Martin Wagner: the work of building in the era of its technical reproduction

MICHAEL HELLGARDT*

What does an exhibition about Martin Wagner (1885–1957) mean for us today? Let us take the question of the rationalisation of house construction to which, as Ludovica Scarpa has shown, Wagner attached great significance [1]. On this issue Wagner sided less with the *Neues Bauen* ('New Building') of the 1920s, with its belief that social and political problems could be resolved by technical means, than with contemporary reformers in Vienna, England and Amsterdam who saw the problem from the opposite end and attached as much, if not more, significance to social questions as to technology [2]. The criticism in recent years by the public of the bankruptcy of modern architecture has a parallel in specialist theoretical debate, and it is appropriate to begin by giving an outline of the present stage of discussion.

The Modern Critique of Functionalism

As Adolf Behne at the time and, much more recently, Reyner Banham, Alan Colquhoun and Julus Posener have shown, modern architecture was full of contradiction and was less technologically orientated and less objective than it claimed [3]. Behind the declarations and programmes of modernism lay a symbolism—the 'machine aesthetic'—which, protestations to the contrary notwithstanding, had not rid itself of its classical and academic heritage.

Banham attributed the formal degeneration of modern architecture after 1945, not to the inadequacy of the concept of 'Technoform' as such, but, following Buckminster Fuller, to a spurious 'Technoform'. While acknowledging Banham's critique, Colquohoun and Carlo Argan pointed to the limitations of the concept, showing that 'Technoform', regardless of its symbolic references, was an unrealisable monstrosity [4]. The separation of technique and form by these theorists brought theory into direct contradiction with current design practice, as represented by postmodernism; for the latter is not based on a rational assessment of recent experience but rather has made a complete U-turn, making form dominant once again and making a bogeyman of technology. Nor do the images of 'Hi-Tech' solve the problem: they are simply promulgated, without rational justification, as one style among many.

On the same level we find the new symbolic orientation of postmodern architecture set out on a programmatic basis in Italy through the '*Tendenza*', the influence of which

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is to be seen throughout current architectural practice. In this regard, whether the provenance of the forms is classical, vernacular, modern, or technological is irrelevant. What is decisive is that technology is not seen as "belonging to architecture", as Aldo Rossi put it at the famous XVth *Triennale* in Milan [5]. Compared to earlier statements by Rossi, this verdict has somewhat rhetorical overtones and is undisturbed by theoretical qualms. Has Walter Benjamin and his analysis of 'The Work of Art in the Age of Mechnical Reproduction' been superseded [6]? Will buildings no longer be technically (re)produced? Has architecture become an island in the ocean of industry? This can hardly be the case. Despite all the lamentations since the 1920s about its technical backwardness, building production has become mechanised, even if remaining radically bound to human bodies [7]. And while conditions in building are quite distinct from those in the film industry (which was the specific object of Benjamin's analysis), nonetheless they affect the means for artistic production in much the same way.

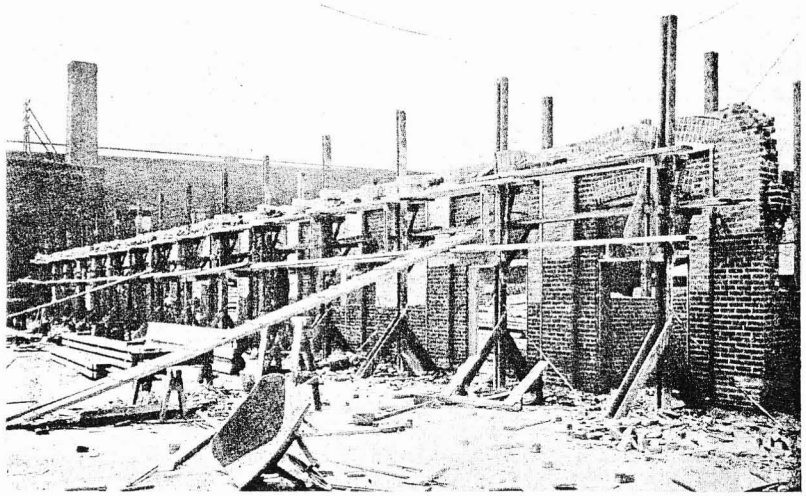

FIG. 1. The Gilbreth scaffolding in use.

In view of both the present state of theoretical discussion, and of the complacency of an approach to design that seeks to legitimate itself solely through form, we should approach modern architecture neither with condemnation nor with servile praise. Despite Bruno Taut's comment that Wagner was 'only an engineer' [8], Wagner was neither an aesthete nor a technocrat, but rather someone who cast a prophetic light over a darkened landscape. Seen from today's perspective, his statements reveal the one-dimensional and mechanistic conception of technology that was beginning to emerge with the experiments at Frankfurt, and they show what this conception would involve, as actually applied through the years of the post-war economic miracle up to the present day. It is not enough however to rest the matter there: we must take Wagner's statements not as self-evident truths but rather as invitations to look again at some unclarified issues. In doing so we must distinguish clearly between his programmatic statements and his built projects in the Berlin of the 1920s.

Wagner and the *Neues Bauen*

In the precarious state of the building industry after the First World War, Wagner called for a 'complete register of cost-reduction' in the areas of finance, technology and form [9]. Characteristic of his programme was complexity, with a resultant ambiguity that avoided the precipitate and inappropriate absolutising of individual factors. However, we can already detect an implication which is dangerous, both technologically and in its ahistorical determinism: the notion that monotony of form was a necessary presupposition of rationalisation, or, in other words, that rationalisation meant built-in monotony. This criticism of Wagner springs from the recognition of the autonomy of architecture made by contemporary theory, which holds that even in its technological aspects the design process is not 'causally' determined. On this issue Wagner is not distinguishable from the rest of the *Neues Bauen*, as for instance at Frankfurt. The elements shared in common by the programmes for the rationalisation of housing construction developed in Wagner's Berlin and Ernst May's Frankfurt were the *Großsiedlung* (large housing estate), the minimum floor-plan, and typification. This programme requires urgent revision from the point of view of today, without falling into the opposite position of Ruskin and Morris and making a bogeyman of technology.

The concept of the *Großsiedlung*, in whatever form it appears, is no longer tenable today. To that extent we are not much interested in formal differences between the Frankfurt and Berlin housing schemes. The large housing scheme destroys the city as it has evolved historically and creates a no-man's-land bereft of habitability. Experience of urban renewal has made this clear. On the other hand, the functionalist concept of 'type' and the minimum flat, even if today it is a few square metres larger, still remain the sacred cows of public housing. There are good reasons for this, in as much as public housing is still bound up with conditions of shortage and thereby with the supposed economic advantages of the minimum floor-plan and the corresponding housing 'type'.

If one looks at projects in Berlin realised under Wagner's direction, such as Britz, one finds that notwithstanding any difference in external forms there is no fundamental difference from the Frankfurt housing schemes, where the 'declination of typology' (in Tafuri's phrase) merely 'takes on different connotations' [10]. At the level of programmatic intentions, however, things are very different. Two points immediately arise: the critique of the minimum floor-plan and the pragmatic attitude to technical rationalisation found in Berlin. Wagner and Taut held that the minimalisation of the floor area was an expedient of questionable value and should be tested against other possible means for reducing building costs, such as organisational economies, public funding, and the integration of the roles of planner, client and builder through building guilds or co-operatives [11]. From this arose their critical attitude towards those technological experiments that proceeded irrespective of the availability of materials and methods and that ignored the obstacle to technical innovation constituted by the market mechanism [12]. But the floor-plans that resulted in Berlin were hardly affected by these ideas, and in terms of floor area were only marginally different from *Neues Bauen* apartments elsewhere. It certainly appeared as if Wagner's concept of rationalisation differed from the Frankfurt concept only in being less fixated on design intentions than on the needs of the building industry [13]: his proposals for serial production, related as they were to the concept of the *Großsiedlung*, were based on a universalising and unilateral concept of technology similar to that held in

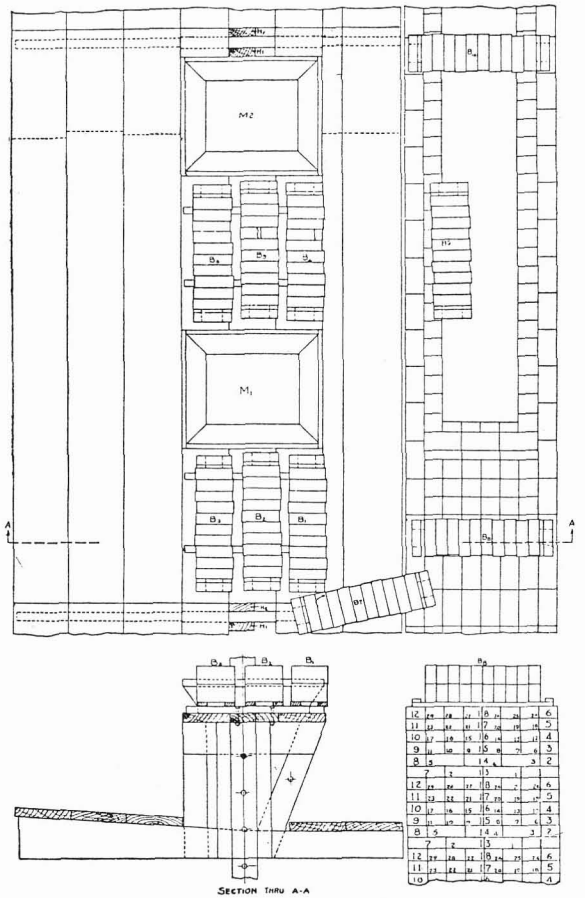

FIG. 2. Distribution of the mortar- and brick-planks on the Gilbreth scaffolding.

Frankfurt. In all these attempts to solve the problem at the generalised economic level, Wagner failed to see the social assumptions and consequences of the rationalisation that he called for, such as the monopolistic role of the general contractor or the inertial effects of the machinery for duplicating types called for in his scheme [14].

Nonetheless, Wagner differed from the Frankfurt theorists in important respects regarding the concept of 'type'; as witness the polemic against the 'common denominator' employed in Alexander Klein's work on typology [15], or the Soviet-inspired proposals for collectivisation of housing which Bruno Taut represented symbolically in the Britz scheme [16]. Compared to the open row form of the Frankfurt schemes, the overall form of Britz is still self-consciously in the tradition of Lindenhof (i.e. inward-looking and cut off from the rest of the city), and is removed from the notion of a technologically-determined form both by its closed quality and by its symmetry. There

is an unequivocal contradiction here in relation to the complexity of the programme and theory. But there is also the question of the internal space of the floor-plan understood as a unit of reproduction. The type-designs produced by the Wagner–Taut collaboration, examined solely on the basis of these superficially distinguishable 'connotations' follow the basic forms current at that time. Above all, they illustrate that universal hallmark of *Neues Bauen* typology, which was called for with almost ritual emphasis by Wagner: uniformity [17]. Yet, taking him at his word, Wagner's critique of the minimum floor-plan suggests what his socially-oriented concept of technology confirms: that despite all Wagner's technocratic tendencies, he and Taut had a concept of 'type' and a consequent structure of 'type' opposed to those of the *Neues Bauen*. To explore the implications of this is the aim of this article.

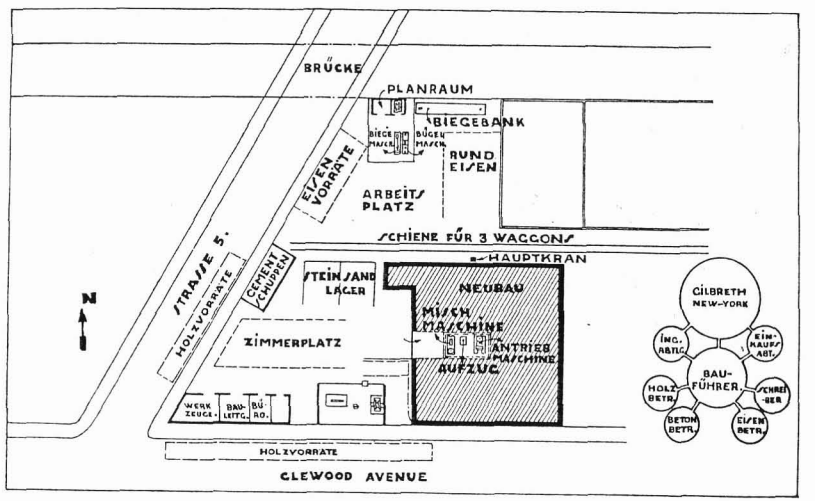

FIG. 3. Martin Wagner, ideal site organisation (1925), designed after his trip to America.

The Fiction of the Minimum Floor-plan

Let us start with the simplest issue, the dimensions of the minimum floor-plan, and then proceed to the more complex issue of the concept of 'type'. One argument still current in the profession, which even Wagner and Taut used to support their critique of the mechanistic minimalisation of floor-space, is that the cost per square metre of floor-space does not rise proportionately with the size of the dwelling [18]. Costs for the infrastructure of the dwelling are in principle the same for all types of dwelling and change only slightly with size; overall costs for the infrastructure of the block work out proportionately greater for small apartments. It is well known that large apartments are more cost-favourable relative to surface area; nonetheless, those poor minimalised sheds were built for decades, which only confirms, now as then, Zille's famous comment: "You can kill a man with a house as easily as with an axe". The relation between dwelling-size and cost cannot be explained merely on a quantitative basis: it

also depends on the 'type' in use in each case. Furthermore, the false economies of the minimum floor-plan in the end have to be paid for by the tenant. It seems that the allure of the concept of the minimum floor-plan has stopped it from being tested on any real economic criteria.

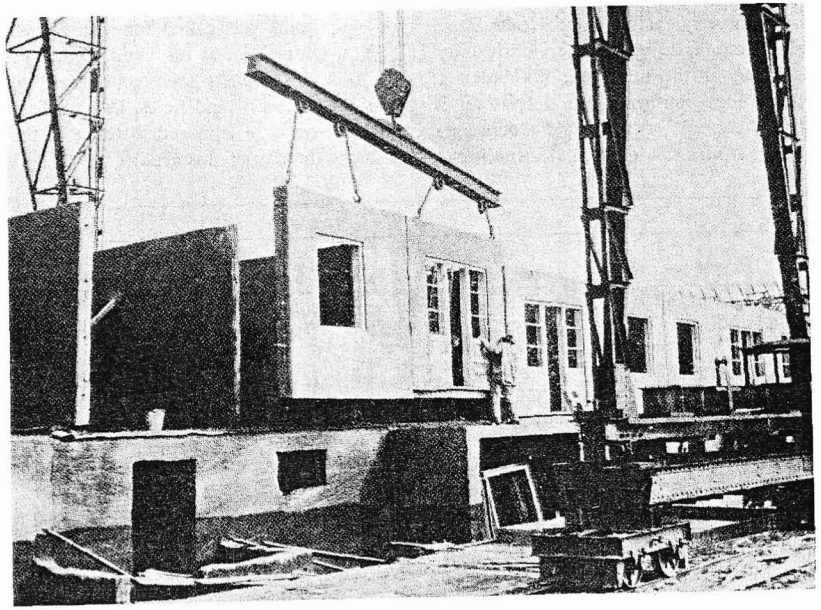

FIG. 4. Occident reinforced concrete construction system: hoisting of the wall panels by crane.

To overcome this, it is useful to divide the cost of building the dwelling into three categories (leaving aside the question of planning and municipal costs). First, there are the structural costs belonging to the dwelling *per se*: internal partitions, heating system, internal plumbing, etc. Then there are the structural costs belonging to the building block as a whole: foundation, roof, common parts of the building, provision of communal services, etc. Finally there are the costs of the useable floor space of the individual dwelling. These costs can be computed for dwellings with varying numbers of rooms.

In a recent (1982) project for municipal dwellings in the Netherlands, my collaborator W. Klinkenbijl and I carried out such a calculation (Table I). This showed that a large increase in useable floor space was accompanied by a relatively much smaller increase in cost: a 100% increase in useable floor space meant an increase in rent of only 50%.

In the smallest (two-room) dwellings the structural costs are about the same as the costs for useable floor space; in the largest (five-room) dwellings these structural costs represent only about 80% of the latter. In other words, for an individual household a rent increase of 5–10% secures an increase of 7–9m² in space. The official method of

TABLE I. Breakdown of unit costs of the dwelling

1 No. of rooms per dwelling	2 Net useable floor area (m²)	3 Floor space costs of the dwelling	4 Internal costs of the dwelling	5 Common costs of the dwelling	6 Site costs	7 Overhead costs and VAT	8 Rent (gildrs)
5	86.9	27,802	22,136	18,702	78,917	99,599	436
4	77.9	25,011	22,136	16,961	73,682	92,941	415
3.5	67.9	22,869	21,429	15,041	68,181	85,964	379
3	58.7	19,403	17,383	13,694	57,942	72,960	361
2.5	49.7	17,664	17,383	11,952	53,921	67,852	331
2	43.7	17,061	17,383	10,792	51,885	65,266	313

calculating rents used in the Netherlands would show even smaller rent increases per unit increase in floor area.

The mere figures show nothing new. The function of our project as a model was that we directed it to the cost advantages of a relatively large apartment. This was not done by enlarging all the buildings; prevailing conditions excluded that. Rather, by designing the project in the way already suggested (including the provision of service-free and therefore movable walls), we made it possible (within present regulations) to convert one of the five-room dwellings into a single open-plan dwelling, or into two-, three- or four-room dwellings with correspondingly larger rooms. The opportunity is then given to the users, in an allocation procedure, to choose a house corresponding to their needs and possibilities (provided no extremes are permitted, that is, no one or two individuals are allowed to rent a five-room house) [19]. Naturally enough, many small households chose larger houses, which are then transformed by the removal of partition walls into two- or three-roomed houses. This simple and obvious model reduces the functionalist minimum floor-plan idea *ad absurdum*. Rent fluctuations, which are tied exactly to that increased expenditure per square metre which is necessary to remove from the houses that crampedness for which subsidised housing is notorious, stand in no relation to those economic barriers (such as property speculation) which prevent access to an economically viable house to large sections of the population, and which are, as is well known, only very loosely related to matters of building technology.

In view of this, one questions how generations of specialists, architects and planning authorities could have been taken in by the fiction of the minimum floor-plan, not to mention the users who have had to put up with it. The answer can lie only in the fixation that we have already examined on the forms and ideals of the functionalist concept of 'type'.

The root of the question is the reproducible unit. The minimum floor-plan, that is to say, the house-form ('type') classified according to dwelling-size on the basis of minimalisation, has meaning as a system only if it is repeated stereotypically. As soon as this dogma is broken, the way is open to an endless spectrum of mixed and intermediate forms, which functions chaotically at a first, purely geometrical, glance, and which seems in its multiplicity not to be technically reproducible. The suggestive effect of immediately visible order, the imputation that the external appearance should be the same as the reality, produces the functionalist concept of 'type' and the related simple assumption that the production-unit and the use-unit must be identical.

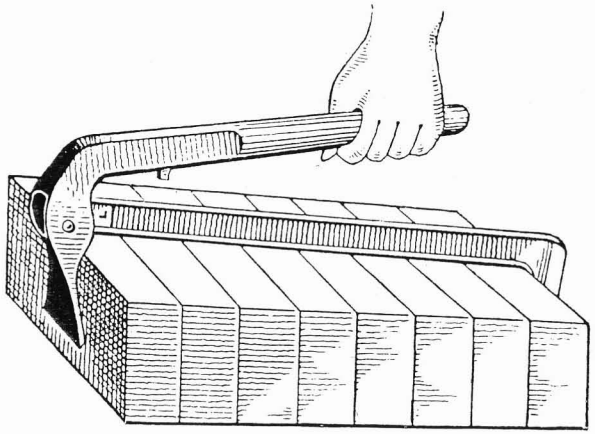

FIG. 5. 'Tool to lift several bricks in one movement': illustration used by Martin Wagner in 1918.

Dwellings, however, are not produced or reproduced piecemeal, excepting the detached house, which is not what we are talking about here. It is also easy to understand that dwellings are not used in those stereotyped ways which the concept of 'type' takes for granted: such a sterotyped dwelling-form makes real, unalienated living impossible. The critique of this has been articulated in various respects and can easily be carried out on the technical level, despite all the moralists and economists who have told of the supposed economic necessity for the monotony of the type, and in opposition to the pure formalists who say that architecture and life are superior to technical constraints.

Tafuri and the 1920s

The critique also has a theoretical basis, and this focuses on Walter Benjamin's concept of the technical reproducibility of units under industrial conditions. It is the merit of the authors quoted at the outset to have uncovered the aesthetic dimension of a technological gesture which underlies the functionalist concept of 'type'. It is also their merit to have made a new topic out of the relations between aesthetic and technical conditions. By contrast, Manfredo Tafuri and others [20], in writing on the Weimar period, have taken at face value the slogans of the 1920s, to which belong not least the 'bluff' of the identification of the production-type and the use-type. Subsequent research has mantained Tafuri's position rather than put it in question [21]. Starting from this situation, I will now develop the theoretical level and begin with the 'technical balance'.

Working in the climate of the 1960s, Tafuri made a new topic out of the political dimension of intellectual work in the realm of building, including social-democratic politics and municipal government in the 'red' centres of Frankfurt, Berlin and

Vienna [22]. For Tafuri, the consequence of capitalist urban growth was that architects were "deprived of certain tasks", out of which situation, more or less automatically, the "drama of architecture today results": architecture is pressed to "become pure architecture" again [23]. This conclusion became the apologia (attacked by Joseph Rykwert [24]) for architects who concentrated wholly on form. It neglects alike the problems thrown up by Argan and Colquhoun, and the mechanisms of technical reproduction itself, which, on the basis of the typology of the Frankfurt and Berlin housing schemes, Tafuri takes for granted.

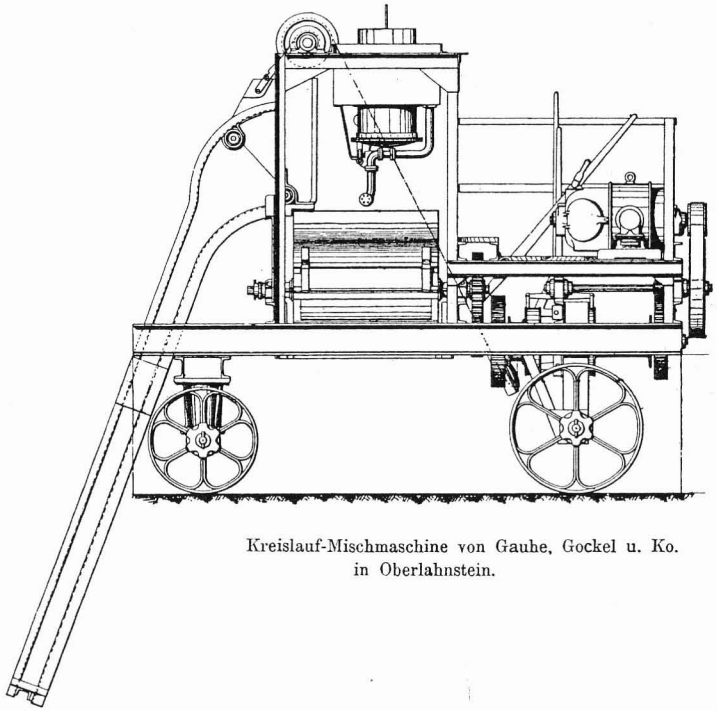

FIG. 6. Gauhe, Gockel & Co.: rotating concrete mixer (1926).

Furthermore, Tafuri's discovery of the "declination of the typology of the housing scheme" rests on the reproduction of the mistaken assumption that the identity of production-units and use-units is perceivable in geometric terms. Almost incidentally, Tafuri links the 'type' of the Weimar housing schemes, Benjamin's concept of technical reproducibility and the image of standardised rationality presented by dance routines of the 1920s, as elaborated in Kracauer's *Ornament der Masse* [25]). The link, however, remains remarkably indeterminate. Tafuri certainly points to the ineffectiveness in real terms, at the end of the era of the Frankfurt housing programme, of the ideal of rationalisation geared to the assembly-line production of housing-types; he also demonstrates (as Wagner and Taut well knew) that this rationalisation was unable to

reduce building costs, but he does not develop the point. Instead he just leaves it there, along with his analogy between the sterotyped form of the housing scheme and that of the dance girls performing at the Berlin *Admiralspalast*. Tafuri says that the Tiller-girls "celebrate in playful fashion the superiority of scientific work-organisation". He finds in them the same *Zeitgeist* as in the housing schemes: "the mass of the same". Tafuri ignores the question of floor-plans and the relationship of interior to exterior, as if the city were an object in an exhibition or a cabaret act. Yet, as Tafuri acknowledges, this discrepancy between reality and the assertion of a 'rationalised' reality is crucial to Kracauer's analysis. For Kracauer the *Ornament der Masse* is not an unquestionable standard, which plainly contains rationality as a metaphor, but the abstract, insubstantial and subdivided rationality of capitalist production and cultural enterprise, which does not "take account of the human being" and which is a barrier to any other kind of rationality because of its deceptiveness.

Tafuri abides by that form of capitalist rationality, which he himself has styled 'celebration', but which Kracauer criticises for containing not too much but too little rationality. Here Tafuri comes into contradiction not only with that other, actual rationality, but also with his own form of rationality. In the introductory chapter of his analysis of the Frankfurt and Berlin housing schemes, he writes (following the approach put forward by Carlo Ginzburg) of locating the 'historical project' on two levels, one manifest, the other hidden:

> "Can one write the history of such projects [from the realm of architectural signs] without taking them out of that realm, without giving up the perspective of history itself and without asking what provides their justification for existence? Is it necessary to remember in this context that the universality of capitalist relations of production is both a condition of stability and of disruption, and to remember that the 'secret of the commodity' which lies at the heart of the reproduction of these relations at the same time shatters and fragments them?" [26].

But by remaining committed to the functionalist 'type' in his own rationalisation, Tafuri reproduces just that confusion of image and reality which he here rejects as a programme for the 'historical project'.

Ludovica Scarpa takes up Tafuri's reference to Kracauer in her book on Martin Wagner. But albeit only incidentally she goes further, in that she treats of that confusion of appearance and reality which is pointed to in Kracauer's analysis. Wagner himself implicitly admitted that the scheme at Britz was not rational in terms of its declared aims, for example, in terms of cost-reduction. Britz was, in fact, an image, a projected rationality, in short, a proposition; it was the projection of a community at peace, which lived in the Britz Horseshoe "far from any sense of the contradictory nature of society" [27]. The rationality and historicity which underlies those images forcibly imposes on the actual performance of building production and on real society an abstract rationality, whenever this kind of rationality is identified with the *Ornament der Masse*, since the latter is an already alienated rationality. That is the content of the social-democratic rationality of the reproduction of the 'type' and its declined form: they rest on the confusion of image and imaged.

Building Production and the Concept of Technical Reproduction

Here we reach the crux of the question. It is not enough just to say, "Here is the unit

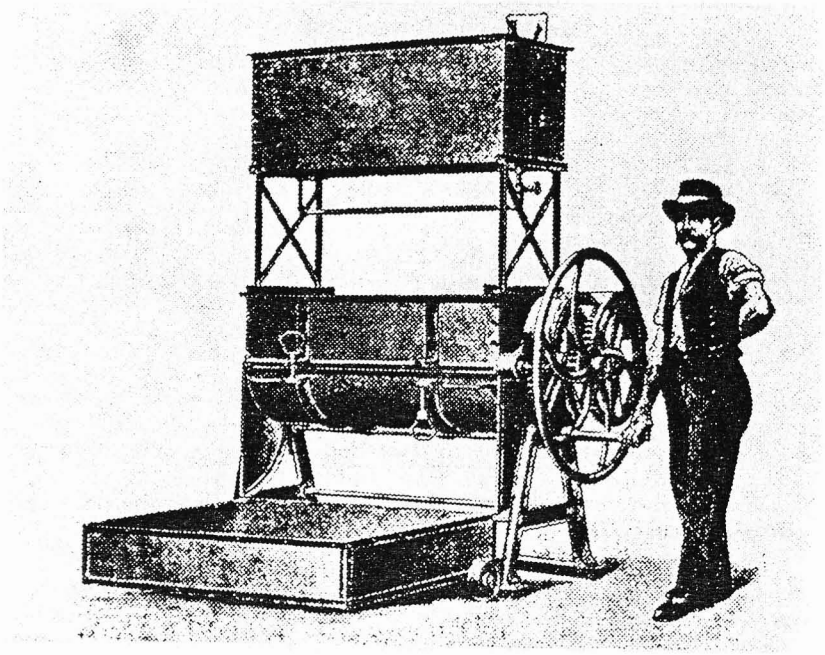

FIG. 7. The first barrel concrete mixer: the hand-powered Tietze machine (1870).

of use (the apartment), and this will be multiplied". It is readily observable on any building-site that the apartment will not be (re)produced there piecemeal, like stamped-out lettering, cast cooking-pots or mould-made buttons. In building we encounter a palette of diversified technology in which the different elements are produced, each in particular forms, rhythms and units of (re)production. Out of these specific conditions for the production of housing, comes the 'technical balance of the apartment', which is arrived at by analysis of the building work in the various technologies included in its production. Does a mechanical digger excavate an individual pit for every apartment? Of course not: yet this item accounts for a significant part of the 'balance of the apartment', the confrontation between 'what you get' and 'what you pay'. Much of this is independent of the form of the apartment itself: the strip-foundations, floor areas, wall surfaces, concrete casting units, external walls, etc. The form adopted in any particular design certainly conditions the repetitive nature of the different production performances on-site, but the overall design and the frequency of use of any one apartment unit are by no means the same. A small number of apartment plans of a 'form-active' configuration pose more problems for technical repetition than a large number of apartment plans of a 'form-passive' sort.

In contradistinction to these aspects which are unrelated to the form of the apartment, there is one part of the 'technical balance' which is largely determined by the apartment. Everyone involved in building knows that the relationship between the plant (plumbing, electrical services, etc.) and the load-bearing superstructure is crucial. The plant is usually reproduced on site for each building, although this has

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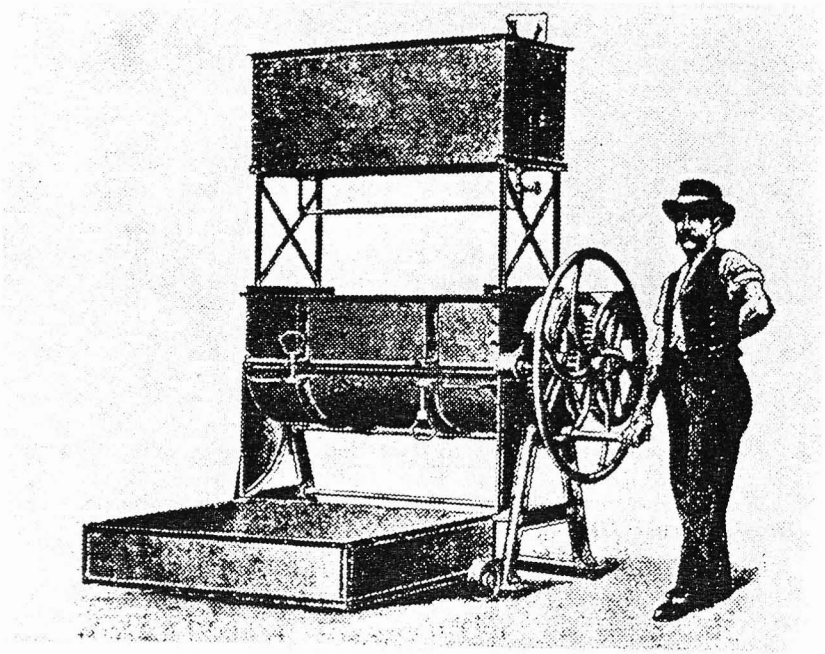

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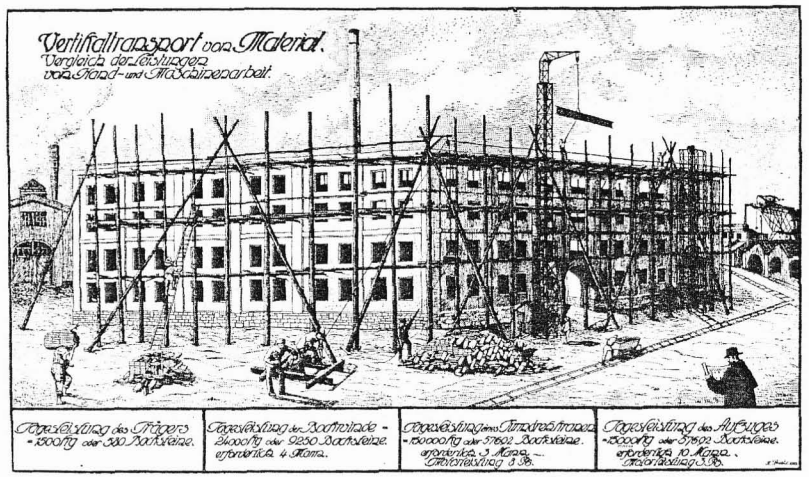

FIG. 8. Comparison between manual and mechanised methods for the vertical movement of materials (1923).

changed to some extent with prefabrication. In the eyes of plant-installers and their supervising engineers the apartment and the apartment-block is merely the dressing for pipes and ducts. It is their privilege to put forward this 'dressing-theory', but should it, therefore, be applied to the apartment as such? The load-bearing structure (consisting of walls, floors, columns and beams) is produced in technologically-defined units such as spans and grids, which are independent of the individual dwelling. This technologically-defined structure is disturbed by the plant, which is governed by different factors. A time-exposure of individual production run-offs, of the interrelated disturbance of production cycles (about which Wagner warned) [28] shows the proportion of the production time of the apartment that is determined by the apartment-unit or type. The 'technical balance' shows that only about a third of the building cost is reproduced apartment-wise: that is, the greater part of the plant; about half of the load-bearing superstructure; but the foundations, external walls and roof only in very small measure, and the overall site costs and general overheads even less. This low proportion of work related to the apartment-type can, however, so considerably influence the result, that one must ask oneself whether architects should not have remained faithful to the apartment-type in their practice. The obstructive effect involved is not of a material or technical nature: it arises out of the pre-production management production and control. It results from an autonomous rationality of the non-material production-performances. Here we see that labour processes embed human traces, and on this point it seems to me necessary to make a flashback to Walter Benjamin.

When we apply Benjamin's concept of technical reproducibility to housing production, we are not so much concerned with the fact that something is being (re)produced—'The work of art has always at root been reproducible', says Benjamin—but more with the question of how it is (re)produced. Both the production and perception of the work of art changed with the change in technical reproduction: the

conditions of perception are no longer recognisable behind the units to be reproduced, rather they are barricaded in by them. Technology itself, as it actually exists without the costume of a dictated rationality, teaches us what is to be (re)produced and how. If we want to recognise these real units and forms, we must use a specific kind of perception. Benjamin analysed this in the case of film. The film reproduces *The Magic Flute*, for example, not just as if it were being performed on stage. It shifts the angle of vision, the acoustics, the sequences and locations so much that they acquire other forms, and through this arises a shift of meaning: there is no content without form. The same shift characterises the production-process of film. A shift of meaning arises in the 'making' and even the meaning itself will be, in part, established by the particular qualities of the technical apparatus. In sum, the film establishes its own laws, which reflect back on the contents, and lend them new, particular forms and modes of behaviour, production and perception. The illusion-effect of the entertainment industry, of which the Tillergirls are an example, is bound up with supply and demand and moreover attempts to abolish the shift of form and content and the distance which automatically results, and to evade the uncertainty of the market. On these grounds Benjamin rejects as commonplace the attitude which condemns technical reproducibility as such. Just on account of its technical reproducibility, in Benjamin's positive inversion of the concept, film creates 'distance' and 'diversion', preconceived meanings, opinions, clichés and illusions.

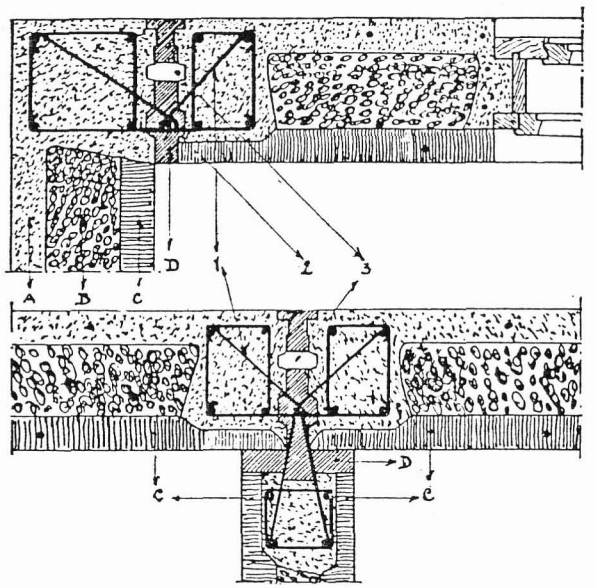

FIG. 9. Occident reinforced concrete construction system: wall section, showing outer skin of gravel-aggregate, central filling of cinder and inner skin of cinder-aggregate.

The comparison with film shows the impossibility of maintaining the element of preconceived meaning under conditions of technical (re)producibility. The slogan

'better living', the pre-packaged promises of happiness offered by architectural projects, and a housing policy orientated to the institutionalised forms of 'subsidised happiness': all these are part of a slick comedy which corresponds neither to the life that takes place in that housing nor to the conditions of its technical (re)producibility.

Let us stick to the subject of rationalisation. Housing is without doubt technically (re)produced. While buildings resemble films in being produced in sections that are later assembled, unlike films they are not reproduced with projectors. Such a technique does not yet exist! And yet the history of building has long held to the fiction of a universal assembly-line production, after the pattern of other consumer goods. If we do not accept the technocratic fiction that locality can be eliminated, then we must state that a building is always tied to a particular location. If we look at the issue of time, we find that in both use and production a building resembles a film, as Dieter Hoffmann-Axthelm showed in the case of Kreuzberg [29]. Every user concerned with a building uses it in such a way that it runs counter to the official interpretation of history, in which fashion it itself becomes part of history and so participates in its production.

Let us come back to the human component of work. It may be more rational from the point of view of profitability today to reproduce housing-types. However, the organisational forms arising out of this require the behaviour of Pavlov's dogs. The synthetic production-unit of the apartment seen in terms of actual productive labour, is an abstract statistical mean, which eliminates the perception-component of both production-process and product: it is a fictive administrative unit, not a unit of production. To give one example: whether an assembly worker always puts up the frame for the walls in exactly the same rhythm and at exactly the same location, or at irregular rhythms and locations, is of little importance for the actual labour process. But if we exclude from the labour process every conceptual element, then the administrative average becomes decisive. The distinction between administered and actual reality can be situated in the realm of housing too. In so far as Taylor and Ford wished to achieve habitual conditions (i.e. the Pavlov reflex) they generated a logic which, to quote Kracauer, "doesn't take account of the human".

The objection to both the functionalist concept of the 'type', and to the post-modernist concept opposed to it, is that neither distinguishes between type and

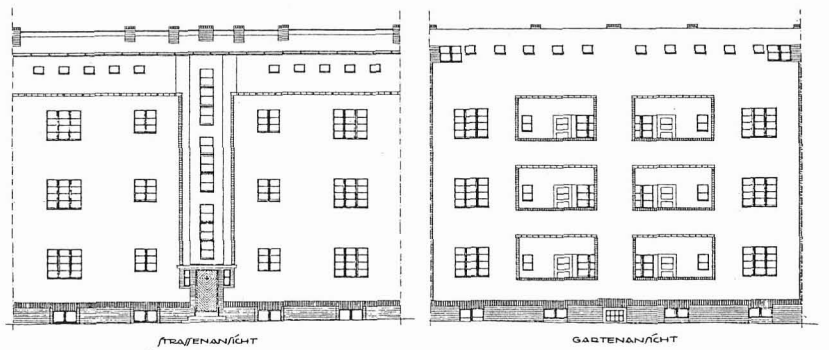

FIG. 10. *Großsiedlung* Britz, Berlin ('Horseshoe'): street and garden elevations of section for six families, Type II, by Bruno Taut.

typification [30]. As Foucault has shown in the realm of language [31], the 'identical-repetitive' model is an artificial construct which was first put forward during the Enlightenment. Before then, representations or expressions could only be similar to their model. That becomes clear if one tries to copy exactly a musical or drawn figure: it is infinitely easier to reproduce similar figures. Copying demands constructional aids, and on these aids depends the kind of typification which associates itself with the 'type' of the similar, robbing it of its substance, of its conditions of reproduction, of its history, and draining away the sustenance from it. The 'declination of typology of the housing-scheme' in Frankfurt and Berlin rests not on the reproduction-mechanism of the 'type', itself enclosed in the laws of production, but on typification, which defines the same thing on a foundation arbitrarily in relation to production. The typological variation of the 'type' as reproduced in "calculated monotony" (Tafuri), and the relation of the type to the overall form of the housing scheme, show at Britz quite other connotations to those of Frankfurt; yet both are part of the same process of typification and only expose the 'type' in its sameness.

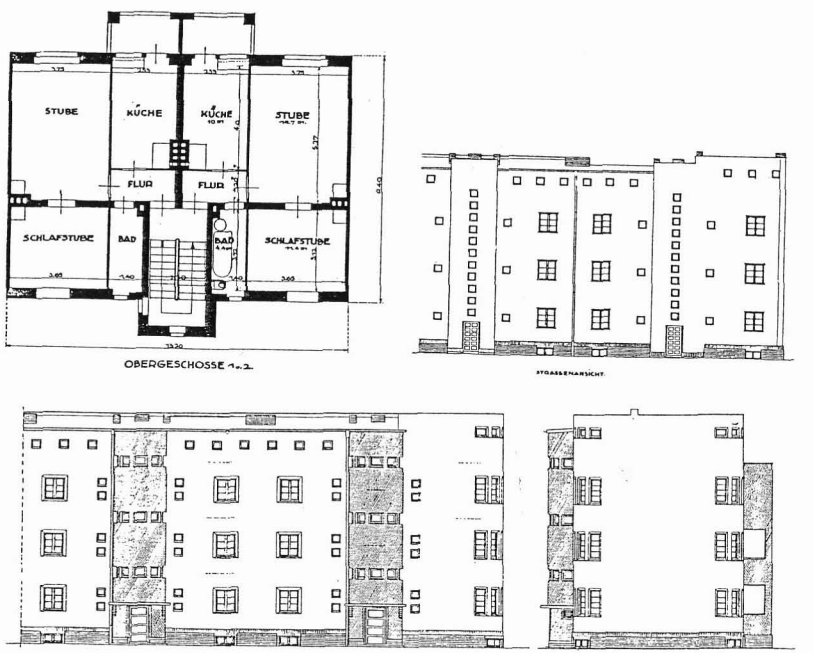

FIG. 11. *Großsiedlung* Britz, Berlin ('Horseshoe'): floor plan and elevation of section for six families, Type I, by Bruno Taut; street elevation of Type I, by Martin Wagner.

This process of typification also lies at the root of the ostentatiously sterotyped projects of Aldo Rossi and Oswald Mathias Unger, and belongs really where it

originated: in feudal relations. If we look at Frederick the Great's Prussia, for example the typification at Potsdam as recorded by Friedrich Mielke, we find exactly the same 'declination of typology', apparently largely the work of the king himself [32]. The king and his advisers were influenced both by imported models (Palladianism from England, Italy and the Netherlands) and by the Enlightenment. Enlightenment, however, is a double-edged weapon: "It entangles itself with every step deeper into mythology", said Adorno and Horkheimer [33]. The Enlightenment turned itself against absolute arbitrariness—also in architecture—but at the same time it defined the method for the creation of identical subjects who are again subjected to the myth of an absolute objectivity and ratio. The 'type' has its roots here. The forms of mass accommodation (compare Foucault's analysis of 'The Panopticon' [34]), which were conceptualised precisely in the name of the ruling rationality by means of separation and individualisation, have their origins here and not in the nineteenth century which cultivated these forms but did not originate them. Today, when the idea of universal objectivity has disappeared (to say nothing of the bankruptcy of universal technological standards in building), these forms of the 'type' belong to the scrapyard of history.

From the '*Modulo-oggetto*' to the '*modulo-misura*'*

In this regard it is useful to draw on the distinction made by Argan in relation to the industralisation of buildings, between the '*modulo-oggetto*' and the '*modulo-misura*' [35]. For Argan the '*modulo-misura*' is the formal standard, based on the rule-system of classical architecture and the specialisation and academicism which followed in its wake. However, the industrial standard is not a 'type' of form, but a 'type' of the object, thus of the '*modulo-oggetto*'. It has its origin not in the passive state of contemplation, but arises out of action and out of the real object, which has itself arisen out of the development of technique and function [36]. "The great discovery of modern architecture," writes Argan, "is the replacement of the '*modulo-misura*' by the '*modulo-oggetto*'." With that the circle of the questions raised by Banham, Colquhoun and Posener is closed. According to Argan, the supersession of the '*modulo-misura*' by the '*modulo-oggetto*' took place in three stages.

> The first phase is that of repetition and the depersonalisation of the motivating forces and formal performances of handicrafts: it is this phase which determines the crisis in handicrafts, and which calls forth the reactions of utopian socialism and the polemics of Ruskin and Morris. The second phase is that which assimilates into understanding the rational and scientific quality of mechanical processes, which concedes that there can be no beauty outside of rationality, for there can be no ideality outside of rationality, and which therefore tends to link itself to art, but only on condition that this art is purely rational.

Finally, the third phase, "arises out of the fundamental transformation which the idea of science and with it the idea of human rationality has brought about in recent years" [37].

* Literally, 'object-standard' and 'dimension-standard'.

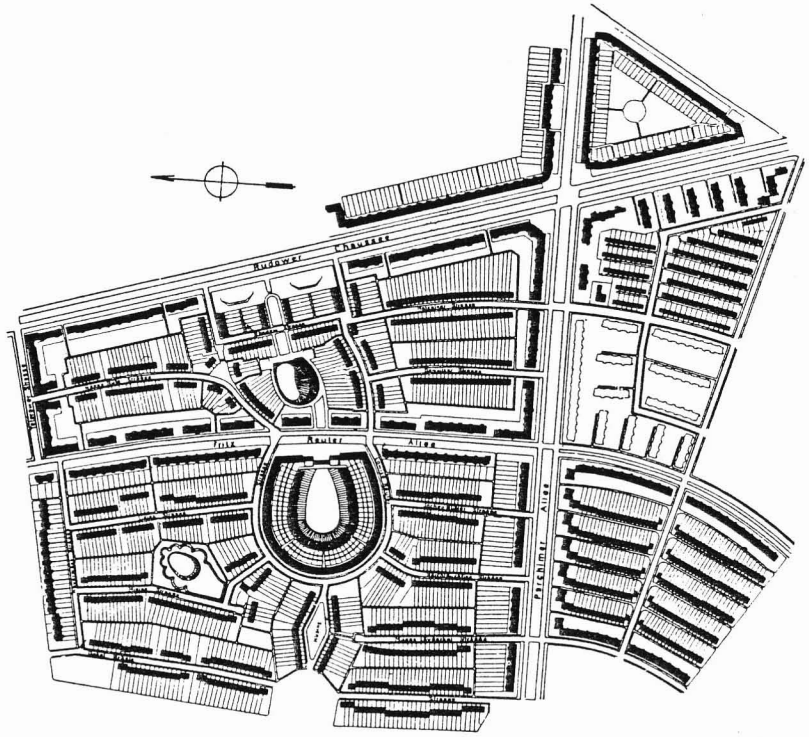

FIG. 12. Plan for Britz, Berlin (1929), with the 'Horseshoe' *Siedlung* in the centre.

The housing schemes of the 1920s belonged to the second phase, during which function, material and technique were already acknowledged, but which still held fast to the idea of material and formal rationality, called 'beauty', and which still held to the idea of a universal and timeless rationality. Today this idea has collapsed. Argan states as much, but he does not draw the conclusion that architecture should become 'pure' or self-referring, and he does not predict the end of rationality as such. He points to another rationality freed alike from the boundaries of the '*modulo-oggetto*' and of the '*modulo-misura*', which on account of the development of technology and of the perspectives of an enlightened or democratic public had become a fetter. In its concrete actuality lay its multiplicity of meaning, its freedom from hard and fast formal rules and from the boundless, one could almost say, ritualised, repetition compulsion of a mechanical rationality and of the '*modulo-misura*'. The '*modulo-oggetto*' provides—under the control of a democratised public—a new concept of space, a new typology and morphology, a phenomenology of production [38], which is not to be found in Euclidean concepts and even less in those of classical perspective or in concepts of one-dimensionally understood function. For the functions of space embraced by the '*modulo-oggetto*' are complex; they have their own phenomenology,

which cannot be grasped by means of general formulae, and which can only be expressed in the fourth and at the same time 'always-local' space-time dimension what Argan calls the 'absolute present'. Given the assumption of a socially adjusted production, design for industry in its complexity is not characterised by lack of spontaneity, by the lack of aesthetic qualities or by slavishly reproductive relationships of production; on the contrary, it assumes "recourse to intuitive processes". The alternatives do not ring out as—'Art *or* Industry', but *both* or *neither* [39]. Put another way, as the concept of technology is dehistoricised, it becomes itself a myth, the kind of myth which is played out every day, in building-production as well. That is the lesson which we can learn from the enquiry into the 'blind spot' in the concept of technological rationality during the 1920s. The failure of those years points to both the necessity for, and the liberating qualities of, a new technological rationality which has freed itself from the shackles of its determinist heritage.

Correspondence: Michael Hellgardt, Prinsengracht 151, NL-1015 DR Amsterdam, The Netherlands.

References

[1] L. Scarpa, *Martin Wagner und Berlin* (Brunswick, 1985), p. 18. I must thank L. Scarpa and M. Kieren for suggestions about Wagner's work and for making available to me Wagner's writings on rationalisation.

[2] Particularly A. Kepler under whose influence the 'betondorp' was raised as a technological experiment. See. E. Ottens, *Ik Moet Naar Een Kleiner Woning Omzien: 125 Jaar Sociale Woningbouw in Amsterdam* (Amsterdam, 1975). Wagner states that cast concrete panels arrived in Germany from America via Holland and were first used in Berlin by the Dutch firm Occident: see M. Wagner, 'Großsiedlungen, der Weg zur Rationalisierung des Wohnungsbaus', *Wohnungswirtschaft*, 11–14 (1926), p. 109. E. May also mentions Dutch experience in *Das Neue Frankfurt* (Frankfurt, 1926), p. 95.

[3] A. Behne, *Der Moderne Zweckbau* (1923; reprinted Berlin, 1964), especially section 3; R. Banham, *Theory and Design in the First Machine Age* (1960), especially the conclusion, 'Functionalism and Technology'; A. Colquhoun, *Essays in Architectural Criticism* (New York, 1981); J. Posener, *From Schinkel to the Bauhaus* (1972).

[4] See 'Typology and Design Method', in Colquhoun, *Essays*, pp. 43–50. A summary of the controversy with Banham can be found in Frampton's preface, pp. 1–10.

[5] *Architectura razionale* (Milano, 1973). See the introduction by A. Rossi.

[6] See. W. Benjamin, *Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit* (Frankfurt, 1963).

[7] J. Janssen, 'Das Baugewerbe—ein rückständiger Wirtschaftsweig?', in W. Richter, ed. *Bauarbeit in der Bundesrepublik* (Cologne, 1981).

[8] B. Miller-Lane, *Architettura e politica in Germania 1918–1945* (Rome, 1973), p. 132 (English original, *Architecture and Politics in Germany 1918–1945* (Cambridge, Mass., 1968).

[9] M. Wagner, 'Baukostenverbilligung im Kleinwohnungsbau', in *Ein Programm für die Übergangswirtschaft im Wohnungswesen* (Deutscher Verein für Wohnungsreform, 1918), pp. 69–84; M. Wagner, 'Neue Bauwirtschaft. Ein Beitrag zur Verbilligung der Baukosten im Wohnungsbau', *Deutscher Wohnungsausschuß, Schriften* (Berlin, 1918).

[10] M. Tafuri, *La Sfera e il labirinto* (Turin, 1980), p. 267.

[11] M. Wagner, *Die Sozialisierung der Baubetriebe* (Berlin, 1919). For Wagner's critique of the minimalised apartment see 'Minimalwohnungen', *Wohnungswirtschaft*, 13 (1930), p. 247; and for Taut see F. Bollerey, K. Hartmann, 'Bruno Taut. Vom phantastischen Ästheten zum ästhetischen Sozial(ideal)isten', in *Bruno Taut 1918–1938. Ausstellungkatalog der Akademie der Künste* (Berlin, 1980), pp. 15–85.

[12] See Taut's essay 'Gegen den Strom', in *Wohnungswirtschaft*, 17 (1930), reprinted in *Bruno Taut*, p. 215 and Bollerey and Hartmann, 'Bruno Taut'. For Wagner see among others 'Großsiedlungen' (1926), and for his ideas about the "elimination of the middle-man", put forward in a meeting of the ADGB (association of German unions), see L. Scarpa, *Siedlungen der zwanziger Jahre heute. Vier Berliner Grioßsiedlungen 1924–1984* (Berlin, 1984), pp. 21–26.

[13] Especially important in the German-speaking world was the research on management in the construction industry by the American Gilbreth, a fellow-student of Taylor's (see reference 9).

[14] See Wagner, 'Großsiedlungen', p. 113.

[15] Taut's sly dig at Klein can be found quoted in Bollerey and Hartmann, 'Bruno Taut', p. 215.

[16] See Bollerey and Hartmann, 'Bruno Taut', p. 60 and pp. 70–73.

[17] M. Wagner, 'Der internationale Wohnungs- und Städtebaukongress in Wien', *Wohnungswirtschaft*, 18/19 (1926), p. 156. Wagner, in a polemic against the 'Housing-palaces' in Vienna, declared that the "repetition of a thousand-fold unit alone can express the rhythm of the identity of the masses".

[18] See reference 11.

[19] The current allocation norm in the Netherlands is: number of members of household plus one=permitted number of rooms.

[20] For Tafuri's position see Tafuri, *La sfera*, p. 267. See also, for example, V. Magnano Lampugnani and B. Reichlin in 'I terreni della tipologia', *Casabella* (Jan–Feb 1985), pp. 84–87 and 32–39; and C. Mohre and M Müller, *Funktionalität und Moderne* (Cologne, 1984).

[21] As in Mohr and Müller, *Funktionalität*, p. 168.

[22] In Tafuri, *La Sfera*, and *Progetto e utopia* (Rome, 1973).

[23] See introduction to Tafuri, *Progetto*, p. 3.

[24] J. Rykwert, 'The 15th Triennale', The Necessity of Artifice (London, 1982), p. 75.

[25] Benjamin, *Das Kunstwerk*; S. Krakauer, *Das Ornament der Masse* (Frankfurt, 1963), pp. 53–58.

[26] M. Tafuri, *La sfera*, p. 5.

[27] Scarpa, *M. Wagner und Berlin*, pp. 48 and 52.

[28] Wagner, *Großsiedlungen*, pp. 97–100.

[29] D. Hoffmann-Axthelm shows that the everyday experiences of space as the real production of space runs diametrically opposite to official space, in: 'Neubau für die Mischung', in *Kreuzberger Mischung, Ausstellungskatalog* (Berlin, 1984), pp. 58–65.

[30] The distinction between *tipologia* and *tipizzazione* made by Lampugnani in 'I terreni della tipologia', pp. 84–87 points rather in the opposite direction, the more so since Lampugnani emphasises not the correspondence but the difference

between the characteristic type of the 'Neues Bauen' and the artificial constructions of the Enlightenment.

[31] M. Foucault, *Les mots et les choses* (Paris, 1966), especially chapters 2–4.

[32] Wagner's detailed reference to the "Typenbaupläne der kurmärkischen Kriegs- und Domänenkammer" (Typified Building Projects of the Royal Prussian department for War- and Building-Affairs) is to be found in 'Neue Bauwirtschaft', pp. 15–16. F. Mielke, *Das Bürgerhaus in Potsdam* (Tübingen, 1972).

[33] The whole sentence reads, "Just as myths perform Enlightenment, so Enlightenment is, with every step, entangled deeper in mythology": M. Horkheimer and T. W. Adorno, *Dialektik der Aufklärung* (Frankfurt, 1977), p. 14.

[34] M. Foucault, *Surveiller et punir. La naissance de la prison* (Paris, 1975), chapter III s. 3.

[35] 'Modulo misura e modulo oggetto' (1958), in C. Argan, *Progetto e destino* (Milan, 1965), pp. 104–115.

[36] 'Il disegno industriale' (1955), in ibid., p. 139.

[37] Ibid., pp. 134, 135.

[38] See D. Hoffmann-Axthelm, *Sinnesarbeit* (Frankfurt, 1984), especially pp. 18 and 30.

[39] 'Progetto et destino' (1965), in Argan, *Progetto*, p. 63.

Innovation and Contracts in the Postwar British Building Industry

E. W. COONEY

During the past quarter of a century or so, and particularly during the last ten years, there has been a remarkable diversification of contractual arrangements in the building industry. This article attempts to summarise those changes in order to suggest causes and effects from a standpoint provided by the history of the building industry in Britain since the nineteenth century.* I shall emphasise the implications for the architectural profession because the architect has seen himself, and has usually been acknowledged, as 'the head of the building team', so that if innovations derogate from that status there may be exceptionally wide-ranging consequences not only for architects but also for the qualities of buildings—whether for better or worse.

A contract may appear to be a rather two-dimensional source of information, lacking in the depth of knowledge about the processes of building which is available to those who work in the industry, or are closely concerned with it as clients and customers. But the main forms of contract are readily available, unlike much other desirable information, even today, and they reflect the organisation of the industry in summary fashion by bringing together a number of its main participants—the building owner, the architect and other professionals, the contractor and sub-contractor—showing them in various relationships according to the form adopted. Probably the main participant not to feature so prominently in most cases is the building worker, sometimes with the trade union in the background. Many building materials suppliers, too, though so important, are often in the background.

Architects and Innovation in Building

Innovations in building contracts began *circa* 1960 for the most part but were of small scope until the 1970s. The Department of the Environment has not published statistics of their use and value. A private survey in 1984 by the Centre for Construction Market Information listed "the top 16 management contractors" and showed that the number of firms offering that arrangement increased from three in the 1960s to five in 1970 and to 44 'national contractors' by 1984 [1]. A further survey by the Centre shows that design-and-build contracts and management contracts together probably covered about a quarter of all new non-housing construction in 1985: 15% by means of the former and 10–12% by the latter. It appears that the top 20 management contractors accounted for 90% of the total value of that type of contract while the

* The article is directed towards building rather than civil engineering. However, for various statistical and analytical purposes a sharp distinction cannot always be made.