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AEG
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Modern Architecture and Industry: Peter Behrens, the AEG, and Industrial Design

Stanford Anderson

1 Cover of brochure for Peter Behrens's "Flammeco" industrial light fittings for the AEG, December 1913.

Early and repeated claims for the innovative role of Peter Behrens in the field of industrial design may serve as an instructive point of departure from which to examine traditional German concepts of the relationship between artistic form and technique.

Nikolaus Pevsner summed up and most successfully propagandized these claims for Behrens (figs. 2–9):
"The importance of Germany in the early years of the twentieth century lies altogether in the shift from craft to industrial design and concurrently in the discovery by architects (and engineers) of the aesthetic possibilities of industrial architecture. . . . The most important architect was Peter Behrens, the most important organization the Deutscher Werkbund founded in 1907 and dedicated to the cause of good functional form in the crafts and soon in industry too. Peter Behrens was made consultant to the AEG, the Berlin manufacturers of electrical products, both for these products and for their buildings—a completely new and highly influential job. His tea kettles, his street lamps, his notepaper and invoices, his shop interiors and his large factories have all the same functional directness. Art Nouveau which had been Behrens's own point of departure about 1900 was left leagues behind. The style and the spiritual attitude of the twentieth century had indeed been achieved."[1]

Pevsner remained loath to abandon this position, first expressed in his *Pioneers of the Modern Movement* of 1936, even when he felt compelled to recognize that others did not share his view.[2] An attempt at a better understanding of Behrens's contribution might well start with an examination of his design of an arc lamp (fig. 4) for the large German electrical corporation, the AEG. Though this lamp was his first work in industrial design, it quickly became—and has remained—the touchstone for his reputation as the first industrial designer.[3]

AEG publicity and internal histories misdirect the interpretation of Behrens's role in the origins of industrial design. In two publications,[4] only the ornate "late Victorian" arc lamp (fig. 2) and Behrens's most renowned design (fig. 4), both produced by the AEG, were shown. The

2 Decorated arc lamp, designed late nineteenth century but in continuing production after the arrival of Peter Behrens at AEG.
3 Undecorated arc lamp, precedent for the design by Behrens.
4 Arc lamp housing as redesigned by Behrens, 1907.
5–7 Portable electric heating units by the AEG. Peter Behrens, 1909.

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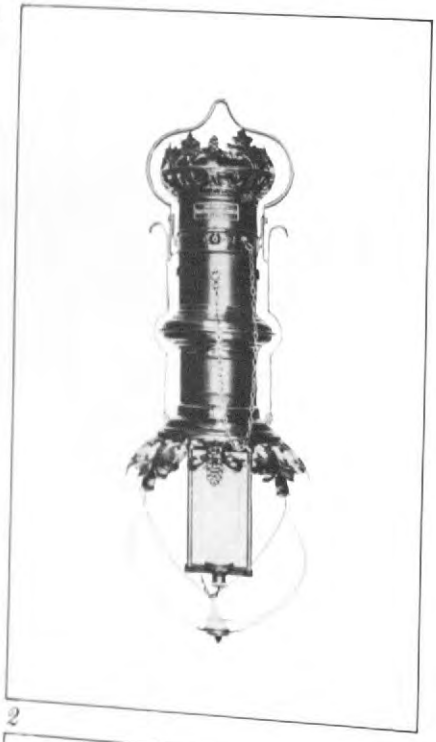

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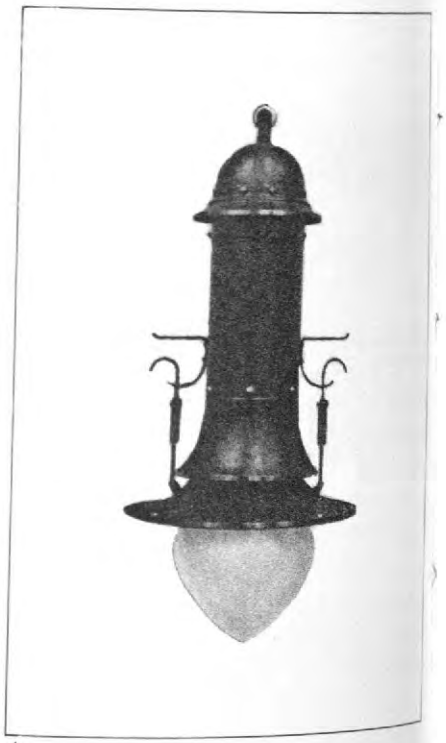

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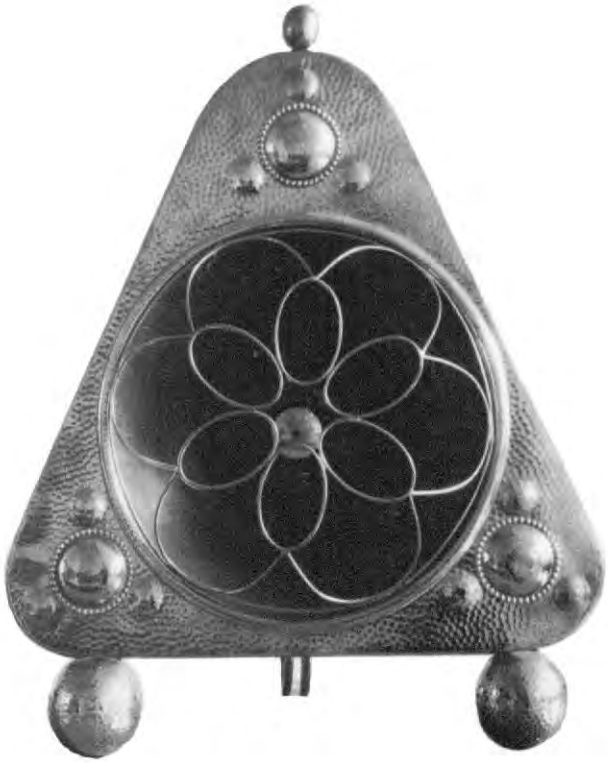
8 Electric tea kettles by the AEG. Peter Behrens, 1909.
9 Portable radiant electric heater by the AEG. Peter Behrens, ca. 1907–1908.

former was labeled "*aus dem Jahre 1906*," the latter dated 1908. The implication seems to be that Behrens came in and, with one fell swoop, swept out nineteenth-century abuses and achieved "the spiritual attitude of the twentieth century." The situation was not that simple; while honoring Behrens's achievement, such comparisons obscure the facts.

The "Victorian" lamp was composed of two basically simple parts: a spherical globe shielding the arc and diffusing its light, and a cylindrical tube housing the regulator and the feed mechanism for the carbon electrodes. The floral decoration was literally "applied art" intended to make the lamp acceptable in rooms in which similar decoration was prevalent. This applied art would have been supplied by the *Fabrikzeichner* (the factory draftsman), one of the predecessors of the industrial designer. According to Arnold Schürer,[5] this lamp was in production in the late nineteenth century and was still represented in AEG catalogues after Behrens's arrival. It was always offered not as *the* arc lamp model, but as an alternative to unornamented models. An AEG catalogue of 1901 shows a very handsome, unornamented lamp, literally just a sphere and a cylinder with a short cylindrical collar at their juncture.[6] The lamp in the center of our illustrations (fig. 3) was another model available prior to the arrival of Behrens at the AEG. In such a lamp, one recognizes a fundamental, engineered form. One should not imagine that such form is achieved automatically nor that it is the best solution. However, successive AEG catalogues reveal increasing recognition of the problems addressed, mastery of the technology employed, and articulation of these factors in the changing forms of the products.[7]



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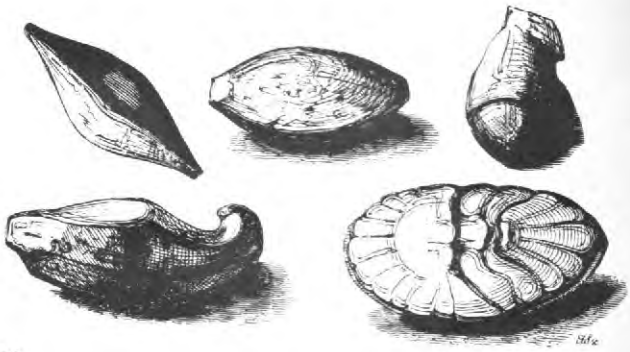
When Behrens turned to the problem of industrial design, he could accept neither the loose application of ornament nor the simple refinement of "functionally direct" form. Rather, he sought to give such technological products their place within the greater synthesis of *Kultur*:
"it is true that the works of engineers are not without a certain beauty. One need only think of the great iron halls, the broad-spanning roofs which definitely give an impression of grandeur. We cannot deny that the simple utili-

tarian buildings built by engineers, still more their machines, achieve a certain aesthetic impression by means of their often bold and logical construction. This effect is achieved despite the fact that no conception derived according to artistic principles prevailed in these examples and that the aesthetic result is accidental. This phenomenon can be explained in that these works possess a pseudo-aesthetic embodied in a certain lawfulness, that of mechanical construction. This is the lawfulness of organic development which Nature also reveals in all her works. But just as Nature is not *Kultur*, so the purely human fulfillment of functional and material needs cannot create *Kultur*. Despite all this genuinely enthusiastic recognition of the accomplishments of technology and transport, nothing could be more natural than that the desire for absolute beauty should be awakened in us. Quite naturally we will not believe that from this time on the satisfactions called forth by exactitude and utmost functionalism will take the place of those values that have formerly delighted and elevated us."[8]

For Behrens, then, the engineer's "pseudo-aesthetic" achievement was not art. Far from allowing these products to be formed in accordance with the dictates of purpose, material, and technique, he insisted that art was a response to human expectations and psychic pressures. It must therefore be free to fulfill itself unhindered by (and perhaps even in contradiction to) material conditions. This was an explicit instance of Behrens's resistance to what he saw as the materialism of Semperian thought and his acceptance, via Riegl, of the dominance of artistic will.[9]

In Behrens's formulation, it was the artist's role to accept the imperatives of technological civilization and then to overcome them in the interests of a holistic culture. In redesigning the arc lamp, he saw his problem as the formulation of an aesthetic which accepted the blunt, prosaic power of the machine, of engineering, and of industry, but which also raised this power to an electric, economical poesy expressive of a suprapersonal and modern *Kunstwollen*. Behrens's lamp,[10] at the right of our illustrations (fig. 4), did not tamper with the mechanics of the lamp; it was the housing that he reformed. Without any apparent



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coercion, the silhouette of the lamp became simple and harmonious. A strong, central shaft replaced the jointed and molded midsection of the earlier lamp. The absence of these moldings allowed the cap unit of the new lamp to be easily distinguished; the reflector, now achieved in a pair of graceful and repeated curves, was then complemented in the similar but reversed curves of the globe below. Even the operable hardware, though still rather flat, asserted itself as a set of bolder strokes in interplay with the massive form of the housing. Beyond the calligraphic elegance of silhouette, this new simplicity suggested that the lamp was made of a few solid parts. The handling of the sheet metal enhanced this effect; rather than expose the sharp edge of this light material, Behrens had each exposed edge turned down and then given a bronze edging in order to 'portray' the termination of a sturdy material. In contrast to the engineered design (fig. 3), which was perfectly frank in its jointing, assembly, and character of material, Behrens's design was sculptural, almost Egyptian in both its line and weightiness. The engineered lamp was admirably direct, and yet Behrens's design offered, in this instance, the more compelling image of technical efficiency.[11] Wolf Dohrn records the anecdote that salesmen for the AEG were so pleased with the new form of the housing that they requested a similar redesign of the working parts.[12]

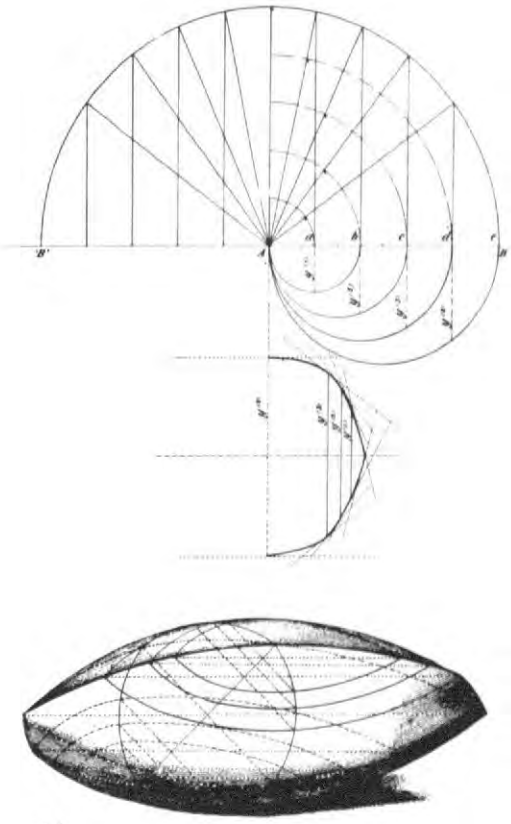
Through Behrens, the AEG lamp received a form which was to serve as an aesthetic reformulation of the "new nature" of industrialization and thus as an indirect testimony of the underlying technical efficiency. This comparatively small artistic form drawn from the new nature also implied a new architecture, for Behrens's flower-like lamp[13] would have been as out of place in a work of raw engineering construction as the florally ornamented lamp had been. Behrens's arc lamp and his AEG Turbine Factory, for example, are complementary designs.

A deeper understanding of Behrens's approach to industrial design and of his opposition to Semper emerges from a consideration of the German concept of *Tektonik*.[14] The late Schinkelesque classicist Karl Bötticher wrote a detailed study of ancient Greek architecture entitled *Die*

10 Ancient Greek lead shot for slings.
11 Analysis of ancient shot. Gottfried Semper, 1859.

Tektonik der Hellenen.[15] The motto for his book indicates the immanence of meaning in form to which *Tektonik* was to refer:
"Des Körpers Form ist seines Wesens Spiegel!
Durchdringst du sie—löst sich des Räthsels Siegel."[16]
On his first page, Bötticher explained that *"Tektonik"* referred not just to the activity of making the materially requisite construction that answers to certain needs, but rather to the activity that raises this construction to an art form. That is, every element of a building—a column, for example—has an actual technical function, but this function may not be fully apparent. The functionally adequate form must be adapted so as to give expression to its function. The sense of bearing provided by the entasis of Greek columns became the touchstone of this concept of *Tektonik*. Under this interpretation, the Greek temple became a composite of functionally expressive members relying on organic analogies, a kind of mosaic of functions. According to Bötticher, in the Hellenistic tectonic, as in nature, the form of a body was the embodiment or plastic representation of its essence. Form gave to the construction material the expression of its fulfillment of function.[17]

Gottfried Semper shared Bötticher's belief that the Greeks had achieved the highest tectonic expression and that this achievement bore a relation to the forms of nature. Semper was convinced "that every art form must be the expression of a definite law of the innermost necessity, just as this is certainly the case with natural forms."[18] However, Semper also stressed that plans, sections, elevations, and all laws of beauty developed from them were artificial and fell short of the organic tectonic forms of the Greeks, which were not constructed, turned, or cast, but organically developed. He specifically chastised Bötticher for his *Strukturschemen* and his applied symbolic ornament. Rather, in Greek art "the forms in themselves are such as are brought forth when the organic energies are thrust into conflict with ponderous matter." Semper drew a lesson from this: "the more the works of our hands appear as though they were the resultant of a similar conflict between elemental energies and vital energies, the higher these works stand on the ladder of artistic fulfillment."[19]



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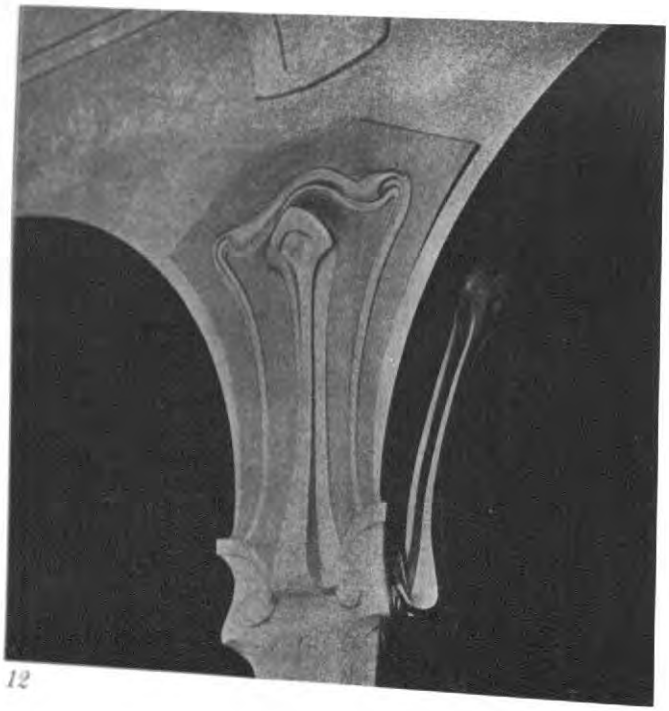

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The book quoted here is Semper's small study of Greek lead shot for slings (fig. 10), in which he questioned why these missiles should have been almond-shaped. In giving his answer, Semper offers a general study of objects moving in a resistant medium. The book demonstrates to us Semper's submission of an ancient "industrial" product to a theoretical study conceived to elucidate both timeless artistic problems and production-related concerns such as those of boat or missile design. In his own statement of purpose, Semper removes some concern about what may have appeared to be a simplistic naturalism:

"I have been driven to the following study by the desire to demonstrate, by means of a simple example, that the Greeks did not merely observe natural laws and then strive to imitate the forms that resulted from the operation of these laws. Rather, I would like to demonstrate that the Greeks actually researched these laws and out of these laws, independent of all imitation, created their own forms. These new forms relate to those of Nature only in the commonality of the underlying natural laws."[20]

As Figure 11 indicates, Semper's aerodynamic studies satisfied him that the "almond-shaped" missiles of the ancients were the expression of a definite natural law. In the final section (§21), he returns to more conventional aesthetic concerns. Noting that in his study of forms moving in a resisting medium all the curves exhibited a "spring-powered resistance" to the straight line, tending to bend into a curve, he also remarks that it is such contours and expansions that characterize the Greek tectonic profile in strong differentiation from all other styles of architecture. Finally, he claims not "that the Greeks constructed their forms according to mathematical formulas, which would be absurd in the arts. On the contrary, the Greeks did not merely sense, but clearly recognized a law of nature: in achieving form in objects extreme limits are observed and energy controls everything."[21]

I am here concerned not to verify the historiographical or scientific adequacy of Semper's study but rather to examine the theoretical insight that it offered to his contemporaries. Discovering the form that answered to all the

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12 Capital, Folkwang Museum, Hagen. Henry van de Velde, 1898–1902.
13 Dining room furniture. Henry van de Velde, 1895.
14 Dining room, Behrens House, Darmstadt. Peter Behrens, 1899–1901.
15 Chair. Richard Riemerschmid, 1899.

demands of its context (the complexity of the context varying with the problem), Semper asserted a relation between the process of "streamlining" and the form of the Parthenon. Two generations later Le Corbusier wrote:

"The airplane is indubitably one of the products of the most intense selection in the range of modern industry.

"The War was an insatiable 'client', never satisfied, always demanding better. The orders were to succeed at all costs and death followed a mistake remorselessly. We may then affirm that the airplane mobilized invention, intelligence, and daring: *imagination* and *cold reason*. It is the same spirit that built the Parthenon.

"Let us look at things from the point of view of architecture, but in the state of mind of the inventor of airplanes.

"The lesson of the airplane is not primarily in the forms it has created, and above all we must learn to see in an airplane not a bird or a dragonfly, but a machine for flying; the lesson of the airplane lies in the logic which governed the enunciation of the problem and which led to its successful realization. When a problem is properly stated, in our epoch, it inevitably finds its solution.

"The problem of the house has not yet been stated."[22]

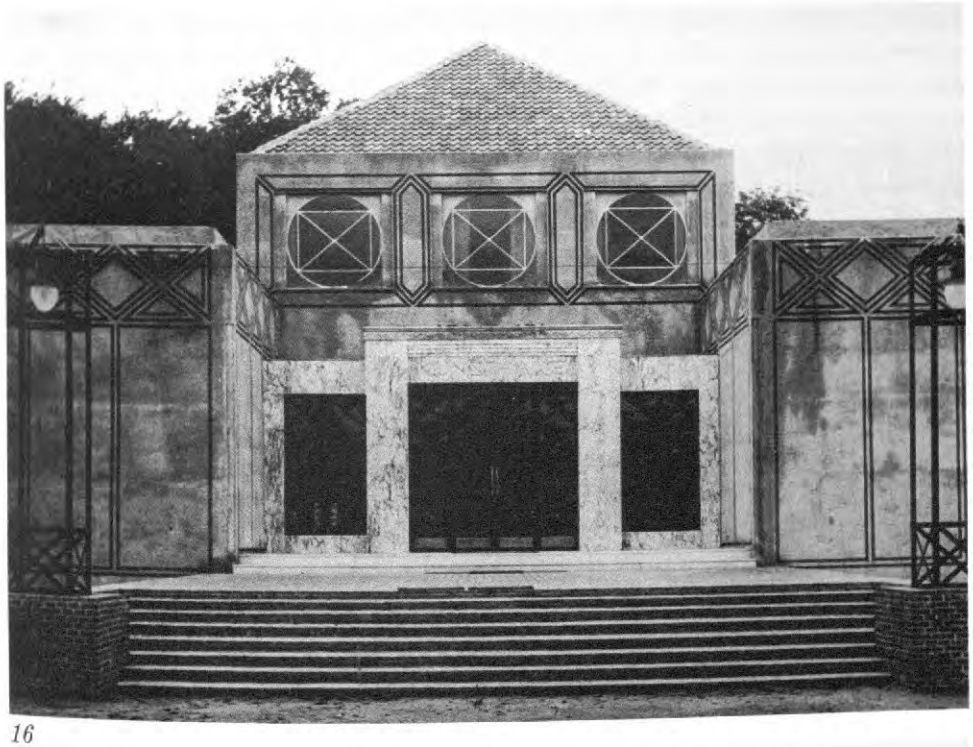
Tektonik was, then, a complex and evolving concept that attempted to establish a relationship between form and technical considerations. According to Bötticher, such a concept was necessary because what was technically functional might not be sensed as such. This implied demand that the artist assert himself in giving form to objects was, then, in the interest of giving expression to the function of the object. The artist must be brought in not for his *a priori* personal sensibility but for his ability to give expression to what was objective in a situation. Semper sought to give a still more reasoned interpretation of good form by demonstrating the necessity of considering all the conditions which the environmental context placed upon the object. *Tektonik* thus received a still more precise functional interpretation.

Such concepts of bringing function to expression through carefully considered form were overt in much Art Nouveau and Jugendstil work—notably with van de Velde (figs. 12, 13) and Riemerschmid (fig. 15), but also in the early Behrens (chairs in fig. 14) and others. The polemics of the time referred to such works as "functionalist." Men as seemingly different as Bötticher and van de Velde were committed to this inferentially functional, organismic world of forms associated with Greek classicism (and Gothic architecture).[23] Semper went on to describe an alternative—an abstract, non-organic formal world labeled *Stereotomie*, associated with the Renaissance (and Romanesque architecture).

The terms *Tektonik* and *Stereotomie*, as well as the architectures with which they were associated, indicate that these were, respectively, distinctions between constructs of articulated elements (elastic skeletal structures, e.g., timber or metal frames) and comparatively inert assemblies (intractile masses, e.g., masonry walls).

Successive sections of Semper's principal work, *Der Stil*, are titled "*Tektonik*" (carpentry) and "*Stereotomie*" (masonry, etc.).[24] The Greek temple remained the highest form[25] even though, as a tectonic assembly in stone, it was a heterogeneous combination of the form allied to *Tektonik* and the material allied to *Stereotomie*.[26] The major distinction between the types was that tectonic structures were composed of members; stereotomic assemblies of identical or similar pieces. These pieces all had the same function, the absolutely mechanical one of compression and resistance to compression. In contrast, the members of the tectonic structure (even if executed in stone) were differentiated in their action, in their position in the frame, and consequently "could, by means of art, be brought to life as organisms." In opposition to this functionally expressive and organic quality of the tectonic structure, the stone mass had a lifeless, crystalline mineral quality which built up into totalities of a crystalline or eurhythmic character and which could only be conceived in terms of a regular, closed form.[27]

Behrens's own development reflects a shift from functionally expressive to crystalline form as he passed from his Jugendstil work in Darmstadt (fig. 17) to the post-Jugendstil work of his Düsseldorf period (fig. 16). Four years later, beginning work for the AEG in Berlin, he was faced



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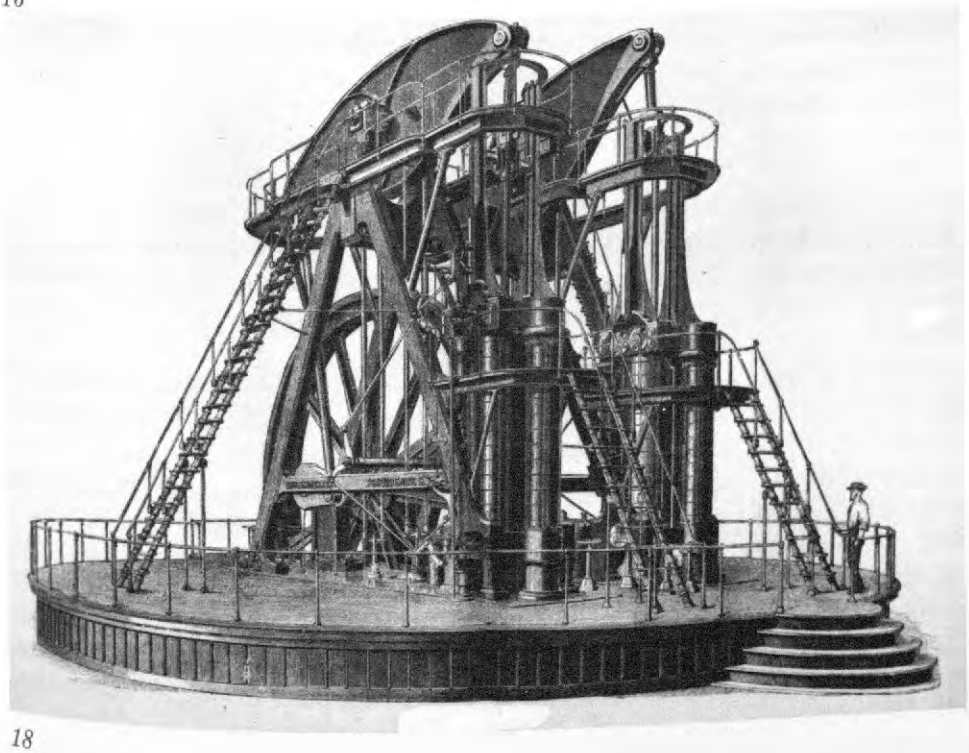

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16 Northwest German Art Exhibition, Oldenburg, 1905. Exhibition pavilions by Peter Behrens.
17 House of the Architect, Artists' Colony, Darmstadt. Peter Behrens, 1901.
18 Corliss steam beam engines which were exhibited at, and supplied the power for, the Machinery Hall, Centennial Exhibition, Philadelphia, 1876.

with problems that encouraged a less absolute division between *Tektonik* and *Stereotomie*. His post-Jugendstil preference for *Stereotomie* came into confrontation with the tectonic qualities of metal-framed factory structures. While a new conception of space assisted Behrens in resolving the contradiction between these two structural principles, this understanding held little reference for the design of industrial objects.

The translation of the ideas behind *Tektonik* into industrial machine construction and machine products had already been made in Semper's time by the noted mechanical engineer Franz Reuleaux.[28] As the head of the German delegation and a judge in the mechanical section of the Centennial Exhibition at Philadelphia in 1876, Reuleaux wrote periodic letters to the *Nationalzeitung* which caused a great stir in Germany. Reuleaux found that the Americans were evolving good form in their machines (fig. 18), a fact which he both appreciated and found tectonically significant:

"Certain details of the steam-engine have been further developed, and they [the Americans] have been able to give it an external finish and appearance which is really admirable. This is a significant sign. For when beauty of form has been developed as the object of especial care, the difficulties of the purely utilitarian design must already have been overcome."

Going so far as to refer to German industrial production exhibited at Philadelphia as "*billig und schlecht*" (cheap and nasty), Reuleaux made a point that anticipates the advocacy of the Deutscher Werkbund around 1910:

"German industry must relinquish the principle of competition in price alone and must decide whether to turn instead to competition in quality or value. Nevertheless . . . German industry must adopt machines . . . when bodily effort can thereby be abolished or lightened . . .; on the other hand, industry must use the intellectual power and the skill of the worker to refine the product, and this to a greater degree the more it approaches to art."[29]

We may now consider this traditional problem of "good" form and use in relation to Behrens's work for industry.

The early nineteenth-century Neoclassical architect Bötticher and the late nineteenth century mechanical engineer Reuleaux held a similar view that there was such a thing as an excellent utilitarian design that was not yet necessarily good form. Good form was a further development. For both these men, good form would express the utility of the object; but, as expression, it had as much or more to do with the perception and psyche of the user or viewer as it did with its actual function.

Semper did not hold the mechanically deterministic view that the satisfaction of utilitarian demands insured an ideal form.[30] But his example of the lead shot would seem to indicate that he would go further than Bötticher or Reuleaux in claiming a symbiosis between utility and good form. One senses, for example, that Bötticher's acknowledgment of good form in a column would be conservative, insisting on the fulfillment of certain traditional expectations. The thrust of Semper's argument suggests that he would be more prepared to alter his understanding and acceptance of conventions in accord with his analysis of the practical problem.

Semper's analysis would appeal to Behrens, one might think, since Behrens was willing to work with industry and to alter traditional expectations; but we have already recorded his antagonism toward Semper. Behrens stands in the classical tradition of Bötticher, although his modern, broadly cultural, and more psychological understanding of Hellenism led him to conceive an even weaker bond between good form and technique.

Like Bötticher and Reuleaux, Behrens accepted the excellence of a utilitarian design; he did little to alter the technical design of AEG products. But whereas Bötticher attempted to rationalize the excellence of Hellenic classicism as a mosaic of expressed functions, Behrens was persuaded by the more complex psychological and symbolic interpretations that evoked the "spirit of the time" and the collective and individual wills of a civilization and its artists. Consequently, Behrens's own work had other more abstract sources than functional expression.

In his designs for industrially produced objects of domestic use, Behrens was often quite conservative. Certainly there had been predilections based now on tradition, now on an ideal geometry, that contributed to the form of the Behrens-AEG electrical heating units (see figs. 5–7, 9). These objects suggest the spirit of Carolingian reliquaries more strongly than the qualities of a revolutionary new heating system. In accord with Behrens's design conceptions, many of the details of these objects derived from other sources than a strict analysis of functional expression.

Similarly, his electric tea kettles (see fig. 8) relied more on late eighteenth-century *chinoiserie* than on a new functional analysis. Or, to make the same point differently, if the handsome Behrens teapots had relied for their form on the expression of function, they would not have appeared simultaneously in three different forms and several finishes (including two "machine-hammered" ones).

In domestic or luxury objects, and in domestic or institutional architecture, Behrens was prepared to have established expectations influence the form. Even if electrified, a teapot or a source of warmth in the home had to participate in human expectations beyond functional expression. He stated specifically that manufactured objects which would come into close contact with people permitted a richer forming, better materials, and ornamentation—though the ornamentation should be economical and "impersonal" as is the case with simple geometric figures.[31]

Only in a secondary sense were the non-domestic arc lamp (fig. 4) or even the simplest tea kettles (fig. 8) or electric fans more functionally direct than their predecessors (fig. 2); fans with similarly ornamented motor housings were also produced. Both Walther Rathenau of the AEG and Behrens accepted the role of science and technology in modern society with a pessimistic resignation. Where traditional forces were not dominant, Behrens felt a historicist compulsion to use his artistry to create an image of technological efficiency and perfection beyond that which the engineered object would have provided. That is, he sought such an image because he believed his place in history compelled him to do so. It is a curious position of an individual human will dominant over material matters but subject to the collective spirit of a people and its history. Thus Behrens was willing to seek new forms; but as the theoretical discussion of Part I of this article (*Oppositions 11*) suggests, he sought the conventions of a new sensibility which encompassed functional expression rather than being determined by it.

Within this context we may return to question Behrens's precedence in the field of industrial design. One aspect of industrial design is surely the design of capital goods and major machinery for public works and for industry itself. The turbines and large equipment of the AEG were prominent items in this category, but there is still no hard evidence that Behrens had any more than an indirect influence on the design of these products.[32] That indirect influence stemmed from his well-known designs for mass-produced objects.

If "industrial design" means design of mass-production, mass-distribution goods, certain of the potential candidates for precedence in the field can be eliminated on the grounds that they were designing for handicraft production or, at most, for machine-augmented handicraft production. In the late nineteenth century, first in England and then on the continent, artists and craftsmen banded together to form workshops where they might produce and market objects meeting their own standards. These workshops were too closely tied to the handicraft tradition to lay claim to an innovative position in design for industry. In 1908, J. A. Lux went so far as to compliment the Wiener Werkstätte as one of the few remaining shops where the worker could devote a labor of love to a single object.[33] At times, much has been made of the "machine furniture" of Bruno Paul or that of Richard Riemerschmid designed for the Deutsche Werkstätten of Hellerau, near Dresden. The Werkstätten published Riemerschmid's designs in a book in which they were at pains to designate themselves as a workshop rather than a factory, and devoted to careful handwork.[34]

19 Bentwood furniture exhibited at Crystal Palace, London, 1851. Michael Thonet.
20 Bentwood furniture made in Boppard, Germany. Michael Thonet, 1836–1840.
21 Bentwood chair No. 14. Michael Thonet, 1859.

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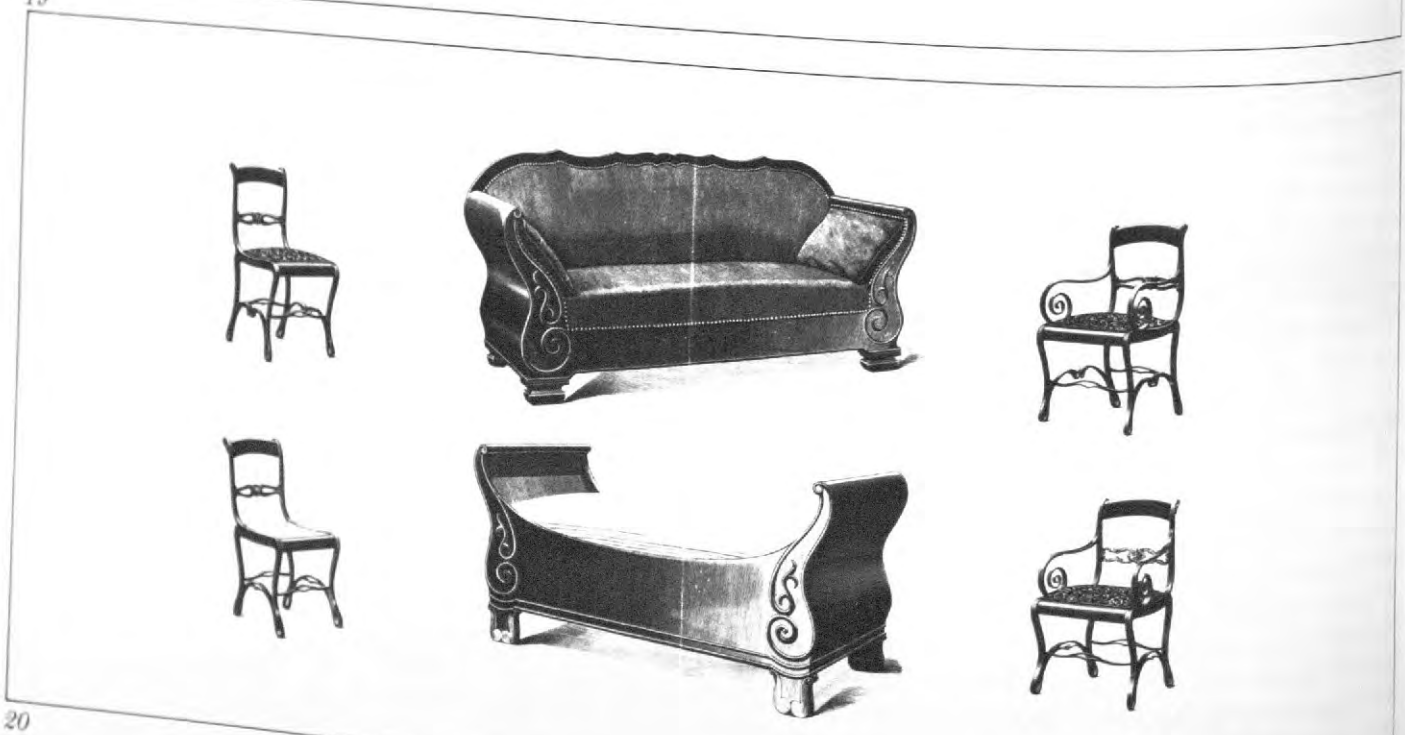

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In point of fact, the Dresden Workshops were quite large, and might have some claim to serial production of furniture. However, that claim could be pressed earlier and more convincingly for certain other industries, e.g., glass, ceramics, wallpaper, linoleum, and the like. Many of the Art Nouveau and Jugendstil artists, including Behrens, had created designs for firms engaged in such manufactures. Sevres in ceramics, Wedgwood in china, Boulton in iron casting,[35] and the English Arts and Crafts Movement[36] provide earlier instances of designers for large-scale production working both within industry and as "consultants."[37] In such industries as ceramics, glass, and weaponry, the existence of "design for industry" must trace back to antiquity. Clearly, there is ample precedent for the design of objects for mass production and mass distribution. The question, then, would seem to be whether the twentieth century, and Behrens in particular, developed an innovative approach which can be called "industrial design."[38]

An attempt might be made to distinguish Behrens's contribution by the modernity of the industry for which he worked. But the electrical industry was not totally new in 1907; and the Industrial Revolution had introduced other technologies, such as steam power, which had posed the full range of industrial design problems. These problems had brought forth the sometimes functional and sometimes rather loosely conceived design contributions of engineers and *Fabrikzeichner*, as we saw in the instance of the AEG arc lamps.

Nor was the scale of mass production of the AEG a distinguishing characteristic. The bentwood furniture manufacture of Michael Thonet may be cited as an earlier example of design for large-scale production; this example also demonstrates a methodology in contrast with Behrens's industrial design. The furniture that Thonet produced in Boppard in 1836–1840 (fig. 20) represented a study of his new technique and the reminiscences that came to him in his role as his own "factory draftsman." Had Thonet stopped there, he might be viewed as little more than another *Fabrikzeichner*; but in Austria, Thonet and his sons went on revising their designs until they

achieved the still admired bentwood chairs with wicker seats, one version of which appears at the upper right of Figure 19. In the researching of their material and technique, and of the more general problems of seating and furniture, the Thonets achieved a variety of seemingly timeless designs. This furniture was made in such numbers (approximately forty million chairs of the basic style No. 14 [fig. 21] between 1859 and 1896) as to clearly establish the Thonets as mass-producers.[39]

A chair, as a traditional object, contrasts with the technical objects of the electrical industry. But the important difference between Thonet's design and that of Behrens is in method, not in the type of object or scale of production. Generations have now taken pleasure in Thonet chairs, the design, development, and production of which suggest comparison with Semper's idea of *Tektonik*. For Thonet, as for Semper, there was no conception of a technical form that an artist should improve. The fully developed and beautiful form was to be achieved along with the refinement of the material and technique—and this need not imply a deterministic, one-way path from technique to form. According to this conception it was the oneness of technical and visual excellence that was important, whether the man who achieved it was labeled engineer or artist. Under this interpretation, design for industry was not new with the twentieth century, certainly not with Behrens.

As we have seen repeatedly, Behrens made a definite distinction between technique and art. Behrens was influential in diminishing the aloofness of early twentieth century artists to industry; but his acceptance of industry was fatalistic rather than optimistic or wholehearted. Even the best products of the engineer, whether mass-production or capital goods, were eliminated from the canon of good form on the basis that they participated in a pseudo-aesthetic. These products or machines, according to Behrens, had an "organic" lawfulness just as nature does; but just as nature is not yet art, so neither is an "organic" machine yet good design, art, or culture. The work of the engineer is a given of modern Western civilization, but an independent *Kunstwollen* must operate upon it if there is to be a modern Western culture.[40]

It comes as no surprise, then, that one of the early claims for Behrens's contribution to design for industry was based on the dualism of technique and art, the engineer and the artist—and on Behrens's desire to aggregate these parts rather than to conceive of a single creative process. Wolf Dohrn, in speaking of the AEG arc lamps, considered Behrens's method to be a model for the future development of German industry. His lamp designs were the result of a cooperation in which the engineer became half an artist and the artist half an engineer. Behrens was the first, Dohrn said, to put his capability in the service of industry; the AEG had innovated in an exemplary fashion in achieving the cooperation of engineer and artist. It was widely recognized that the AEG had shown the greatest capacity to employ the results of German science for economic benefit, so it was no accident, Dohrn concluded, that this same industry had understood how to adapt the artistic capabilities of the time to its economic life.[41]

In summary, Behrens was not the first person to contribute designs (even "good" designs) for the fabrication (even by mass production) of products (even peculiarly modern industrial products) by others.

Nevertheless, Behrens was the first artist to devote special care to the beauty of form of peculiarly modern industrial products in terms of some larger cultural conception *external to the immediate processes* of production and use. Industry, the machine, and industrial production had to be accepted because at this point in history they were inevitable. The only remaining opportunity was to bridle this great force of technological civilization under expressive, reductionist artistic forms.[42] The belief that had begun with men like Reuleaux—that a process of technical refinement of a particular machine should be accompanied by a refinement of form—was in danger of subversion. An alternative belief, rooted in a historical determinist account, that the twentieth century was generally characterized by technical refinement, called for the design of forms that were beautiful, precise and expressive—forms that were often independent of the machines they housed.

Much, perhaps even the greatest part, of what has been known as industrial design in this century has assumed the separateness of technique and art, and the need to give a sympathetic, yet independent, artistic expression to a technical civilization. The broad acceptance of this particular conception of design for industry may indeed be traced back to Behrens and give him precedence within that interpretation of industrial design.

Before going on to Behrens's industrial architecture in Part III of this essay, it will be well to review the task Behrens and the AEG established for the designer. Behrens was not hired as an engineer with a sensitive eye. He was retained as an artist who could provide the signs of technical perfection through beauty of form, whether this involved a well-formed housing for the electrodes of an arc lamp, a well-formed factory building for a work force which the AEG was proud to say operated almost militaristically, or an elegant letterhead for an intelligent and complex executive staff.

The extensive adoption of Behrens's expressive design by the AEG served to create a corporate image,[43] a precedent for such mid-twentieth century firms as Olivetti and IBM. IBM in particular has used reductionist forms in graphics, industrial design, and architecture to express technological efficiency and to establish an image. It may be the desire for such an "image" that has made Behrens's conception of industrial design dominant. The fruits of an inexorable search for the best solution to each problem (in the manner of the Thonet chair) would relate to one another only in terms of excellence and process, but the application of a dominant artistic will can assure a constant image through a great range of problems (the white plastic boxes of Braun electrical appliances, for example).

In Germany, industrial design is known as *Formgebung* and Peter Behrens is generally acknowledged as the first of these "form-givers." Industrial design may be said to range from product engineering to sales cosmetics. It is significant that Behrens was not engaged to work at either of the poles of this spectrum where engineers or draftsmen had already worked. Behrens was the first *Formgeber* through his being engaged in exploring the rather elusive concept of the "giving of forms" which would signal technical perfection, corporate image, and something still more obscure. Beyond the sign language of technique and of corporateness, Behrens was still more interested in finding the symbols, proportions, and constructs which he believed would accord with and reveal the "rhythm of the time." There was also the further, self-imposed demand that this whole endeavor should achieve its "classical" form. Since steel, electricity, rapid transportation, modern industry, and modern enterprise were regarded as the sources of this rhythm, and therefore of the new culture, Behrens's cultural ambitions found support among his employers.

Source Note: This essay is adapted from chapter six of my doctoral dissertation, "Peter Behrens and the New Architecture of Germany: 1900–1917" (Columbia University, 1968). It is complementary to chapter five, which was published in Oppositions, 11 *(winter 1977), pp. 52–71: Please see p. 69 of* Oppositions 11 *for other references and acknowledgments.*—S.A.

1. N. Pevsner in Paris, Musée national d'art moderne, *The Sources of the XXth Century* (Paris: Musée national d'art moderne, 1960), p. 53.

2. N. Pevsner, "Architecture in Our Time," *The Listener*, LXXVI (Dec. 29, 1966), pp. 953–55, and LXXVII (Jan. 5, 1967), pp. 7–9.

3. Two recent works assigning this priority to Behrens are G. Dorfles, *Il Disegno Industriale e la sua Estetica* (Bologna: Cappelli, 1963), p. 74; and O. Bartning, "Zur Eröffnung der Ausstellung Peter Behrens" (Darmstadt: Institut für neue technische Form, Sept. 14, 1957), mimeograph. This exhibition showed certain AEG products the design of which was wrongly attributed to Behrens, including a simple chromed electric iron and a simple tall electric kettle. Well attuned to the sympathies of later viewers, these works tended to enhance the reputation of Behrens without clarifying his actual contribution.

Most works on the AEG, on Behrens, and on the history of modern architecture give some attention to Behrens's work in industrial design. See the notes to the article in *Oppositions 11* and: K. Scheffler, "Kunst und Industrie," VI (July 1908), 430–34; W. Dohrn, "Das Vorbild der AEG," *März*, III (Sept. 3, 1909), pp. 361–72; A. Fürst, "Blech, Beton und Kunst," in *Die Wunder um uns* (Berlin, 1911), pp. 186–98, ill. 74–82; E. Kalkschmidt, "Deutsches Kunstgewerbe und der Weltmarkt," *Dekorative Kunst*, XIX (July 1911), pp. 465–80; C.-E. Jeanneret [Le Corbusier], *Etude sur le Mouvement d'Art Decoratif en Allemagne* (La Chaux-de-Fonds, 1912); H. Lanzke, "Industrielle Formgestaltung und Formentwicklung," *AEG Informations-Mappe 99* (Berlin, 1954); R. Villigier, *Industrielle Formgestaltung* (Winterthur, 1957); mimeograph transcripts of speeches by Ludwig Prinz von Hessen und bei Rhein, Otto Bartning, and Hermann Lanzke at the opening of the AEG-organized exhibition "Peter Behrens. 50 Jahre Formgebung in der Industrie" (Darmstadt: Institut für neue technische Form, Sept. 14, 1957); H. Lanzke, *Peter Behrens. 50 Jahre Gestaltung in der Industrie* (Berlin?, 1958); B. Siepen, "Peter Behrens. 50 Jahre Formgebung in der Industrie," *Die Innenarchitektur*, V (April 1958), pp. 669–70; S. von Moos, "Die Erneuerung," *Werk*, LIV (April 1967), pp. 211–15. See now Tilmann Buddensieg et al., *Industriekultur. Peter Behrens und die AEG* (Berlin: Gebr. Mann, 1979).

4. H. Lanzke, "Industrielle Formgestaltung und Formentwicklung" (Berlin: AEG, 1954), p. 1; and Berlin, AEG, *Peter Behrens. 50 Jahre Gestaltung in der Industrie* ([Berlin: AEG], 1958), p. [2]. The same incomplete comparison also appears in early publications; e.g., Wolf Dohrn, "Das Vorbild der AEG," *März*, III (Sept. 3, 1909), pp. 362–63. See also the preceding note. Even the recent extensive work of Buddensieg chooses an intermediate model (comparable to our Fig. 3), the cap and reflector of which allow a comparison more favorable to the evaluation of Behrens's innovations (*Industriekultur*, figs. 39 and 40 on p. 45;

the discussion on p. 46 misidentifies these as lamps for indirect light).

5. Arnold Schürer is an industrial designer who while in the employ of the AEG researched the design development of the products of the AEG. See his *Der Einfluss produktbestimmender Faktoren auf die Gestaltung* (Bielefeld: the author, 1969).

6. Berlin, AEG, *Elecktrische Kraftübertragung und Kraftverteilung* (Berlin: AEG, 1901), 3rd ed., p. 327.

7. It is this phenomenon which Arnold Schürer studied in great detail. To give one general example, Schürer has demonstrated that increasing understanding and improvement of materials, productive technology, and electrical and mechanical technology contributed to a progressive miniaturization and formal simplification of the products of the electrical industry.

8. Translated from a speech delivered by Behrens at the 18th annual convention of the Verband Deutscher Elektrotechniker in Braunschweig in 1910. Published in the *Elektrotechnische Zeitschrift*, XXXI (June 2, 1910), pp. 552–55.

9. This paragraph is based on the succeeding part of Behrens's Braunschweig speech, ibid., p. 553. The original reads:
Kunst entsteht nur als Intuition starker Individualitäten und ist die freie, durch materielle Bedingungen unbehinderte Erfüllung psychischen Dranges. Sie entsteht nicht als Zufälligkeit, sondern als Schöpfung nach dem intensiven und bewussten Willen des Befreiten menschlichen Geistes. Sie ist die Erfüllung psychischer, das heisst ins Geistige übersetzter Zwecke, wie sie sich als solche in der Musik am klarsten offenbart. Das Musikalische, das Einfach-Rhythmische ist das wesentliche Moment künstlerischer Gestaltung. Oder wie der Wiener Forscher Riegl dies ausdrückt: "Im Gegensatz zu der Semperschen mechanistischen Auffassung vom Wesen des Kunstwerkes muss eine teleologische treten, indem im Kunstwerk das Resultat eines bestimmten zweckbewussten Kunstwollens erblickt wird, das sich im Kampf mit Gebrauchszweck, Rohstoff und Technik durchsetzt." Diesen drei letzteren Faktoren kommt somit nicht mehr jene positive schöpferische Rolle zu, die ihnen die sogennante Sempersche Theorie zugedacht hatte, sondern vielmehr eine hemmende, negative: "sie bilden gleichsam die Reibungskoeffizienten innerhalb des Gesamtproduktes."

10. This design was published as early as September 1907 in *Mitteilungen der Berliner Elektricitätswerke*, III (1907), p. 130. Beginning in January 1907 the cover of this journal used a design by Behrens. This indicates that Behrens had completed graphic and industrial design commissions for the AEG before he assumed his new position in Berlin.

11. Concerning this lamp, Behrens said that the housing had an "aesthetic requirement; it should remove from the viewer's sight the naked, barren electrodes and conceal these in what should preferably be a pleasant form." *Mitteilungen der Berliner Elektricitätswerke*, IV (March 1908), pp. 43–44. As we would now expect, this statement hardly constitutes an endorsement of new functional forms. Behrens's attitude stands as testimony to R. Banham's assessment that "The 'Machine Aesthetic' of the pioneer masters of the Modern Movement was thus selective and classicizing . . . and it came nowhere near an acceptance of machines on their own terms or for their own sakes." From "Machine Aesthetic," *Architectural Review*, CXVII (April 1955), pp. 224–28.

12. Dohrn, *März*, III (Sept. 3, 1909), p. 371. Fritz Mannheimer, "Arbeiten von Professor Peter Behrens für die AEG," *Der Industriebau*, II (June 15, 1911), p. 124, claims that the AEG invested 200,000 marks in the design and models of Behrens's arc lamp designs, but that this was recovered in one year's production savings and increased sales.

13. The flower-like quality of the lamp is worth noting since the early volumes of almost all the Art Nouveau periodicals presented designs for domestic electric lamps which predictably took flower forms. This lyrical form is something of a throwback for Behrens at this time (note his own early lamp, illustrated in *Architectural Design*, 39 [February 1969], p. 73); but it again illustrates the distance between Behrens's *Kunstwollen* and a "machine aesthetic."

14. F. Schmalenbach, "Jugendstil und Neue Sachlichkeit," *Kunsthistorische Studien* (Basel, 1941), pp. 9–21, is suggestive for this discussion though he is not specifically concerned with Behrens.

15. K. Bötticher, *Die Tektonik der Hellenen* (Potsdam: F. Riegel, 1852), 3 vol. Hermann Muthesius, "Die Asthetische Ausbildung der Ingenieurbauten," *Zeitschrift des Vereins deutscher Ingenieure*, LIII (July 31, 1909), pp. 1211–17, refers to Bötticher and his tradition (p. 1213).

16. "The form of the body is the mirror of its essence!
"Master it and the seal of the riddle is broken."

17. Ibid., p. 6.

18. G. Semper, *Über die bleiernen Schleudergeschosse der Alten und über zweckmässige Gestaltung der Wurfkörper im Allgemeinen* (Frankfurt a.M.: Verlag für Kunst und Wissenschaft, 1859), p. 1.

19. Ibid., pp. 1–5.

20. Ibid., p. 6.

21. Ibid., pp. 59–60. There is an engaging anecdote about the Fogg Library's copy of Semper's work on ancient lead shot. Inside the front cover is written in ink, "The first pages of this curious treatise are of importance. Semper was a man of genius, and his remarks on aesthetics, on the use of sections, ground plans, and outlines, and on the fundamental principles of Greek art are admirable. C[harles] E[liot] Norton. 1880."

22. Le Corbusier, *Towards a New Architecture* (London: The Architectural Press, 1946; first pub. 1923), pp. 101–02. Le Corbusier also speaks of the necessity of a standard for perfection; this he illustrates with photos and discussion of the Parthenon and a 1921 Delage automobile (p. 125). A similar linkage, but with characteristic irony about the modern situation, had already been made by Walther Rathenau: "an automobile is more important to him [the modern worker] than the Parthenon." From Rathenau, *Auf dem Fechtboden des Geistes* (Wiesbaden, 1953), p. 39.

23. Because "organic" has so often modified "architecture" to mean different things, I have used the rather awkward form "organismic" to mean "like, or resembling, an organism." Bötticher tended to see this in the individual building elements, and the Greek temple became a "mosaic of functionally expressive elements." Van de Velde had a stronger sense for continuities and the organism-like quality of the whole, characteristics that

were associated with Gothic and Baroque-Rococo architecture. Organism, the ideas behind *Tektonik*, energy, Gothic and Rococo precedent—all these and more are associated with one another, with a "Germanic essence," and with van de Velde in Karl Scheffler, "Henry van de Velde," *Zukunft*, XXXIII (1900), pp. 465–67.

24. G. Semper, *Der Stil in den technischen und tektonischen Künsten oder Praktische Aesthetik* (2 Vols., Munich: F. Bruckmann, 1878–79; first pub. 1860, 1863), 2nd ed., I, p. 9 (a full discussion of Semper would have to include his two other principal categories—*textile Kunst* and *keramische Kunst*) and parts 7–10.

25. Ibid., p. xlii.

26. Ibid., p. 9.

27. Ibid., II, pp. 341–42. Gustav Adolf Platz, *Die Baukunst der neuesten Zeit* (Berlin: Propyläen, 1927), pp. 132–34, continues Semper's division of architectural constructs—*Tektonik* referring to membered structures and now including iron and steel; *Stereotomie* referring to wall structures now including concrete.

28. F. Reuleaux (1829–1905), though especially noted for his very inventive studies in kinematics and machine construction, was a man of broad scientific and cultural interests. He and Semper were colleagues at the Polytechnic in Zurich (Semper, 1853–1871; Reuleaux 1856–ca.1866). On Reuleaux, see: H. Zopke, "Professor Franz Reuleaux," *Cassier's Magazine* (1896). The implications of Reuleaux's statements pass far beyond the naive early nineteenth-century conceptions of propriety in machine design exemplified by S. Clegg, *Architecture of Machinery* (London: Architectural Library, 1842), which concerns itself with such matters as the choice of the proper antique order for the static superstructure of a machine. The moving parts of machines were rarely forced into traditional forms (though Arnold Schürer has drawn my attention to a charming Doric piston for a steam engine in the Deutsches Museum, Munich), but only slowly, and through such men as Reuleaux, were machines fully recognized as dynamic mechanisms for the transformation of energy and therefore in need of a new and dynamic form language. The competition between traditional architectural forms and "dynamic" forms is a recurrent theme. Walter Gropius's Adler automobile of 1930 is still a static architectural concept in contrast to R. Buckminster Fuller's ground taxiing unit of 1933 (which curiously resembles Semper's aerodynamic shot [see fig. 11]). On the Gropius-Fuller comparison, see R. Banham, *Theory and Design in the First Machine Age* (London: Architectural Press, 1960), p. 304.

29. From F. Reuleaux, *Briefe aus Philadelphia* (Brunswick: F. Vieweg, 1877), translated and cited in F. Klemm, *A History of Western Technology* (New York: Scribners, 1959), pp. 326–7. S. Giedion, *Space, Time and Architecture* (Cambridge, Mass.: Harvard University Press, 1941), gives mention of Reuleaux's favorable impression of American tools at Philadelphia. For Reuleaux's understanding of a technological civilization, see his *Technology and Civilization* (Washington, D.C.: GPO, 1891).

30. Semper, *Der Stil* . . ., I, pp. 6–7.

31. Behrens, "Kunst und Technik," *Elektrotechnische Zeitschrift*, XXXI (June 2, 1910), pp. 554–555.

32. One exception to this statement is the AEG electric railroad passenger car attributed to Behrens by W. Franz, "Peter Behrens als Ingenieur-Architekt," *Dekorative Kunst*, XX (Feb. 1917), pp. 150–51. Both the title and the date indicate an assessment ten years after Behrens innovated in design for the AEG. There is no discussion of what part Behrens played in the design of the car. At any rate, it was not new to design a passenger car, and what is distinctively Behrens's work is encountered in his other design work.

33. J. A. Lux, *Das neue Kunstgewerbe in Deutschland* (Leipzig: Klinkhardt und Biermann, 1908), p. 248.

34. Dresden, Deutsche Werkstätten für Handwerkskunst, *Handgearbeitete Möbel* ([Dresden: Deutsche Werkstätten, c. 1908]), *passim*.

35. F. D. Klingender, *Art and the Industrial Revolution* (London: Carrington, 1947), chap. iii.

36. N. Pevsner, *Pioneers of Modern Design* (London: Penguin, 1960), 3rd ed., p. 26, gives special emphasis to Lewis F. Day (1845–1910) and John D. Sedding (1837–1891). In a personal communication, Prof. Edgar Kaufmann, Jr., emphasized the somewhat earlier A. W. N. Pugin (1812–1852) and Sir Henry Cole (1808–1882). See also S. Giedion, *Mechanization Takes Command* (New York: Oxford, 1948).

37. Christopher Dresser (1834–1904) was such a consultant to various producers of objects for domestic use. That position is applauded and termed "commercial designer" in Anon., "The Work of Christopher Dresser," *International Studio*, VI (Nov. 1898), pp. 104–14. The same article refers depreciatingly to the—presumably poor—designers within industry as "trade designers"; the terms would seem to be the English equivalent of the German *Fabrikzeichner*.

38. M. Armengaud, *The Practical Draughtsman's Book of Industrial Design* (New York: Stringer and Townsend, n.d.), indicates that in the mid-nineteenth century the term "industrial design" meant what we would call "mechanical drafting"—in both cases including some understanding of the technical problems involved.

39. On the Thonet industry, see *Michael Thonet* (Vienna: n.p., 1896), and now the catalogue of an excellent exhibition: Hans H. Buchwald, *Form from Process: The Thonet Chair* (Cambridge: Harvard University, Carpenter Center for the Visual Arts, 1967), which supplies a slightly more modest figure on the production of model No. 14: thirty million chairs between 1859 and 1920.

40. See Behrens's discussion of the engineer's pseudo-aesthetic in the material with note 8 above and the illustrations of AEG arc lamps (figs. 2–4).

41. Dohrn, *März*, III (Sept. 3, 1909), p. 372. Colin Eisler of the Institute of Fine Arts of New York University has drawn my attention to an article which indicates that the alliance of art and industry represented by the Behrens-AEG enterprise was also appreciated in the United States through a series of exhibitions in Newark, St. Louis, Chicago, Indianapolis, Cincinnati, and Pittsburgh: Anon., "Modern German Applied Arts," *Art and Progress*, III (May 1912), pp. 583–87. This traveling exhibition had been prepared by Karl Ernst Osthaus and the Deutsches Museum für Kunst in Handel und Gewerbe which operated out of the Folkwang Museum in Hagen. Prof. Edgar Kaufmann in-

forms me that photos and documentation of this exhibition still exist at Newark.
42. Behrens, "Professor Peter Behrens über Ästhetik in der Industrie," *AEG-Zeitung*, XI (June 1909), pp. 5–7, states that the "aesthetic improvement" of industrially produced utilitarian objects must rely upon simplification and good proportions.
43. This image is now well documented and illustrated in Buddensieg et al., *Industriekultur* (see end of note 3).

Figure Credits
2–16, 18–21 Courtesy the author.
1 From *Lotus International*, 12, September 1976.
2, 3 From *AEG Zeitung*, respectively in issues of May 1905 and May 1907, *Beilage*.
4 Courtesy AEG Photo-Archives, Frankfurt am Main and Berlin.
5–7, 16 Courtesy Dr. Franz Stoedtner, Düsseldorf.
8,17 Courtesy Foto Marburg.
9 Courtesy S. R. Gnamm, Munich.
10, 11 From G. Semper, *Über die bleiernen Schleudergeschosse der Alten* (Frankfurt am Main, 1859).
12 From *Linie und Form* (Krefeld: Kaiser Wilhelm Museum, 1904).
13 From R. Schmutzler, *Art Nouveau* (New York: Abrams, 1964).
14 Courtesy Klingspor-Museum, Offenbach am Main.
15 From F. Ahlers-Hestermann, *Stilwende* (Berlin: Gebr. Mann, 1956).
18 From U.S. Centennial Commission, International Exhibition 1876, *Reports and Awards Group XX*, F. A. Walker, ed. (Philadelphia, 1878).
19, 20 From *Michael Thonet* (Vienna, 1896).
21 From Hans H. Buchwald, *Form from Process—The Thonet Chair* (Cambridge, Mass.: Carpenter Center for the Visual Arts, 1967).