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ITALIAN TEMPORARY PREFABRICATED CONSTRUCTIONS (1933-1949). PROJECTS, PATENTS, AND PROTOTYPES



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Laura Greco

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Highlights

The 1930s-1940s small temporary prefabricated buildings, sometimes demountable, based on wooden and metal systems, and intended for colonies in East Africa, holiday homes, alpine shelters. Manufacturing companies of systems and components such as *L'Invulnerabile*, *Curtisa*, *Società Anonima Legnami Pasotti*, *F.lli Ravelli* and *G. Palini e Figli*. Rationalization of the production process, transport, and assembly of components. Archival technical documentation (*Istituto Nazionale delle Assicurazioni*, *Azienda Mineraria Africa Orientale*, *Club Alpino Italiano*) and patents of prefabricated systems.

Abstract

The study considers solutions and systems for temporary and prefabricated constructions developed in Italy in the 1930s and 1940s. Companies such as *L'Invulnerabile*, *Curtisa*, *Legnami Pasotti*, *Giuseppe Palini e Figli*, *Fratelli Ravelli* proposed easy to assemble, changeable, and in many cases, dismountable buildings destined to the 1930s Italian and colonial markets. The survey aims to reconstruct different cases, highlighting both the premises that determined the vanguard of the post-war debate on building industrialization and the factors that constrained further developments of the pioneering phase analysed. The study starts with the V Triennale of Milan (1933) and develops in the colonial season in East Africa, enriched with applications in the Alpine areas, before finally considering some proposals that were presented at the *Consiglio Nazionale delle Ricerche* exhibition on prefabricated houses in 1945 and the development of some patents by manufacturers specialised in this building sector. The buildings were intended for houses and offices of the *Istituto Nazionale delle Assicurazioni* and the *Azienda Mineraria Africa Orientale* in the colonial areas, for bivouacs of the *Club Alpino Italiano*, and for prefabricated houses advanced in the Second post-World War period by *Società Anonima Legnami Pasotti* and by *L'Invulnerabile*. The study, based on the clients' archives (*Istituto Nazionale delle Assicurazioni*, *Azienda Mineraria Africa Orientale*, *Club Alpino Italiano*), technical documentation, and patents of the manufacturing companies, favours the examination of the production and assembly process.

Keywords

Italy, 20th century, Temporary constructions, Prefabrication.

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1. INTRODUCTION

The efforts deployed in Italy in the 1930s and 1940s by a group of designers and companies, oriented towards the production of prefabricated elements and systems, considered temporary constructions as a privileged field for the development of a proto-industrialization approach aimed at the mass construction of small-sized buildings to face the demand for living and working spaces in emergency situations or, to respond to needs of modern ‘nomad users’. This activity also referred to the international framework, in which some experiences stood out concerning steel and wood systems such as the well-known influences of the balloon frame on American construction culture [1] and, in Europe, the steel systems widely used in the Siedlungen such as the German schemes (Wöhr and Weir), and the British solutions (Athol and Dorlonco) [2], the Gropius’ research in the Weissnhoff district and the Copper House system. Le Corbusier’s project for the Maison montées à sec (1939) and, especially, Jean Prouvé’s work with Beaudouin and Lods architects (e.g., BLPS house in 1938-39, the mobile home for the French Ministry of Air Force in 1938 and the removable houses for the Corps of Civil Engineers in 1939), the “F 8x8 m” pavillon with Pierre Jeanneret (1941-42) and the post-war demountable houses marked the French context and were references for the development of demountable and modular buildings with metallic systems.

This study is part of research concerning a repertoire of solutions for temporary constructions developed in Italy between the 1930s and 1940s, consisting of experiences that, although influenced by the same cultural and productive context, are distinguished by their own typological and construction features. The considered repertoire took shape on the wave of the achievements of the V Triennale of Milan in 1933, developed through the season of colonial territories in East Africa in the second half of the 1930s, and enriched with specialized applications destined for the high mountains, to end abruptly with the outbreak of the Second World War, leaving a trace that affected – albeit occasionally – the years of reconstruction, with the *Consiglio Nazionale delle Ricerche* (CNR) 1945 exhibition on prefabricated house projects and with the activities of some companies that marked the experimentation of the

1930s. The analysed solutions largely concerned residential spaces: holiday homes, houses for workers, mountain shelters; in other cases, a neutral functional approach was favoured, suitable for multiple uses with the same planimetric and structural grid.

Recognition of the salient features of this production could be useful for expanding the mapping of the cases developed in the 1930s and participating in the evolution of light prefabrication in the national construction framework. The archive materials of the institutions involved and referred so far (*Istituto Nazionale delle Assicurazioni*, *Azienda Mineraria Africa Orientale*, *Club Alpino Italiano*), the technical documentation of the companies and the patents of the 1930s-1940s, are privileged sources to support a method of investigation with the aim of reconstructing different experiences, to articulate the overall visions of the construction framework of the time already outlined in the literature, to highlight both the premises that determined the vanguard of the post-war debate on building industrialization as well as the factors that restrained further developments of the pioneering phase analysed.

2. TEMPORARY BUILDINGS: A “MINOR” FIELD FOR CONSTRUCTION EXPERIMENTATION

The interest of clients, designers, and manufacturing companies in temporary constructions – a typological field in the 1930s and 1940s that neither participated in the cultural debate nor followed the construction mainstream of the country – was favoured by occurrences that marked the dynamic framework of the 1930s. From a technological point of view, the influence of the “national modernization” of construction, due to the economic policy of fascism and then to the sanctions approved by the League of Nations in 1935 against Italy, was fundamental. Among the effects of the autarchic economy was the experimentation of “new materials, presented as autarchic products of Italian industry” [3] (e.g., panels of Cel-Bes, Populite, and Eternit), widely used in temporary constructions. This climate stimulated the initiative of producers involved in the development of products whose names emphasized their innovative character (e.g., *L’Infrangibile*, a prefabricated panel). Many of these products, reviewed in the Milanese

handbooks of the time (e.g., E. Griffini 1932 and 1934), supported – as evidenced by the cases presented in this study – a quick and sometimes reversible way of building, finding in the temporary constructions a key typological sector compatible with the real potential construction innovation of these products. On the other hand, the development of this “minor” typological field of experimentation was encouraged by factors that animated the demand for this type of building and the research for effective solutions to ensure rapid construction and disassembly of components. In fact, two events occurred: on the one hand, the cultural and socio-economic transformations affecting the more evolved bourgeoisie of the regions of northern Italy and, on the other hand, the development of the most expansive phase of Italian colonial history. These events supported the private and public demand for temporary use buildings. Additionally, from a cultural viewpoint, the event that started the technical experimentation in the sector was the V Triennale of Milan (1933), in which metal construction was a key theme of the exhibition [4, 5]. For the purposes of this study, the five-weekend homes designed by Pietro Bottoni, Eugenio Faludi, and Eugenio Griffini, conceived as demountable, economical, transportable, and transformable prefabricated buildings, are particularly illustrative. Around the mid-1930s, the well-known houses of the V Triennale were flanked by the proposals of companies specialized in the production of wooden and metal prefabricated buildings, which, while mainly directing their products to the Italian African colonies market, tried to stimulate domestic demand with projects of demountable single-family prefabricated houses. In the Alpine areas, the high-altitude shelters developed by the Ravelli brothers and Giulio Apollonio for the *Club Alpino Italiano*-CAI (Italian Alpine Club) inaugurated solutions that also gained an international reputation, supported by a careful study of the production, transport, and assembly phases in severe environmental contexts.

The general spirit that united these pioneering experiences, while being affected by the artisan matrix that characterized the production organization of small Italian manufacturers, took advantage of the innovative impulses coming from the unusual temporary construction market. Wood and metal systems, in particular, excluded from the national construction mainstream, were

engaged in this “minor” experimental field. The requirements of construction simplicity and disassembly of the building systems influenced the connection techniques, as well as the necessary compatibility of the solutions with long and difficult transports, and with contexts afflicted by challenging climatic and anthropic constraints, conditioned the organization of the production process, the dimensions and the weight of the components and, therefore, the concept of the construction systems.

Manufacturing companies such as the *Società Anonima Legnami Pasotti, Giuseppe Palini e Figli* from Brescia, *L'Invulnerabile* (agent of *Società Anonima F.E.R.V.E.T.* from Bergamo) and *Curti S.A.* from Bologna, *Officine Meccaniche Lenzi* from Lucca, Ravelli from Turin designed and produced schemes for temporary constructions, which were both easy and quick to assemble, which could be modified and, in many cases, could also be dismantled.

The Milan and Bari exhibitions were privileged events for manufacturers to present their products and prototypes. National exhibitions, while not reaching the desired commercial objective within the domestic market, were an opportunity to intercept the promising demand from public clients and private companies that had established their offices in colonial territories. The domestic market remained, in fact, a limited experience that also included Alpine constructions, however, confined to well-defined geographical areas. After the interruption imposed by the conflict, the use of prefabrication for the mass construction of small temporary buildings came to light as a niche field of the debate on building techniques, suggesting relationships with the events of the 1930s. The analysis of the development of the theme supports the summary vision outlined so far.

3. THE CATALOGUES OF ITALIAN MANUFACTURING COMPANIES FOR COLONIAL BUILDINGS

The expansion of infrastructures in the Italian colonies in East Africa, which occurred between 1936 and 1943 affecting civil engineering and building constructions [6], offered an unforeseen stimulus to the national developments of light prefabrication and demountable solutions,

suitable for providing temporary homes and services to employees and managers of Italian public institutions and companies established in Eritrea, Ethiopia, Somalia.

The privileged clients of this building production were in fact institutions such as the *Istituto Nazionale Assicurazioni-INA* (National Insurance Institute), the *Istituto Nazionale per le case degli impiegati statali-INCIS* (National Institute for the homes of government employees), the *Azienda Mineraria Africa Orientale-AMAO* (Eastern African Mining Company), the *Banca d'Italia* (Bank of Italy), as well as many private companies.

To operate in colonial territories, Italian manufacturing companies undertook to coordinate the production, supply, and assembly process of components. As proved by the archive documentation of some of the involved companies, the prefabrication process considered the construction of components in the workshop (uprights and crossbars of structure, panels for walls, floors, and roof) and the subsequent assembly together with the other extra-catalogue parts (tiles, windows, doors) to test the product in the factory. The building was then dismantled and prepared for shipping. In some cases, to facilitate shipping and assembly operations, as evidenced by the

production of L'Invulnerabile, the wall, floor, and roof components were of the same size, as well as the bolts used for structural connections all with the same diameter and length. The organization of the packages to be shipped was thus significantly simplified, as well as the type of unions and their execution on-site, without the need for specialized workers.

Ease of assembly, the flexibility of use, and disassembly of buildings were the guiding criteria for the design of solutions, based on framed structures with supports mainly arranged on the perimeter, organized on modular and expandable grids. One of the most recurring layouts, present – for example – in the *Officine Meccaniche Lenzi* catalogue, was the demountable pavilion, a rectangular-shaped space with a central corridor that served the different rooms overlooking a perimeter veranda protected by a sunshade screen. It is a layout compatible with residential and offices functions. The *Officine Meccaniche Lenzi* solved the scheme with six metal portals arranged with a span of 3.50 meters. The asbestos wall panels were fixed to beams placed between the uprights, while the second frame of beams, ordered longitudinally, supported the ceiling panels, anchored to the intrados of the metal pro-



Fig. 1. Removable pavilion under assembly. Project and manufacturing: Officine Meccaniche Lenzi, 1930s (Historical Archive INA-Assitalia- Historical Archives Generali Group, Colonies collection, folder no. 1.2.5)

files (Fig. 1). More complex layouts were organised by the *Società Anonima Legnami Pasotti* of Brescia. They were H, L, square and rectangular layouts, with a perimeter veranda screened by wooden grilles with movable panels for ventilation. The buffer spaces were used by Pasotti to create a filter between the living spaces and the outside, as well as to activate the natural ventilation of the rooms, also through air intakes arranged on the roof (Figs. 2, 3). The typological repertoire of the Lombard company was based on modular layouts, which, set on a 128 cm module corresponding to the basic construction element, allowed the definition of spaces with dimensions of 2-3-4 modules, which could be aggregated according to different schemes adjustable over time.

The order of some buildings destined in 1939-40 to Ugarò, an Eritrean gold mining centre where AMAO worked, underlines the typological versatility of the construction system. Pasotti provided in two phases and “by way of experiment” demountable buildings destined as

houses for bachelor employees, recreational spaces, and the doctor’s house, using the same system and the same technical components [7].

The production of the companies for the colonial territories was characterized, from a construction point of view, by wooden and metal solutions, as demonstrated by the experiences of the Bolognese companies *Curti S.A.* (later to become known as *Curtisa*) and *L’Invulnerabile*, by the catalogues of the Lombard firms *Giuseppe Palini e Figli* and *Società Anonima Legnami Pasotti*, whose systems – almost always – combined dry-assembled structures with multilayer panels composed of cladding and thermal insulation layers, based on wood fibers, metal sheet, cement conglomerate mixed with vegetable fibers, such as Cel-Bes in particular.

Curtisa describes the key points of his system, highlighting “the effective disassembly of the building [...] with all the parts that can be recovered and fully adaptable when you want to reassemble the building in another

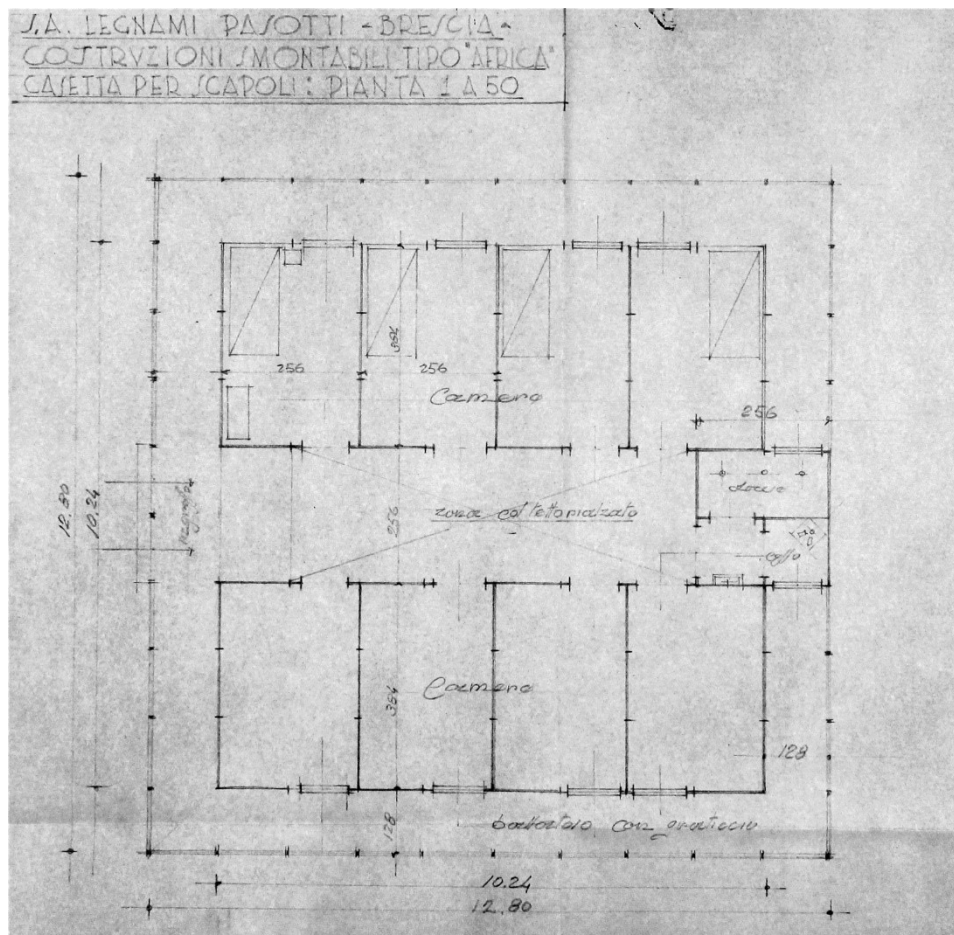


Fig. 2. Plan of removable construction type “Africa”, house for bachelor employees. Project and manufacturing by Società Anonima Legnami Pasotti, 1939 (Archivio Centrale dello Stato-ACS, Rome, Azienda Mineraria Africa Orientale-AMAO coll., folder no. 7).

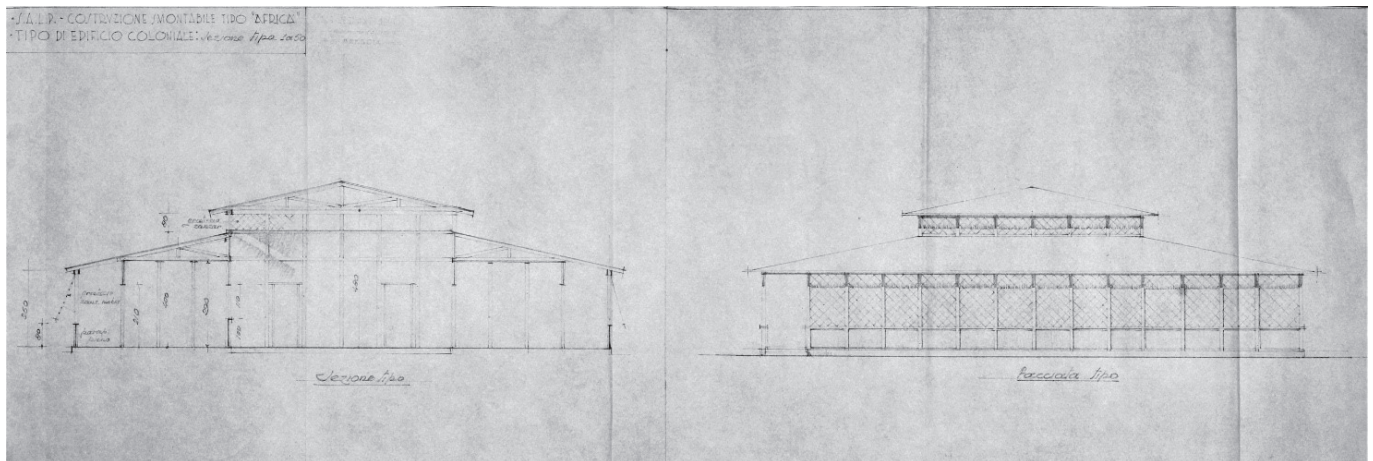


Fig. 3. Section of the removable house for bachelor employees. In evidence, the perimeter veranda screened by wooden grilles with movable panels for ventilation (ACS, AMAO coll., folder no. 7).

er place” [8]. The solution used a structure composed of perimeter iron columns connected by trusses to which the wall panels were fixed by means of bolted joints.

The system commercialised by *L'Invulnerabile* obtained the favour of INA, distinguishing itself for modular solutions thanks to standardized structural spans that could be aggregated according to schemes varying between 51.15 square meters and 134.48 square meters (Fig. 4), which could be further expanded for specific functional needs, as evidenced by the houses realized by Ina in Addis Ababa.

The solution adopted a metal structure consisting of uprights arranged with a span of two meters and connected by crossbars. The steel uprights were formed by the coupling, by electric welding, of two cold-shaped profiles and molded in such a way as to allow the insertion of the panels in special guides [9]. The elements of the metal frames were designed in both cases on the basis of

the structural span so as to use modular and interchangeable pieces. In the *Curtisa* solution, the wall sandwich panels, 10 cm thick, were large (3.00x3.50 m) and could be broken down into submodules to facilitate transport and handling operations on site. The sandwich panels had a frame of “profili ferrofinestra” (iron profiles) and horizontal U-section stiffening profiles, completed by two sheet metal plates with a thickness of Vetroflex interposed [10]. The internal walls, which had a similar organization, were fixed to the structure by means of tightening devices to be operated through small openings arranged in the cladding panels so that the walls could be disassembled and repositioned over time (Fig. 5).

The external walls of the *L'Invulnerabile* system were made up of double panels (each 17 mm thick) of standard dimensions (2.00x1.00 m), separated by a cavity; typical-

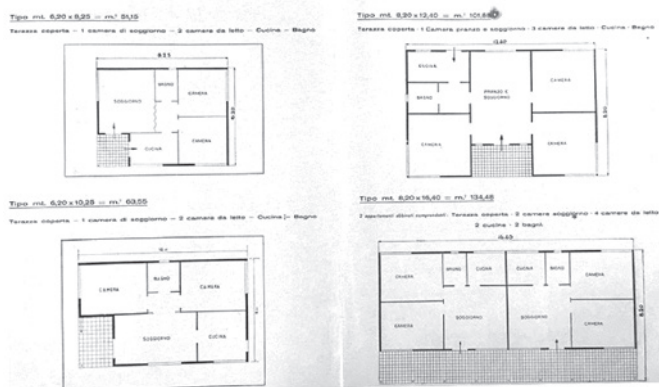


Fig. 4. Plans of removable houses Type “C” by *L'Invulnerabile*, 1938-39 (INA, Colonies coll., folder no. 1.2.5).

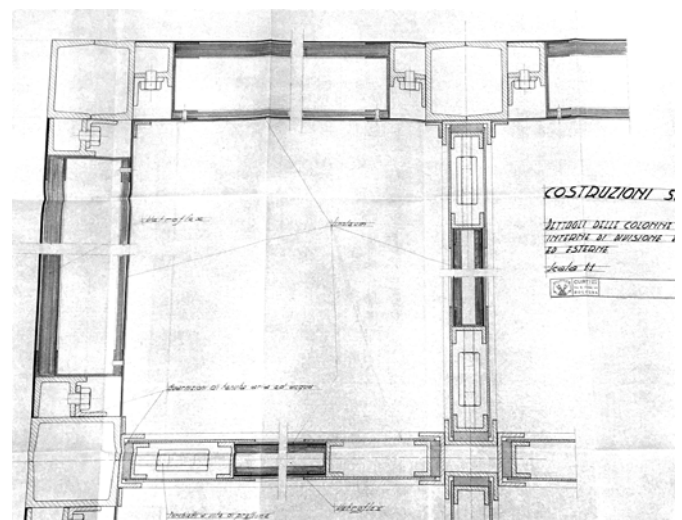


Fig. 5. Construction system by *Curtisa*. In evidence, the details of the external and internal walls (INA, Colonies coll., folder no. 1.2.3).

ly, the external panel was made of high thermal insulation agglomerate and coupled to a fiber cement plate, while the internal panel was made of insulating material combined with a Cel-Bes type plywood plate. The section of the uprights of the structure was designed to accommodate the panels, blocking them on all four sides (Fig. 6). This solution, perfected after the war by the Italian company, allowed the panels to be disassembled and recovered.

Among the wood systems, the proposals of Giuseppe Palini and the *Società Anonima Legnami Pasotti* emerged decisively. In the first case, evidence of the use of the system can be found in the Colonies collection of the *Ina-As-sitalia* archive, as proved by the offer presented to the institute in 1936 by Palini [11]. In Italy, Palini presented its production at the Milan Trade Fair, focusing the promotion on a residential pavilion with a rectangular plan (12.12x8.98 m) surrounded by a veranda. The solution used a structure of wooden uprights with a square section, arranged with a span of 1.062 m, combined with insulat-

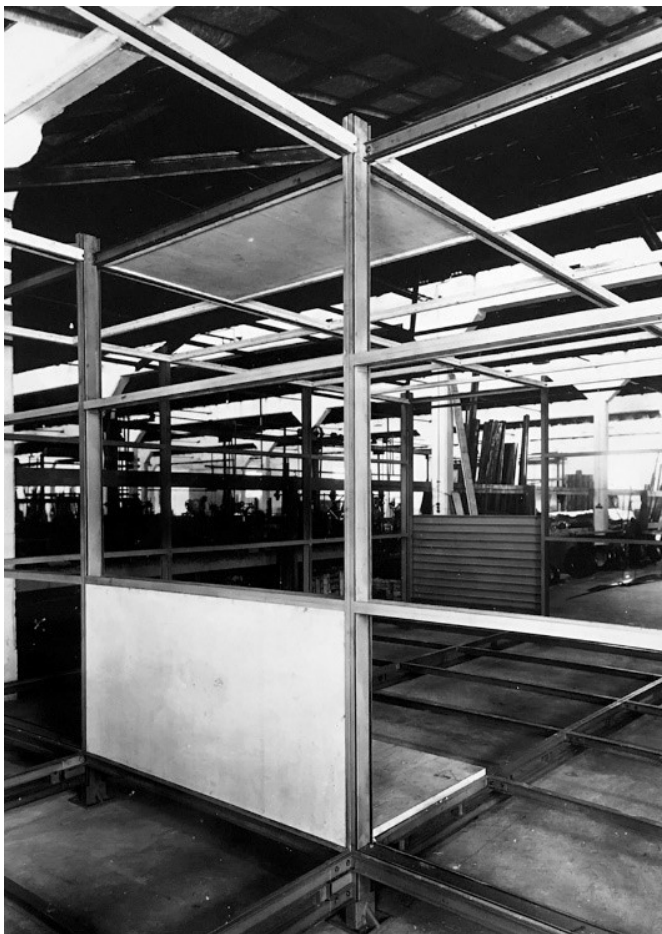


Fig. 6. Removable construction by L'Invulnerabile. Assembly in the workshop (INA, Colonies coll., folder no. 1.2.5).

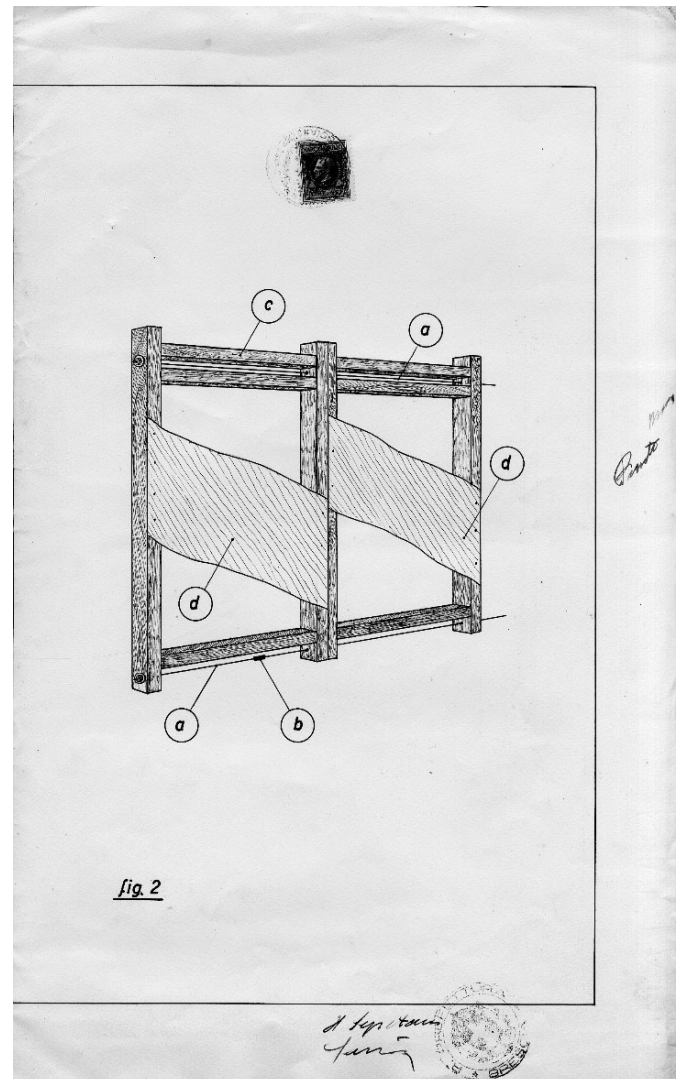


Fig. 7. General scheme of the construction system registered by Società Anonima Legnami Pasotti with patent no. 353302 in 1937 and concerning a solution for "Demountable constructions obtained by means of elements that simultaneously form beam and wall" (ACS, Patents Coll., folder no. 353302).

ing sandwich panels clad with asbestos layers. The panels of modular dimensions (1.00x1.00 and 1.00x2.50 m) were mounted by inserting them into holes prepared in the sections of the uprights and in the stiffening crossbars that completed the wooden framework [12].

In those years, the *Società Anonima Legnami Pasotti* registered the patent (no. 353302 of 11 May 1937) concerning a solution for "Demountable constructions obtained by means of elements that simultaneously form beam and wall" [13]. According to the static scheme developed by the Lombard company (Fig. 7), the crossbeams of the frame resisted compression; the metal tie rods, which connected the various elements, absorbed tensile stress, while the wall cladding panels counteracted shear actions. The

floors, to which the walls were connected, stiffened the walls in the horizontal direction. Finally, the assembly of components, thanks to the use of dry connections, was reversible. In colonial applications, which were inspired by this patent, the cladding panels made of various materials (e.g., fiber cement) were initially combined with a cavity filled with bags of wood chips, used as the insulating material, as evidenced by the offer presented in June 1939 at AMAO from the Pasotti dealer in Asmara, Mario Oneglia. The walls described had a thickness of 9 cm and guaranteed, according to the tender specifications, a K coefficient of $0.03 \text{ W/m}^2\text{K}$ and a conductivity 15 times lower than the masonry walls [14]. However, despite the declared performance, the solution was overcome after about a month in Pasotti's final offer, which provided a sandwich composed of two Cel-Bes panels with an interposed insulated cavity for external walls. This option, according to the company, was more stable to thermal stress and with greater impact resistance [15]. Moreover, despite the efforts of Italian manufacturing companies to provide durable and comfortable solutions able to eliminate the temporary nature of buildings, they were considered unfitting for validation of the image of colonisation promoted by the fascist regime, even if they represented an important opportunity to export some of the results of Italian construction modernization [9]. Ultimately, the outbreak of the Second World War and the subsequent conclusion of the Italian colonial season affected the young and still pioneering colonial market, interrupting the experimentation of companies, whose long wave affected, as we described below, the post-war years.

4. TEMPORARY BUILDINGS AT HIGH ALTITUDE: THE BIVOUACS OF THE CLUB ALPINO ITALIANO (CAI)

The *Club Alpino Italiano* (CAI) promoted the realization of essential construction for mountaineers and hikers at high altitudes in the mid-1920s. In this experience, it must be another unexpected contribution to the development in the 1930s-1940s of prefabricated solutions for temporary use buildings. The bivouacs of the Turin section of the C.A.A.I. (Italian Academic Alpine Club, youth section of the Italian Alpine Club), were initially installed in August

1925 on the Italian side of the Western Alps and at Tête de Roèse, in Valpellina [16]. Other realizations followed in Italy; the echo of the originality of the bivouacs of the C.A.A.I. reached France and Spain, arousing interest in the originality of this system in a framework largely marked by constructions based on masonry technique. The greatest diffusion was in the 1930s. These were temporary shelters, the development of which – albeit marked by very peculiar functional aspects – had characteristics substantially similar to the colonial experience for the management of the production, transport, and assembly phase of prefabricated components. Even in this case, in fact, transport and assembly issues influenced the solutions, and the manufacturer's experience proved to be fundamental in perfecting the technique.

The success of the Ravelli bivouacs was due to the expertise of the Ravelli brothers, skilled and passionate mountaineers, but also carpentry builders, able to manage not only the production but also the transport placement and assembly of bivouacs [17]. The shelter was essential ($2.25 \times 2 \times 1.25 \text{ m}$), with a structural frame consisting of wooden bolted elements placed on the ground on four corners. Some wooden arches, arranged on the fronts of the building, supported the wooden crossbars that defined the semi-barrel vault of the roof (Fig. 8). The



Fig. 8. Ravelli bivouac under assembly, 1927. In evidence, the wooden arches supporting the wooden crossbars that define the semi-barrel vault of the roof (Club Alpino Italiano, Museo della Montagna, Turin).

structure was reinforced by metal strips. The envelope was clad with galvanized sheets. The bivouac components were produced and assembled in the workshop, then numbered, disassembled, and divided into packages transportable by so-called porters up to the site where the bivouac was installed. For this reason, the entire bivouac construction system was decomposed into 25 packages with a maximum weight of 25 kg each.

In the early 1940s, the engineer Giulio Apollonio, with the project of the nine-seater bivouac, took advantage of the first experience of the C.A.A.I. to define a shelter (2.50x2.30x2.80 m) whose structure consisted of five transversal larch wood frames stiffened by longitudinal crosspieces. Apollonio provided for the use of interchangeable elements, with standard dimensions for all parts of the bivouac having the same function so as to make assembly quicker and prevent difficulties. The components were produced downhill in the workshop, where the bivouac was assembled and tested; it was then disassembled and the pieces prepared for transport in packages, the weight of which was determined on the basis of transport difficulties [18]. This organization al-

lowed assembly operations on site in 360 hours, corresponding to the work of two men for a period of about 22 days.

5. POST-SECOND WORLD WAR DEVELOPMENTS

After the conflict, the 1945 exhibition on prefabricated house projects, organized by the Italian National Research Council (CNR), compared designers' and producers' approaches, providing a critical assessment of the Italian context, in which standard prefabrication found difficult to spread, even in the sector of temporary buildings.

In the 1945 Milanese event, Pasotti presented a prefabricated single-family house resulting from the collaboration of the Brescia-based company with the architects Calcaprina, De Micheli, and Radiconcini. The product with self-supporting panels took into account the modularity criteria of patent no. 353302 and the types developed in the 1930s. It was distinguished by the panel joining system, which, given the particular shape of the heads, allowed the connection in line or

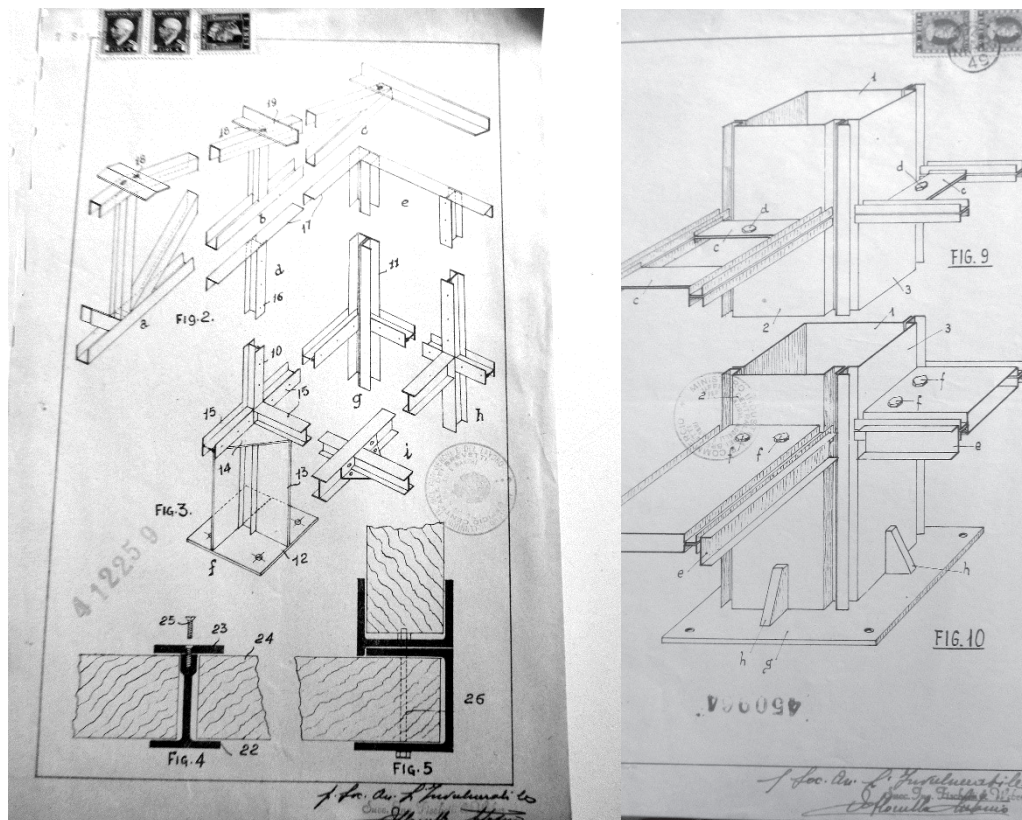


Fig. 9. Light construction systems registered by L'Invulnerabile with the patent no. 412259 of 1945 (on the left) and with the patent no. 450964 of 1949 (ACS, Patents Coll., folder no. 412259 and no. 450964).

crossed indifferently, and the interesting autonomous bathroom-kitchen unit made in sheet metal with piping equipment, devices, connections already installed [19]. The external walls were made up of wooden framed panels (1.12x2.80 m) that were clad internally with masonite and externally with a vertical matchboarding. The joint between the panels was protected by special pieces of matchboarding. In the same years, Pasotti presented the catalogue of Garda houses which also included two types of colonial houses, in which Pasotti confirmed the use of the perimeter veranda and the roof with the opening for natural ventilation, according to the schemes of the 1930s. From a construction point of view, the manufacturer highlighted that the main characteristic of Garda prefabricated houses, based on the use of uprights and wooden wall elements, was “the interchangeability of the components and their modular dimension” [20].

Among the metal systems, it is worth mentioning the work of the company *L'Invulnerabile* on demountable metal sheet systems. *L'Invulnerabile* developed two patents – derived from the solutions of the 1930s – to perfect the assembly and disassembly phases of the panels (Fig. 9). The patent no. 412259 of 12 November 1945 modified the panel assembly system, thanks to the use of double T profiles with a movable wing, which could be disassembled to insert the panel and then inserted again to lock the panel itself by bolting [21]. The corner pillars consisted instead of two bolted U-profiles, side by side and rotated 90° relative to each other, to allow the panels to be placed. The patent no. 450964 of 19 August 1949, concerning “Light construction systems with metal frame made of sheet metal section”, was based on a “light construction system with metal frame and panels of natural or artificial materials” [22]. The sections were obtained by cold-rolled sheet metal and were equipped with longitudinal and transversal cleats designed to form U-shaped guides to place and block the panels. This system also provided at least one of the removable cleats to facilitate the assembly and disassembly of the panels. However, it should be noted that the productions of Pasotti and *L'Invulnerabile* in this second phase attracted less interest, especially among public clients, oriented towards the development of re-

construction programs based on traditional techniques and intensive permanent building typologies. For this reason, Pasotti progressively directed its production towards foreign markets, as evidenced by the residential public orders in Australia in the 1950s. In the 1960s, it finally turned to the school building sector, as evidenced by the development of the “P 63 SYSTEM” with prefabricated elements.

At the turn of the 1950s, prefabricated temporary construction systems were the subject of new experimentations. The projects exhibited at the 10th Milan Triennale in 1954, within the “Exhibition of building industrialization and experimental prefabrication” [5, 23], and in particular the “experimental house B24” and the “transparent house” based on the use of steel profiles of the company Safim [24], emphasized temporary prefabricated buildings and steel systems, confirming the experimental character of the projects. However, comparative analyses between the systems proposed in 1954 and the previous ones can contribute to highlighting the evolution of the production in this sector. In any case, it can be observed that the Milanese exhibition concerned only single-family houses, while the 1930s repertoire considered typological flexibility as a key aspect to optimize the competitiveness of the catalogues. This aspect might have affected the development of technical solutions in terms of structural schemes and roof systems. Further analyses could highlight the relationship and the divergences between the two building phases.

6. CONCLUSIONS

By observing the effects on post-war production, it can be considered that the long wave of 1930s pioneering efforts pushed the activity of some companies in the post-war period; however, it did so without progressing into the definition of a temporary construction market. Some of the protagonists of the 1930s survived the socio-economic transformations of the post-war period thanks to the familiarity matured with the themes of construction standardization. Sometimes the revision of production strategies was determined, as evidenced by the case of *Legnami Pasotti*, or that of *Curtisa*, which applied his

expertise above all to the design and production of curtain walls, favouring the work conducted in the 1930s on iron frames. Other companies, such as L'Invulnerabile, continued, albeit with less evidence, in the temporary construction sector.

However, after the war, the temporary construction sector no longer enjoyed the public demand that supported experimentation in colonial territories and those private clients intrigued by modern housing models. The extraordinariness of post-war construction demand and the fragility of the Italian manufacturing sector, combined with the guidelines of public policies that effectively excluded the use of prefabricated wooden and metal systems, the prevalence of intensive building typologies, were all factors that restrained the development of the experimentation of the 1930s, limiting the use of light prefabrication also for temporary buildings. Furthermore, in the Alpine sector, the launch of mass tourism promoted anthropization strategies of mountain contexts, which almost completely excluded the solutions developed with the shelters of the C.A.I. in favour of intensive tourist accommodation complexes.

Ultimately, temporary construction was a “minor” field of experimentation in which the laborious research conducted in the 1930s-1940s by the manufacturing companies rationalised the production, transport, and assembly of components, to simplify the joints, to achieve improved technological performance in terms of tightness and thermal insulation of the envelope, revealing a short but productive season for the application of light prefabrication in the Italian context. However, compared to the international experience, the Italian case registered a lower diffusion of temporary constructions, especially in the mass housing sector, and a marginal involvement of architects and designers. Furthermore, we can consider that, despite the pioneering and provisional character and the limited diffusion of the 1930s-1940s production, the results of this experimental fabrication, and in particular of the metal construction solutions, contributed to improving the manufacturing of lightweight components for façades and internal partitions, participating to the diffusion of the metal constructions in the Italian context.

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