
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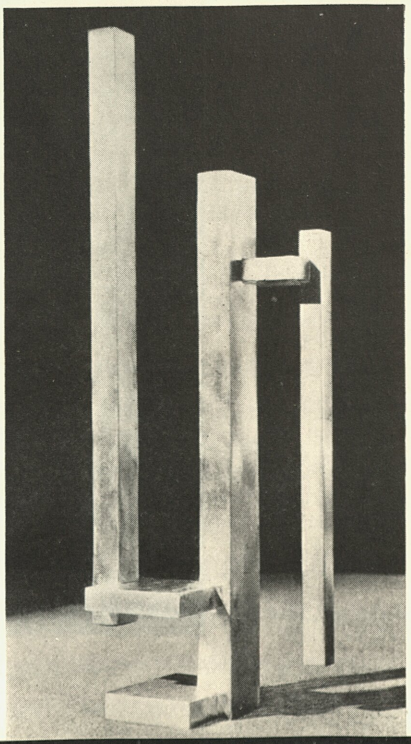
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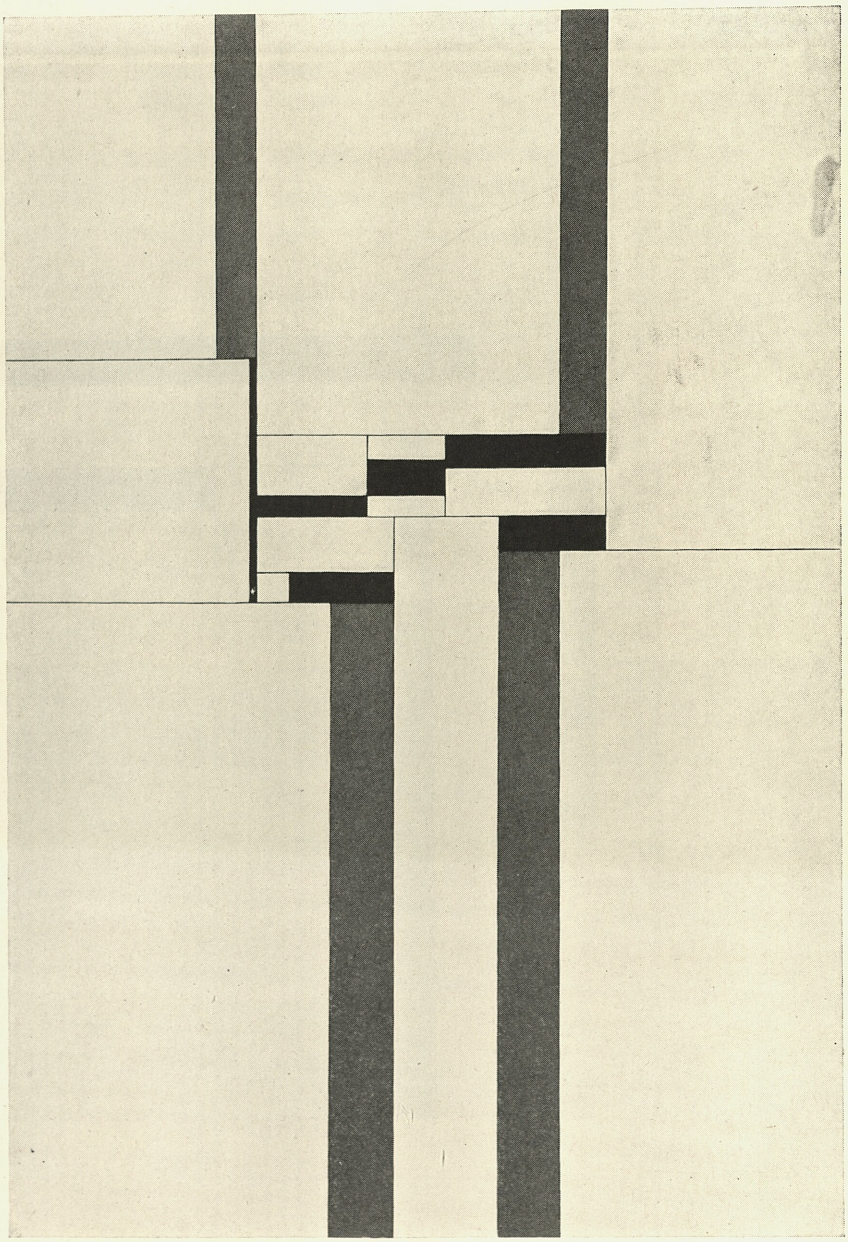


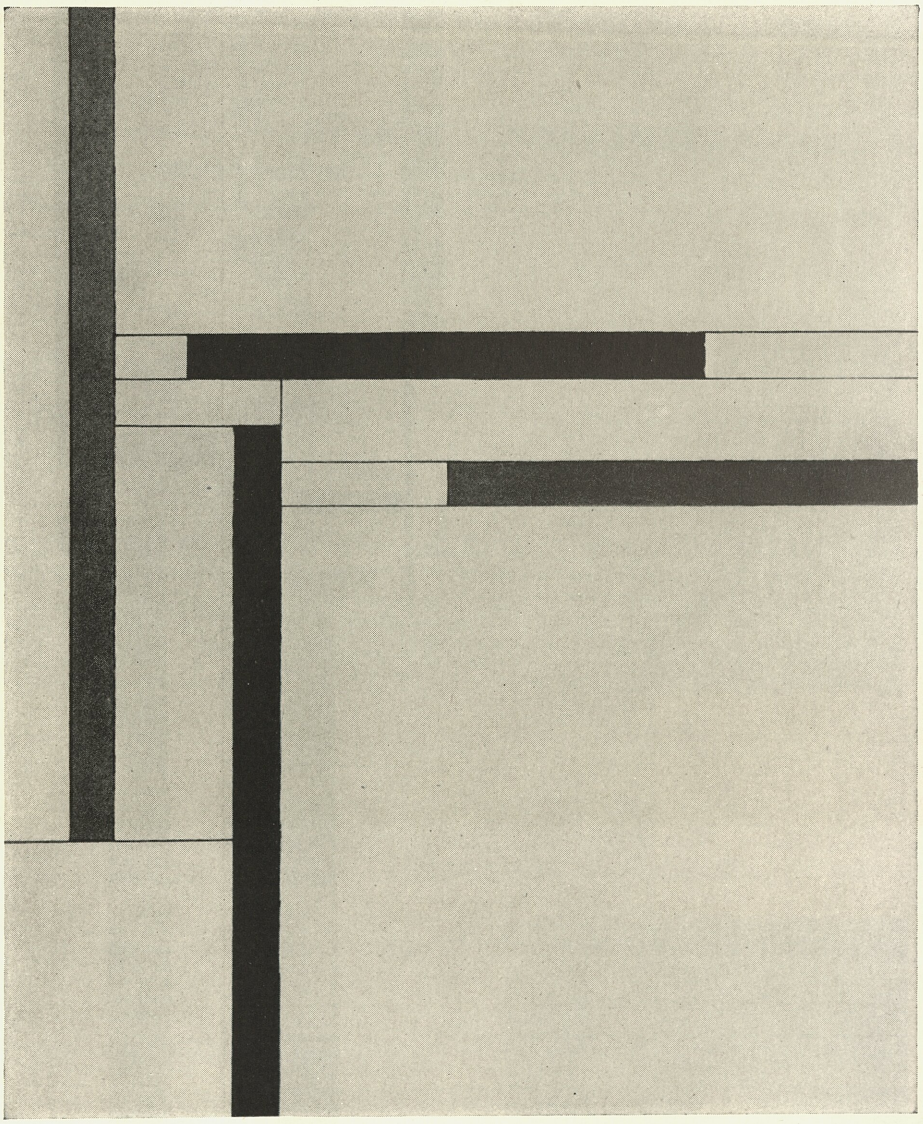


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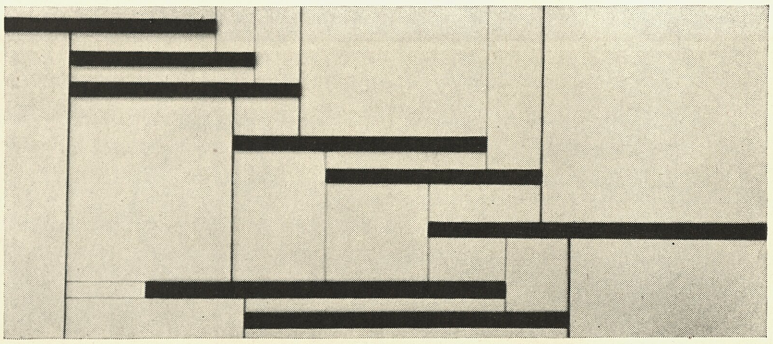
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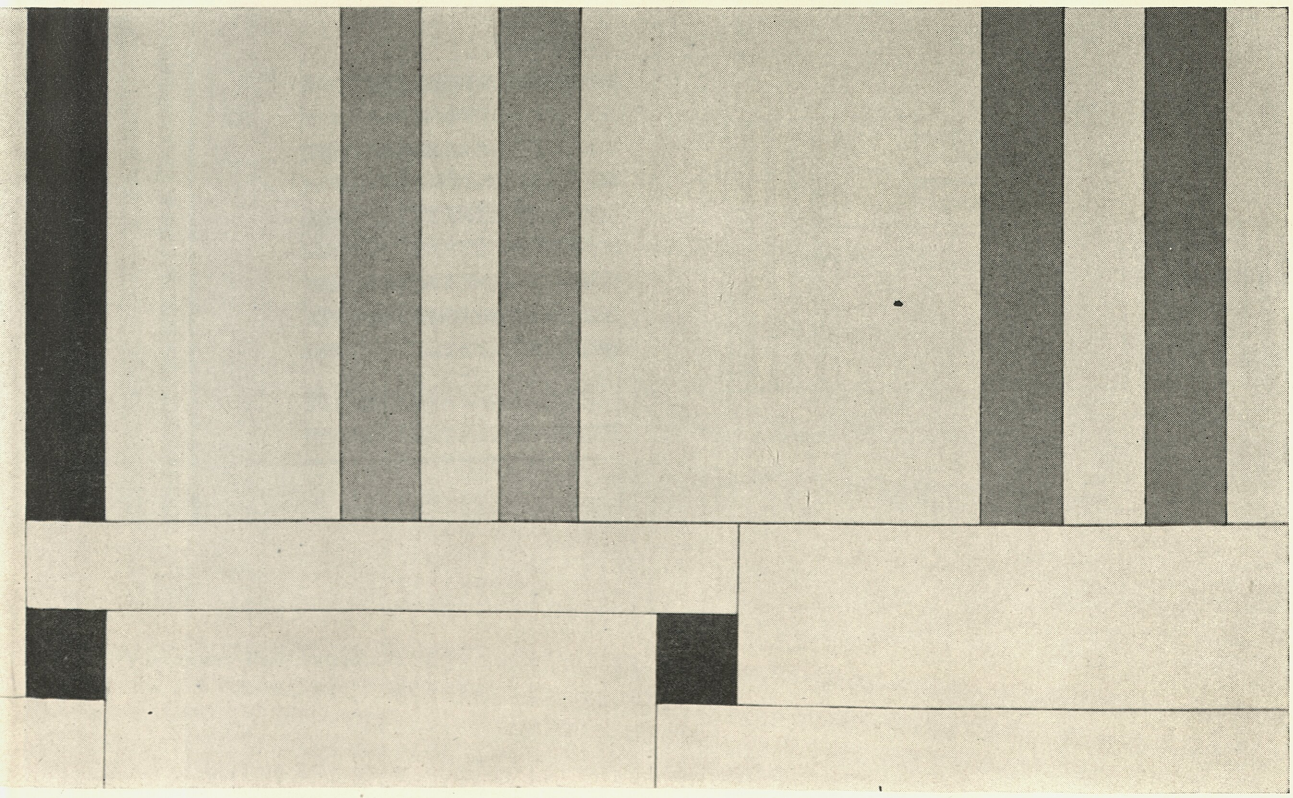


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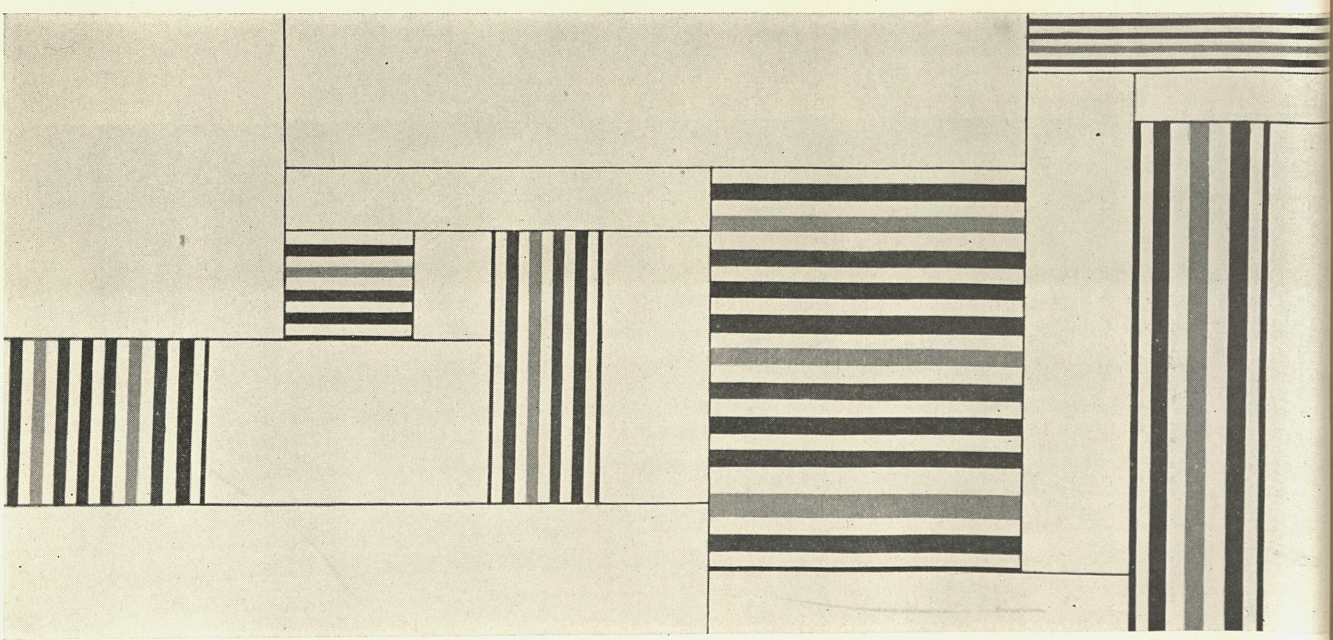


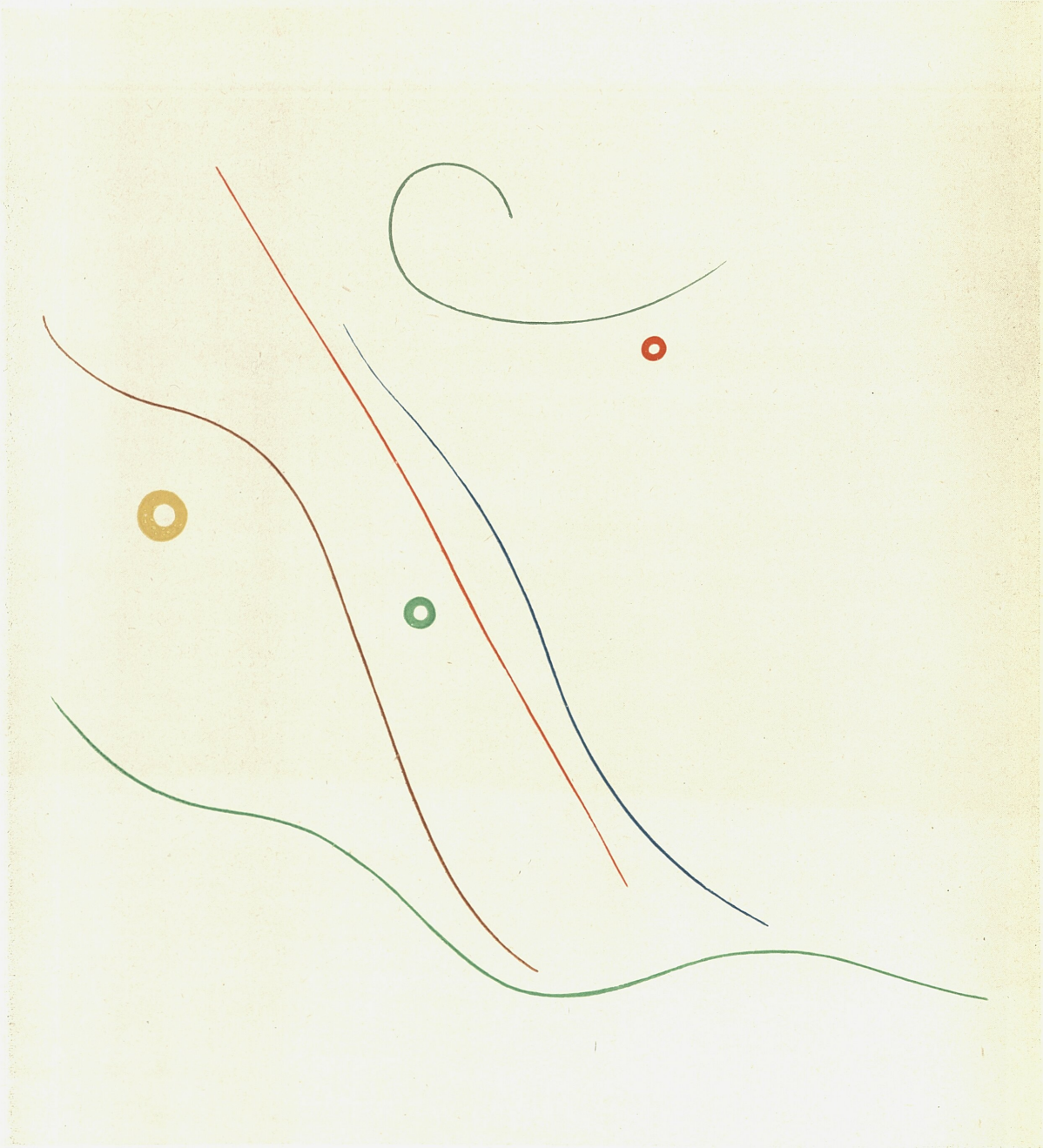
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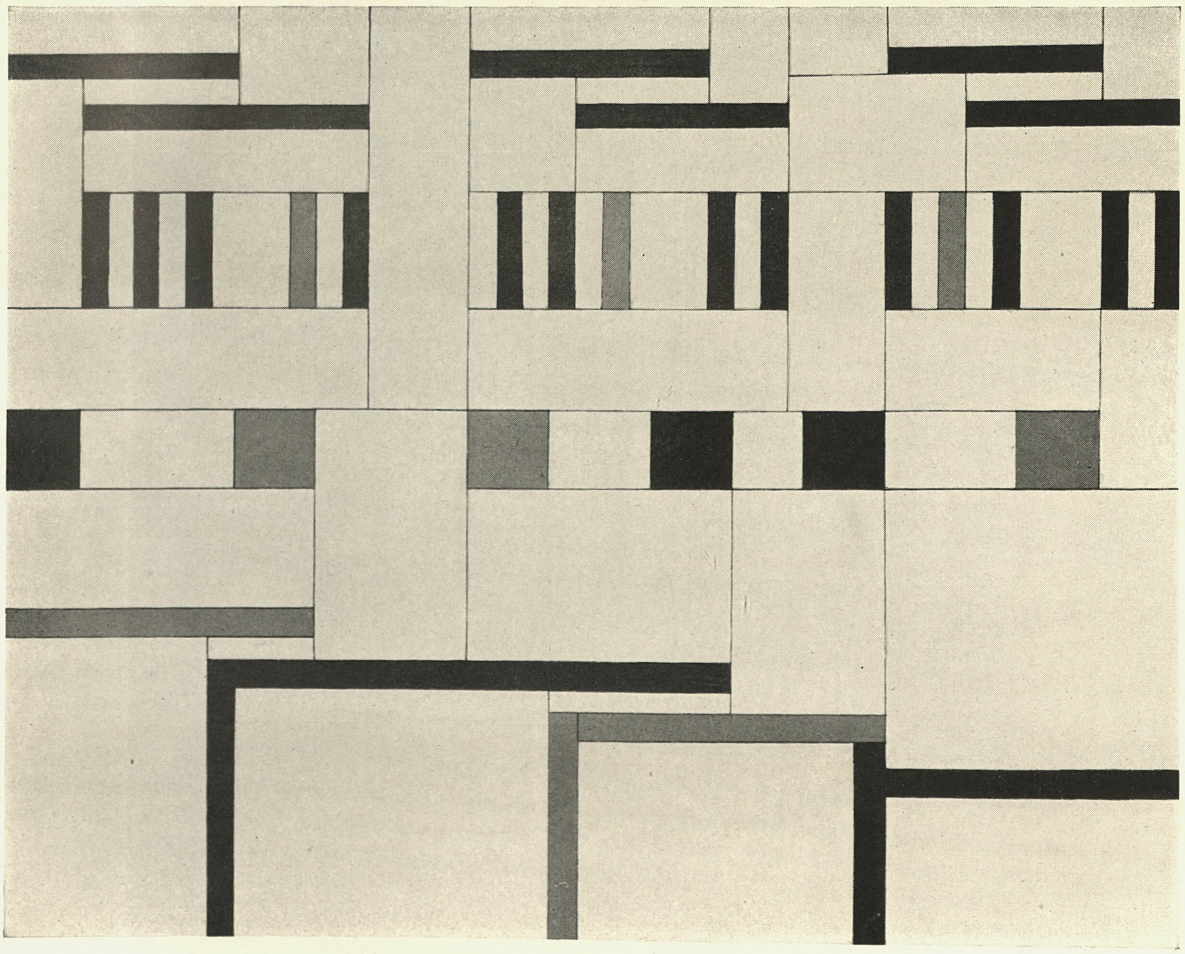


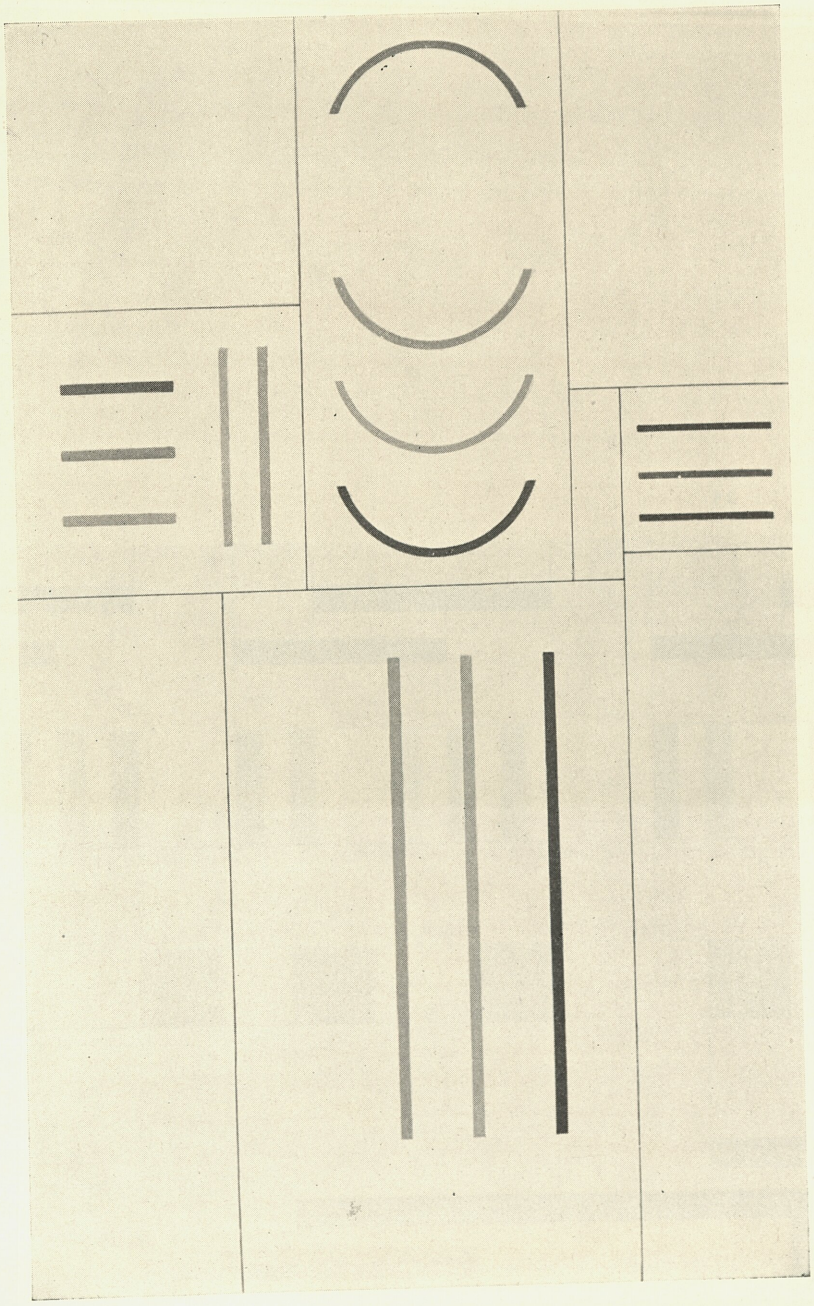


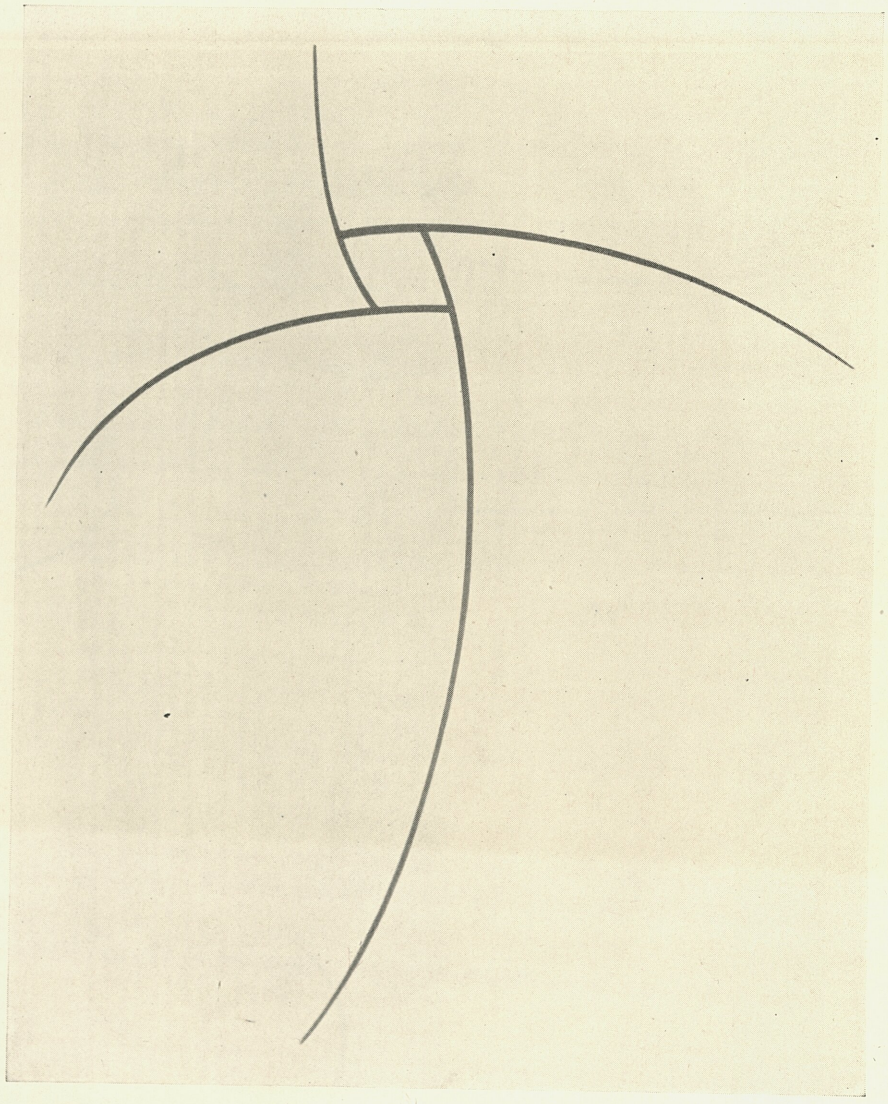
Variations, Paris, 1939.

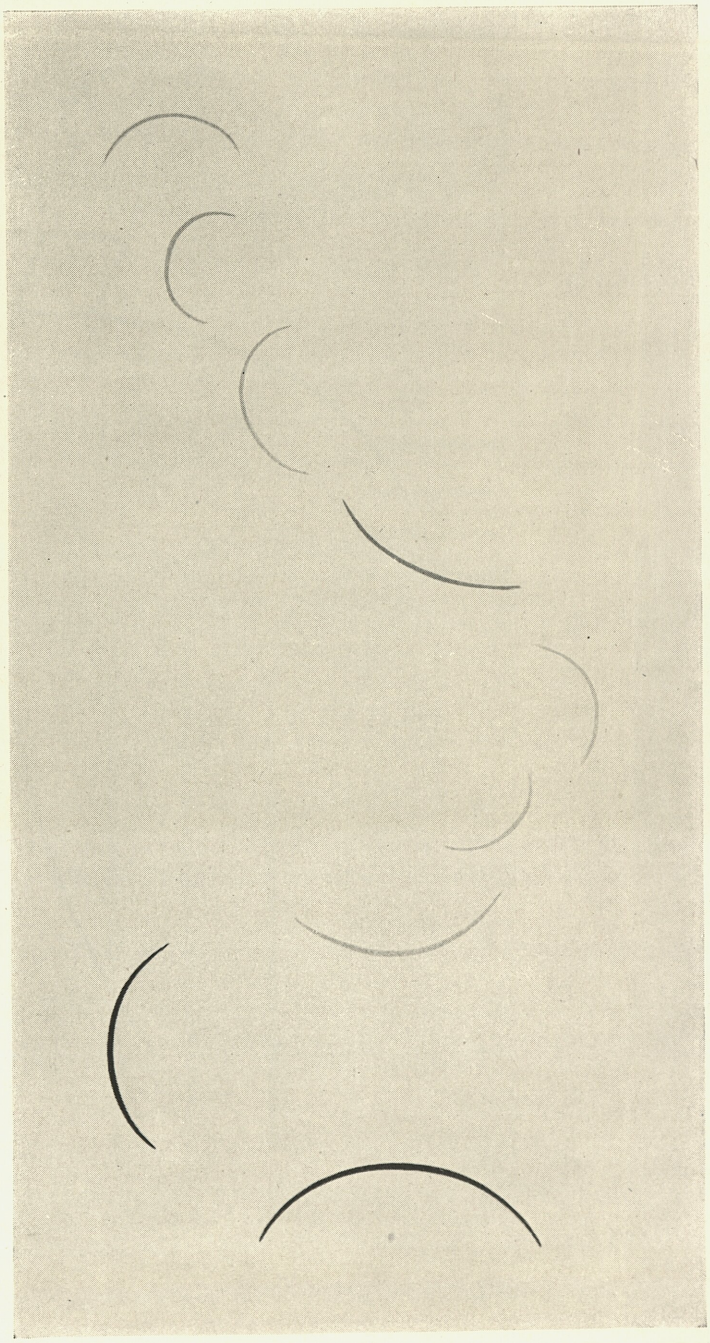
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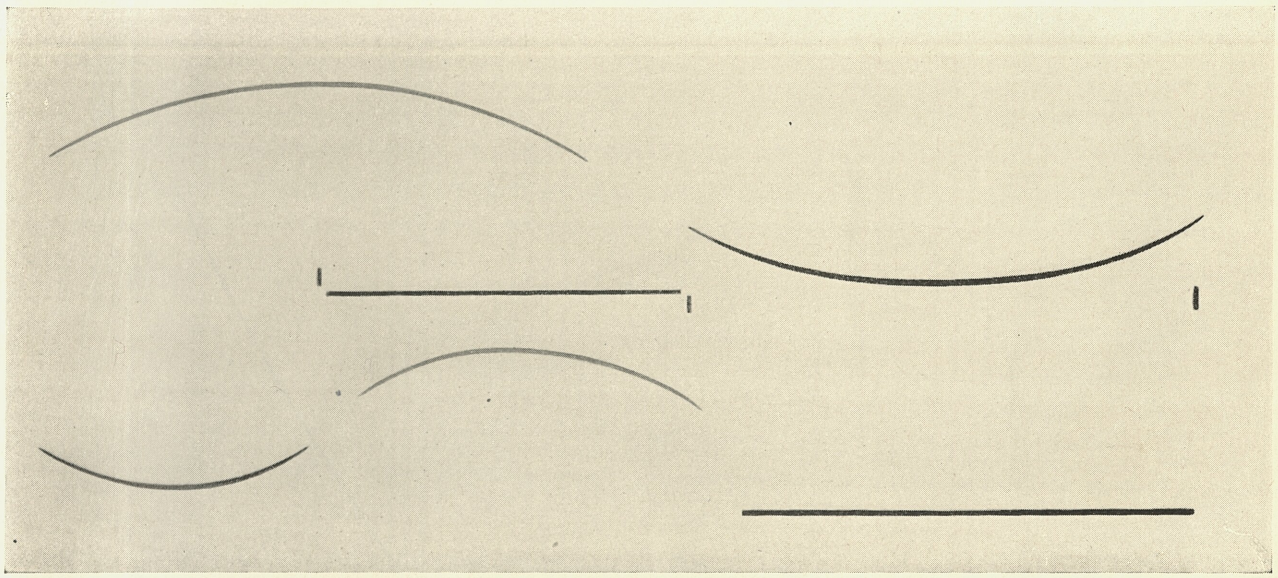
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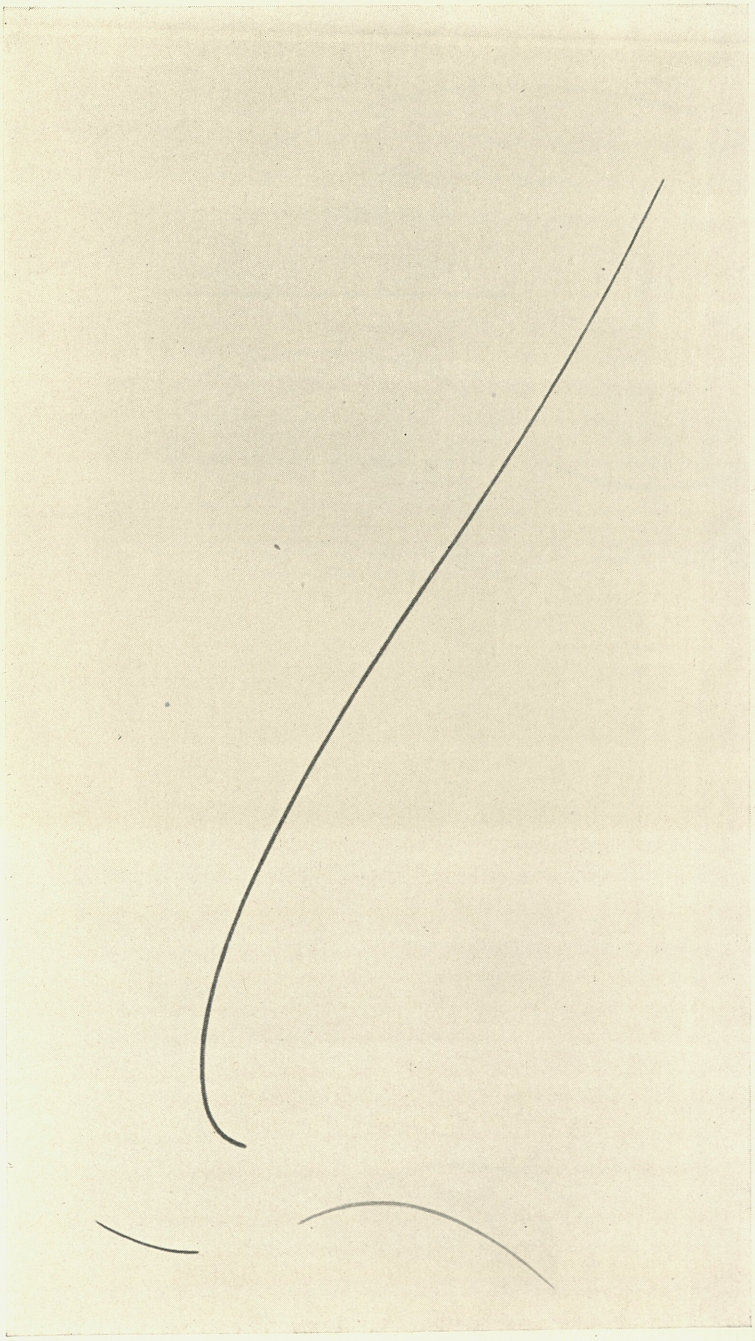




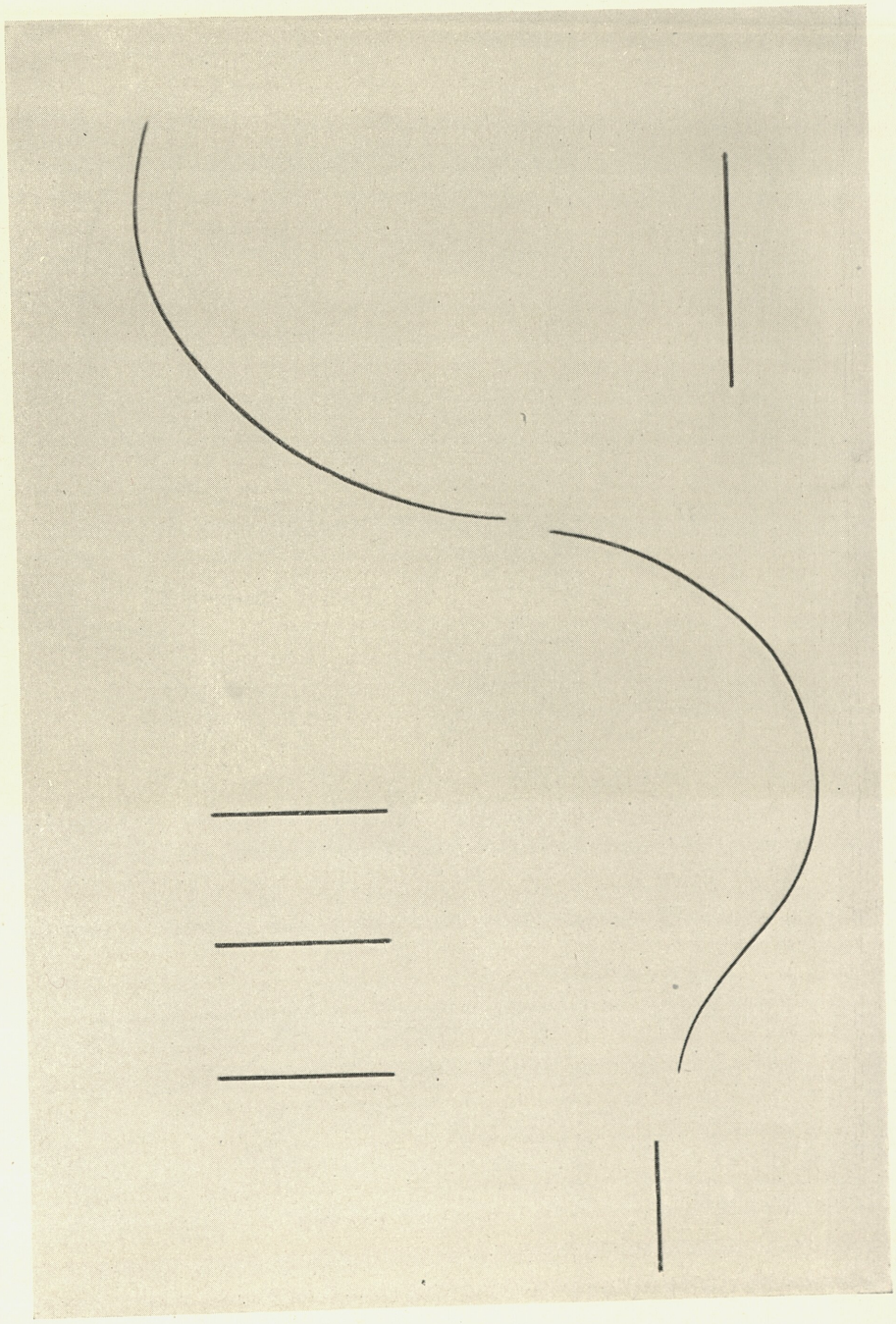


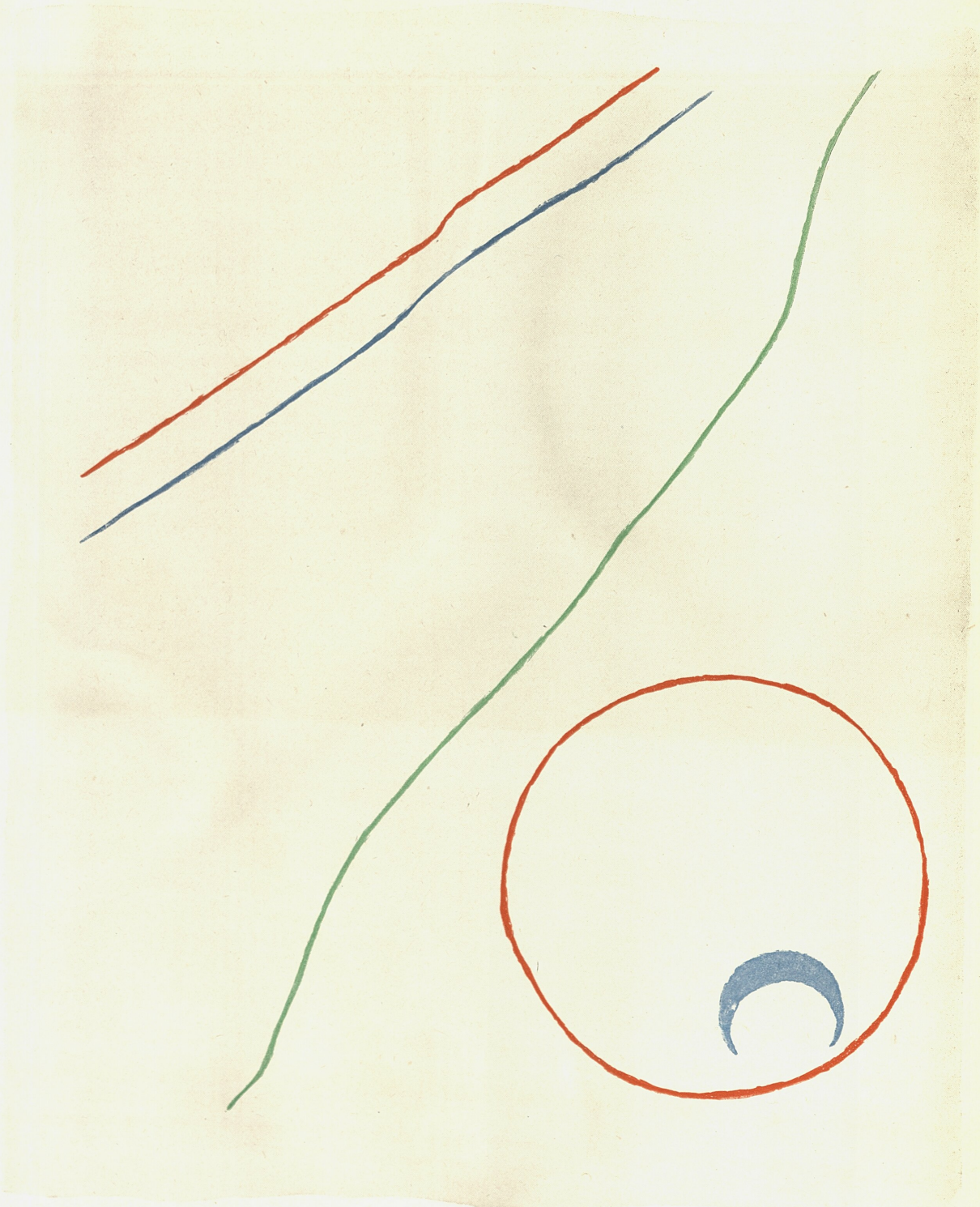






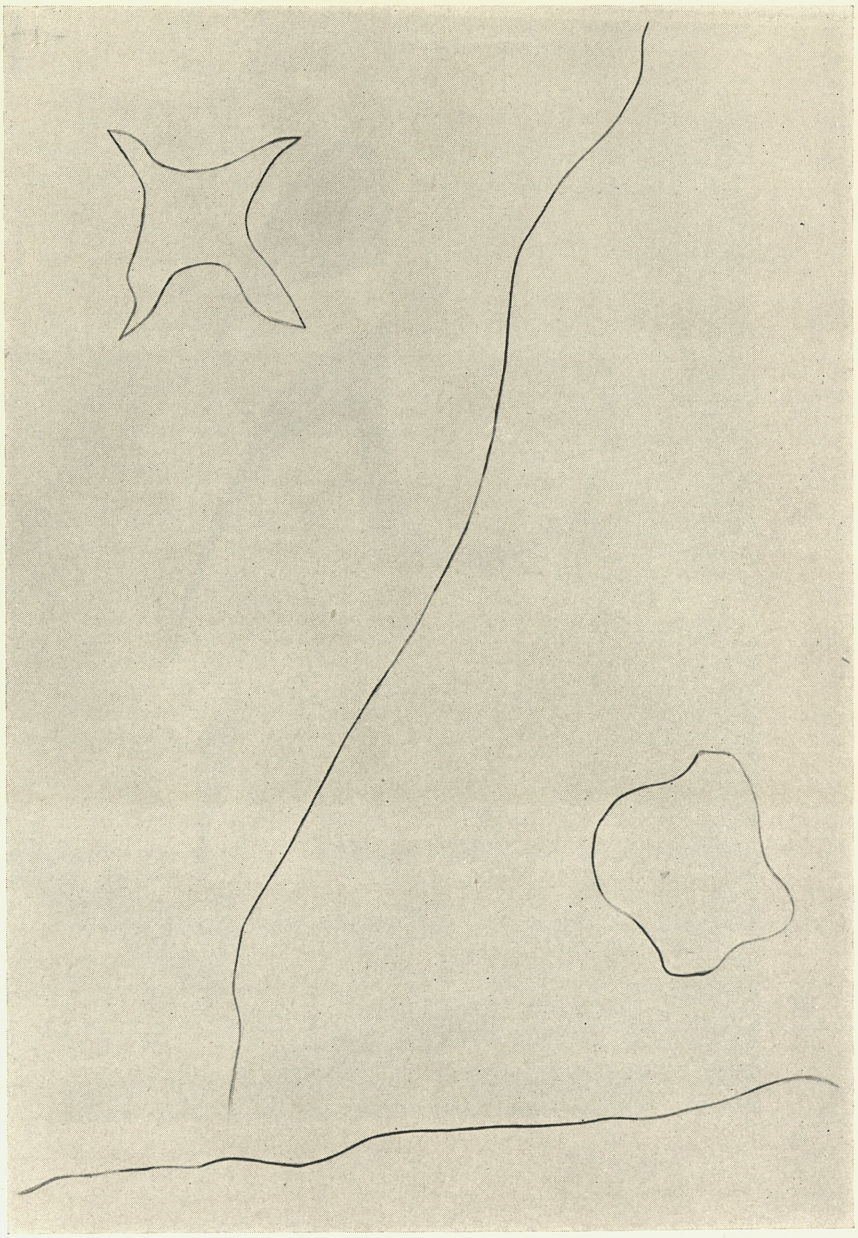




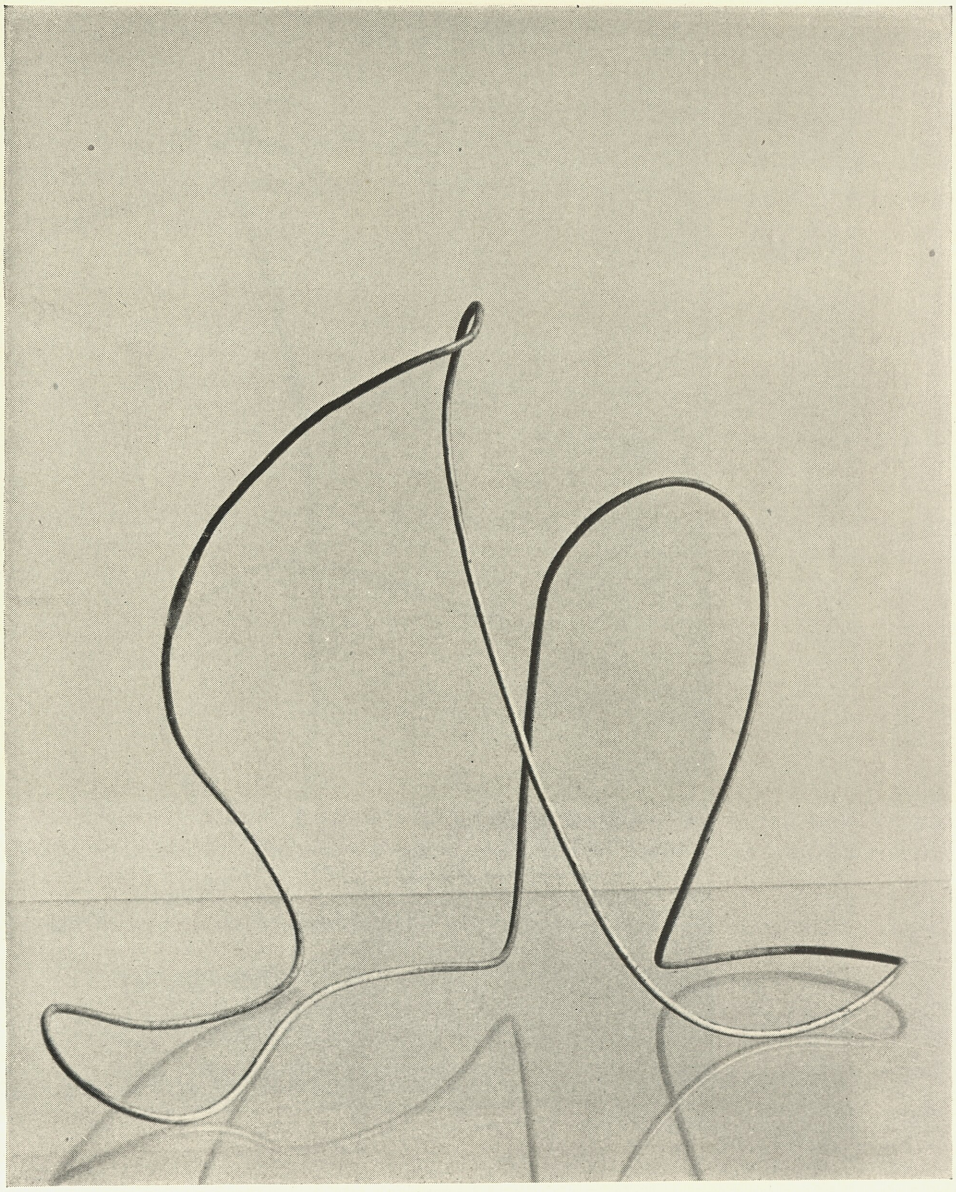


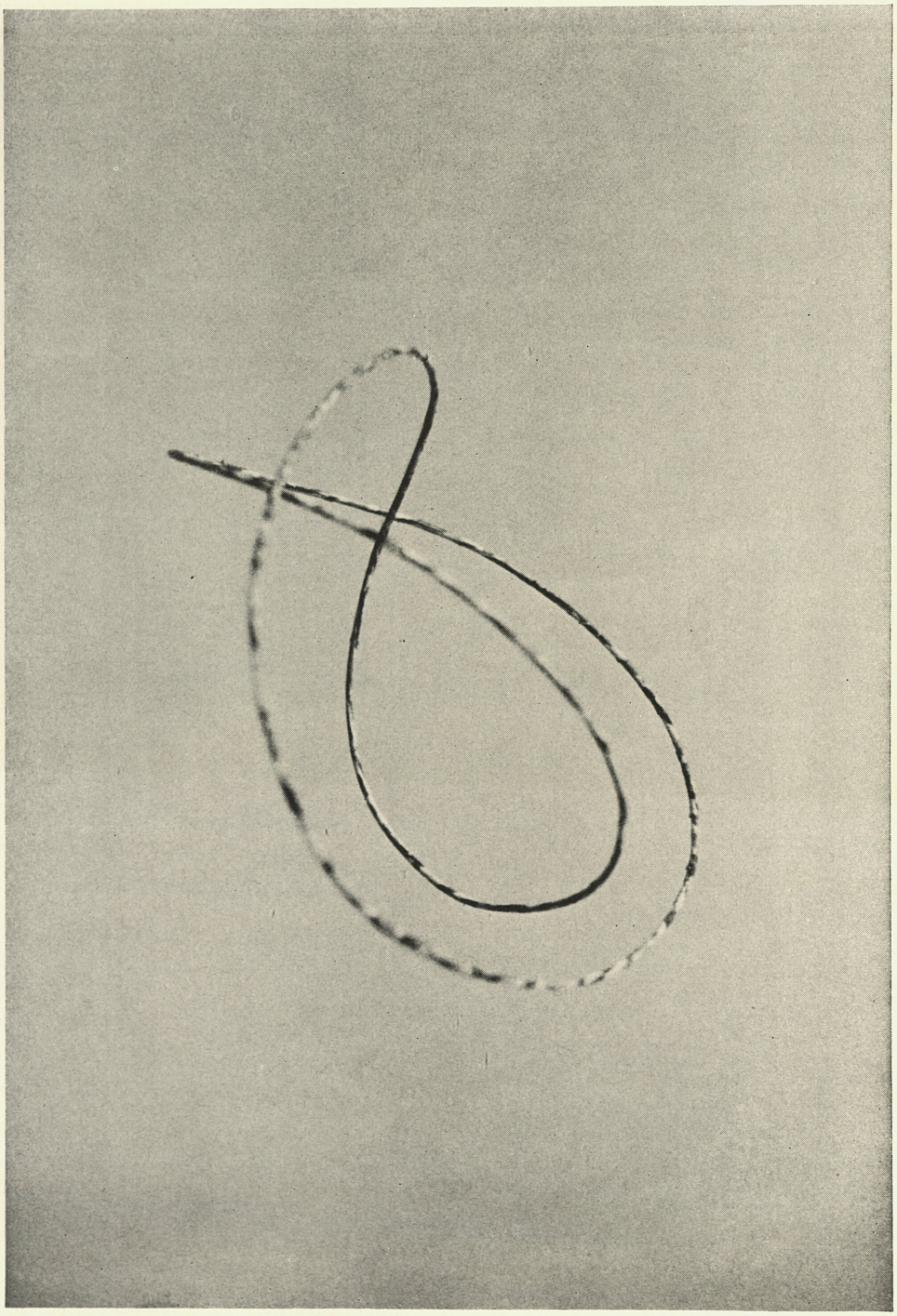
Free composition, « irregular », two parallel lines, a green one, a closed line and a spot, Paris, 1945.

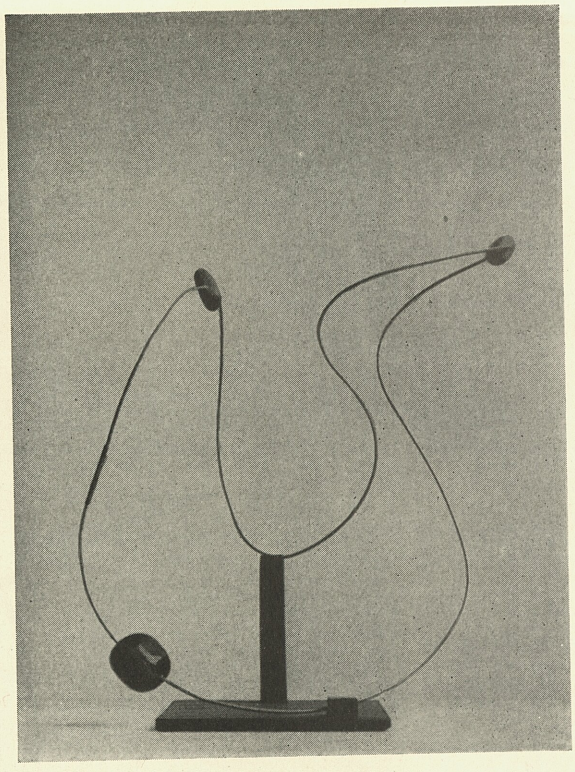
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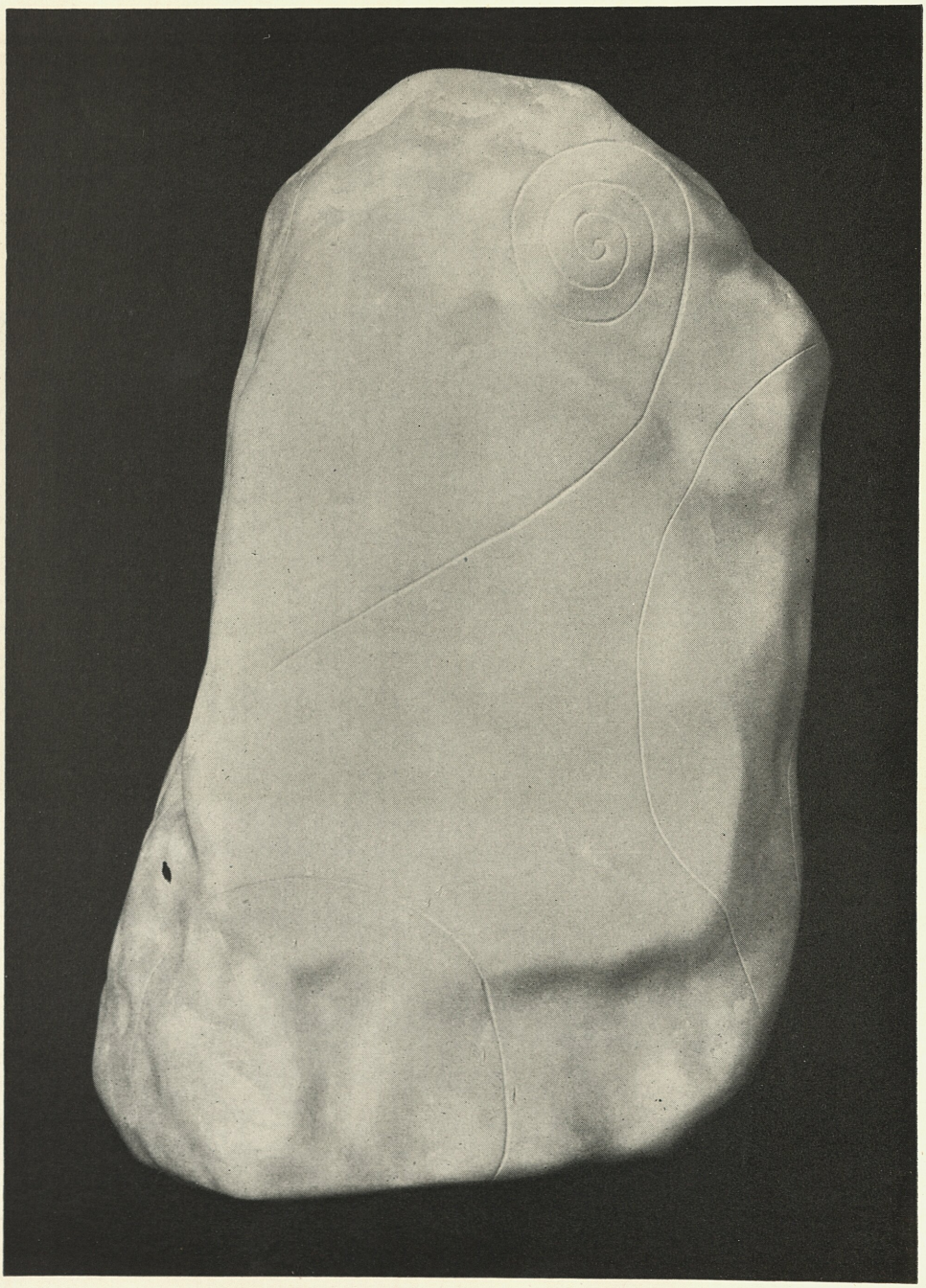








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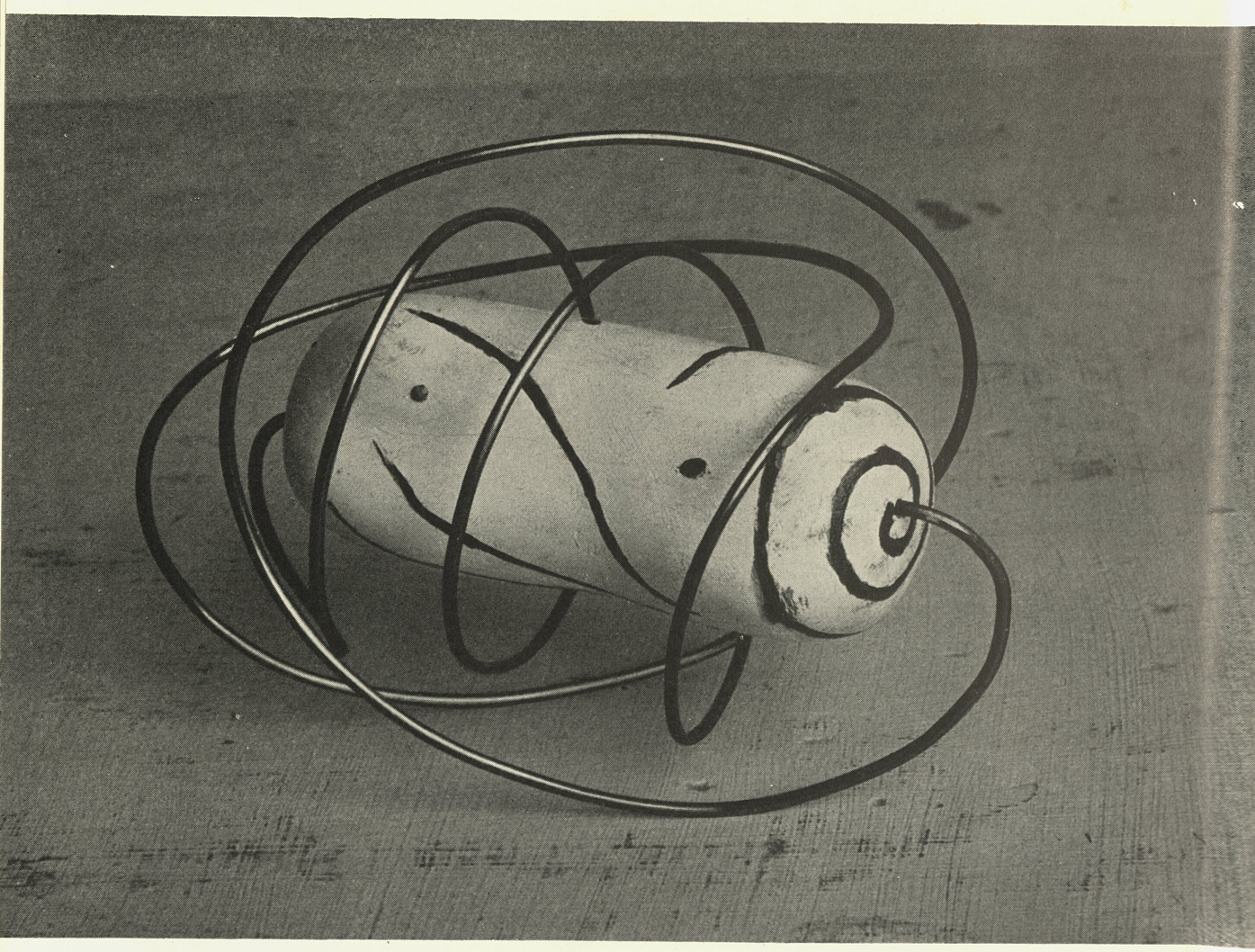


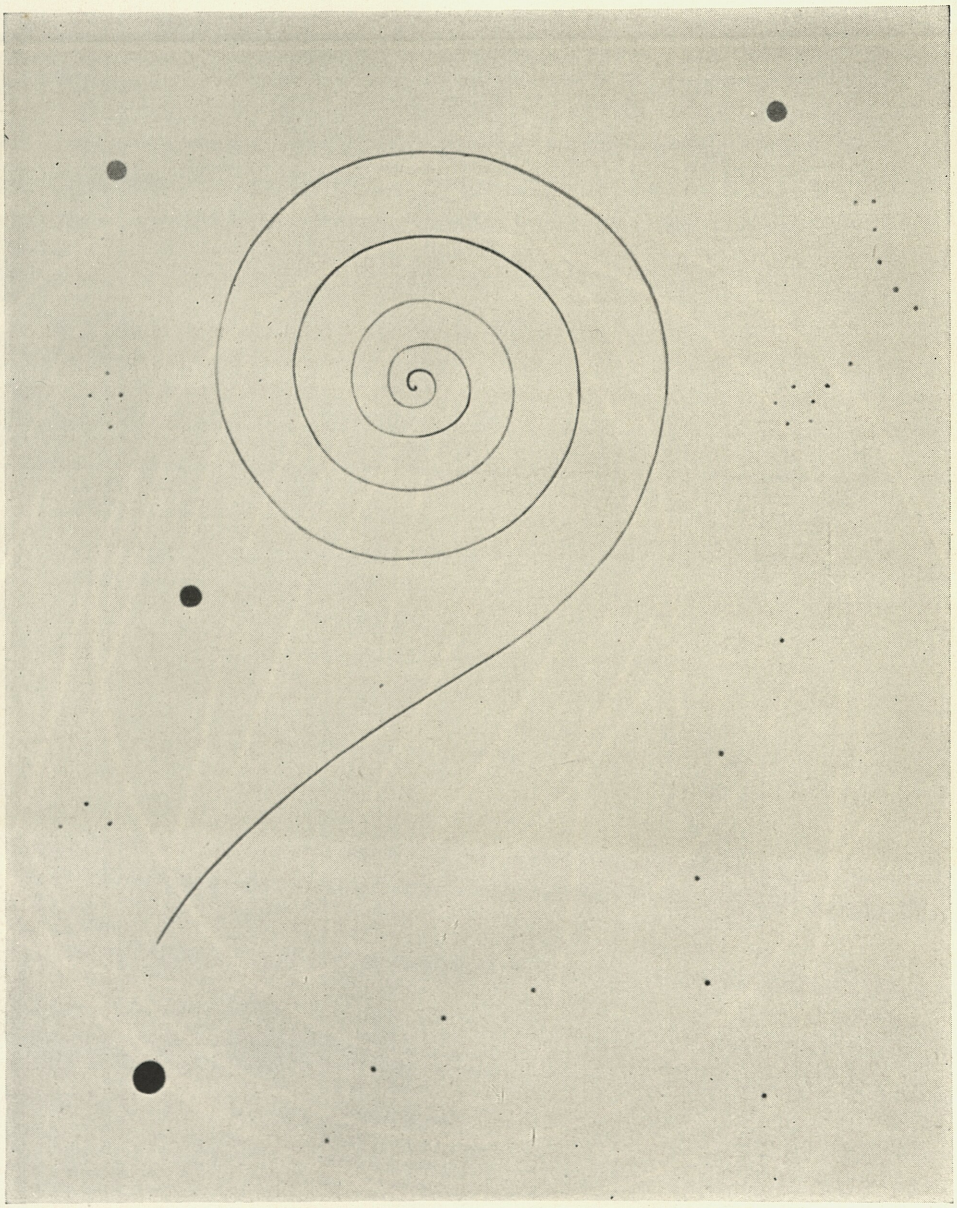
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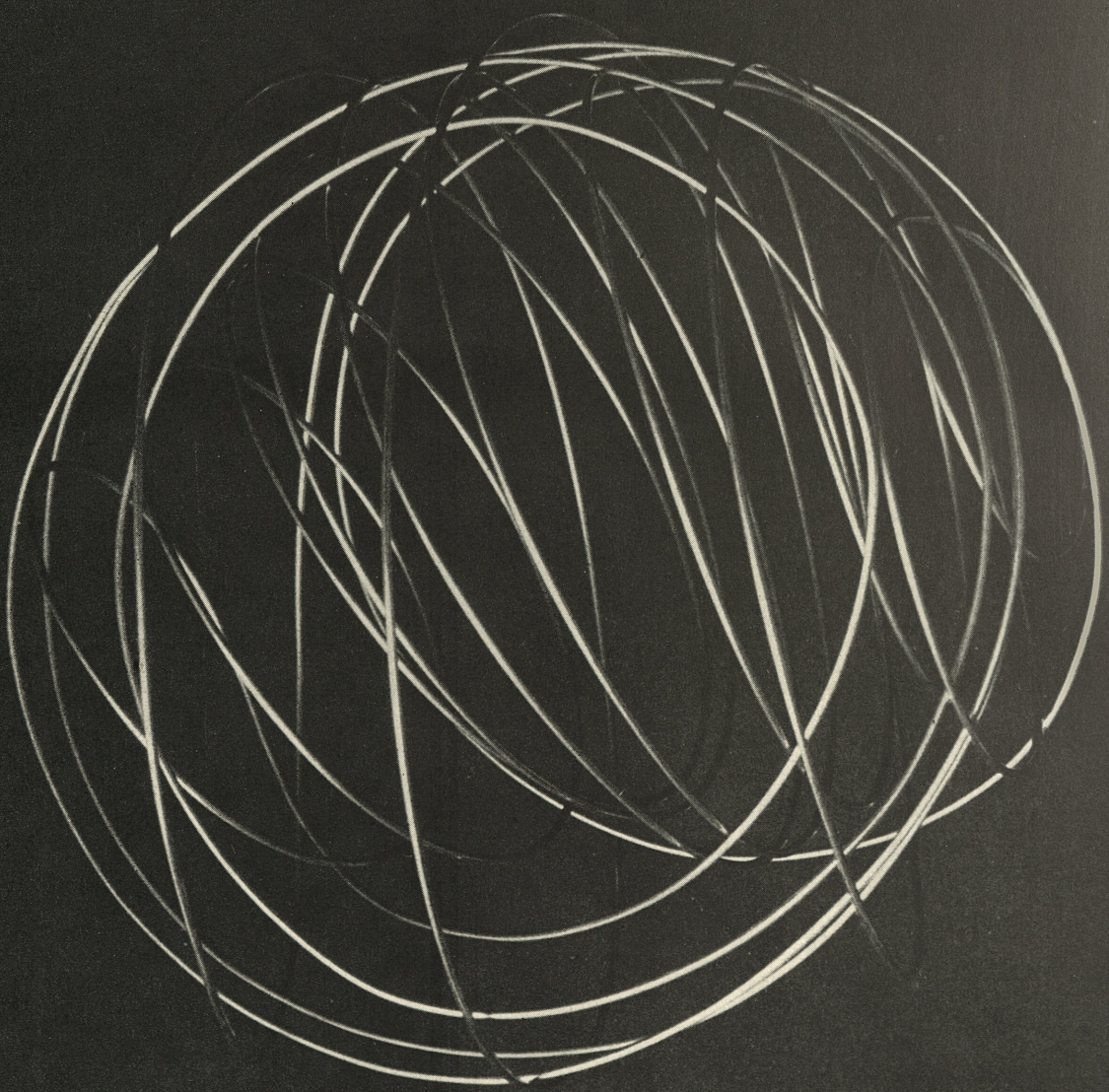


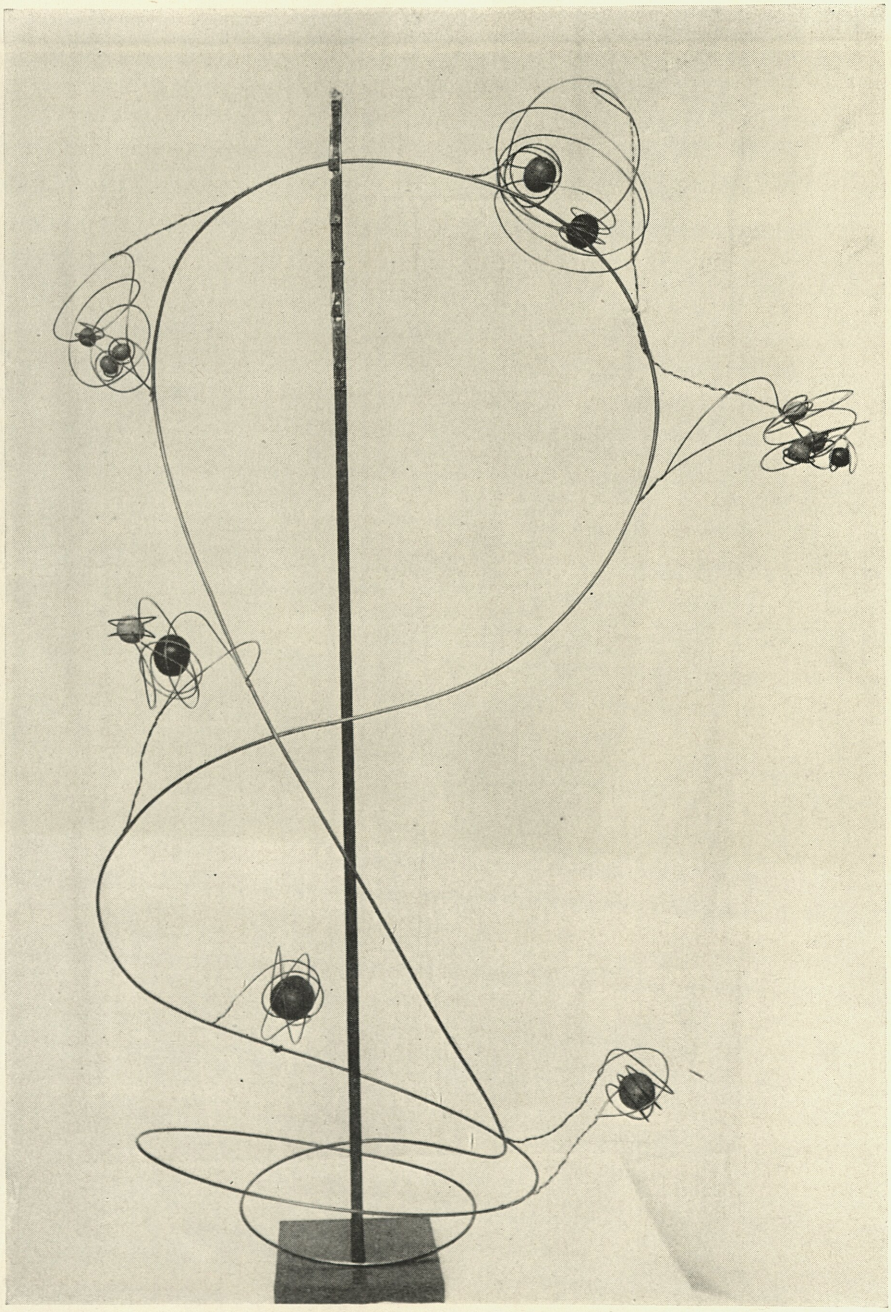
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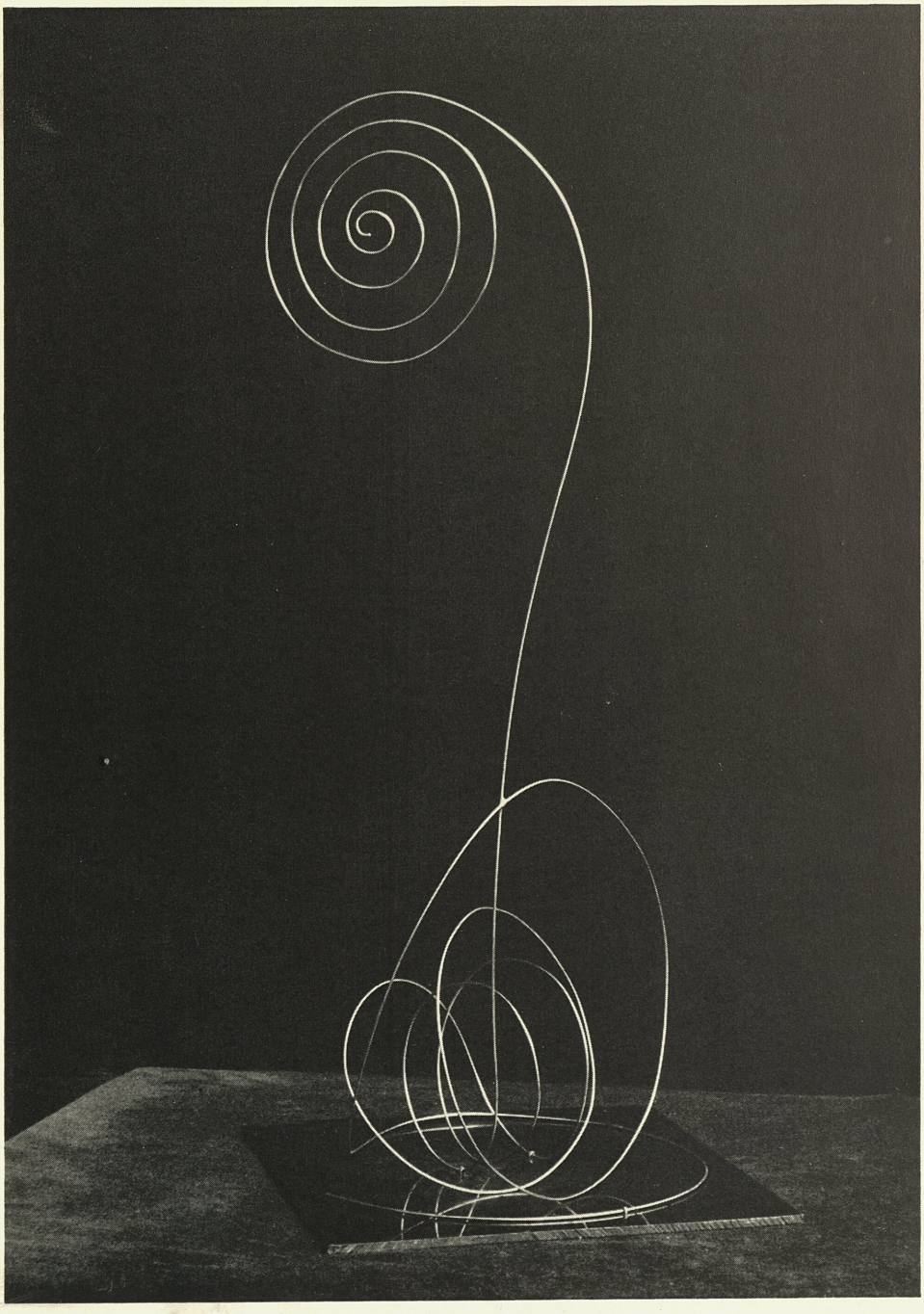




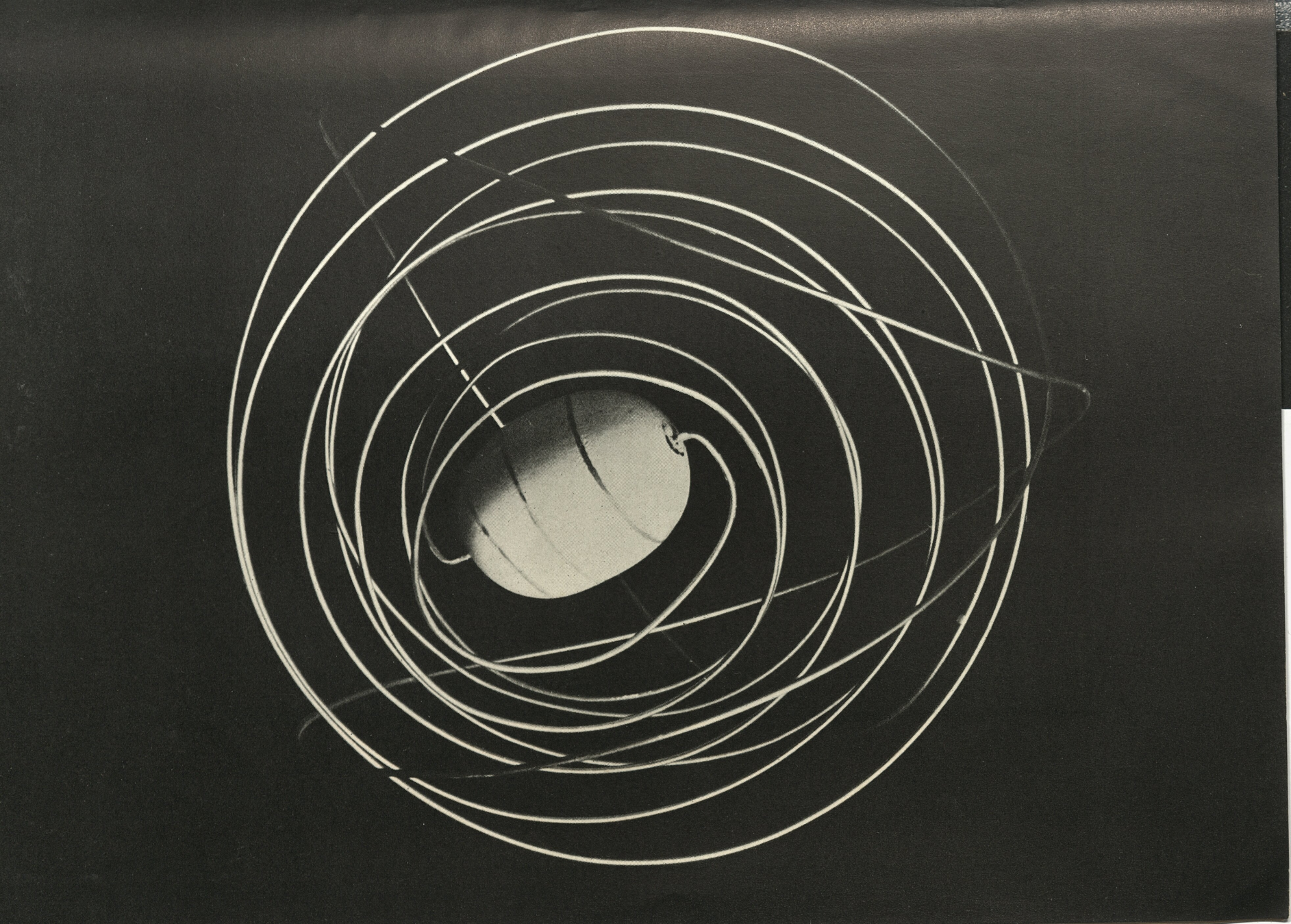




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