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No. 514

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In this book an attempt is made for the first time to assess the actual *protective value* of different types of shelters, and then by comparing their cost, to arrive at their *value for money*.

The character and effects of Air-Raids which are to be expected in the event of war, the different types of bombs and their effects, are described and vividly illustrated.

The authors then analyse the various recognised types of shelters and suggest methods of improvement. Some entirely new designs considered to be more efficient and at less cost, are given.

Finally, the authors' own scheme for the Borough of Finsbury is fully discussed and illustrated. This scheme gives protection for the whole population in the Borough against bombs up to one ton in weight by means of large shelters holding 7,000 to 12,000 people, equipped with air-conditioning plant, electric lighting, lavatories, warden posts, decontamination chambers, etc. The financial calculations for the whole scheme are set out.

The size of the book is 10 in. by 7½ in., containing 156 pages including 120 illustrations. Price 5s. Postage 6d.

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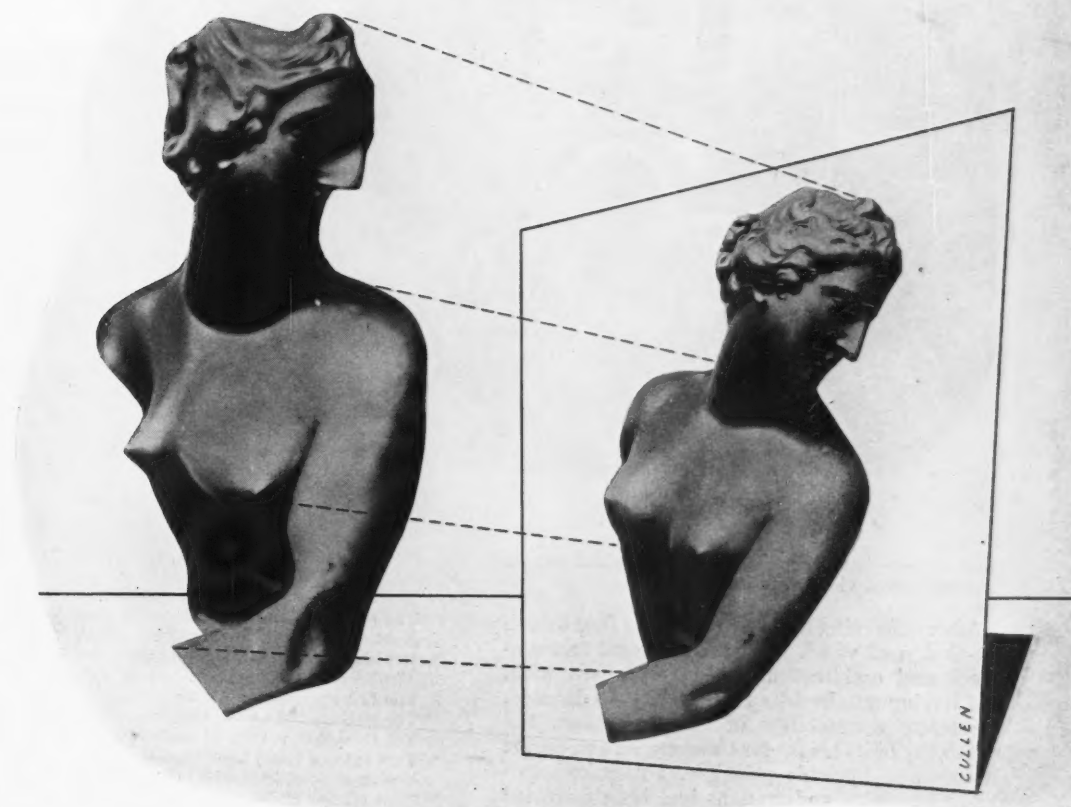


Fireworks in conjunction with water was a characteristic form of Baroque display to celebrate a royal marriage, a military victory or the conclusion of peace (see Christopher Tunnard's article). The above illustration depicts one of the displays given in celebration of the marriage of Maria Josepha to the Dauphin on the twelfth of January, 1747. From Mr. A. St. H. Brock's collection of pyrotechnical prints and engravings which will be exhibited at the R.I.B.A. from the 28th of October to the 9th of November.



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On the following pages Mr. Tunnard gives some notes on the way water was utilized in past periods of garden and landscape design, and discusses the kind of experiments in its use that modern designers might make. As a raw material for architectural display water presents especial opportunities, and in discussing this aspect Mr. Tunnard includes some notes on aquatic pyrotechny when water co-operates with its rival element fire.



THE ADVENTURE OF WATER

By Christopher Tunnard

ON a warm June evening, I and about fifty thousand others stood at Flushing Meadow* watching the latest grappling of art and element. A spectacle which grew from small beginnings—subdued jets springing to life in power and illumination—it could never be called ballet and scarcely ever art, though artifice was there in plenty. Confectionery of a delicate kind abounded. But whether the slow sculptured foam of the opening passages or the gigantic frosted edifice of the climax, the affair was clad in architecture—dress of a nature which one remembered although so quickly changed; and in spite of a synchronization striving to be modern, the eye found images of old-fashioned things . . . of living water in the mosaic pools of Master Bernard—the incredible extravagances of Richelieu's marble cascade and his musketeers who fired a drenching salvo—of water lights at Pillnitz—the smoke of gunpowder drifting across the Thames . . .

A week or so later in a triumphal avenue in London, long given over to the pursuit of com-

merce and engineering, I came upon the headquarters of an organization devoted to good work.* My thoughts were running on display, magnificence and ceremony. Triumph and usefulness—how were they connected? "Fireworks for Tryumph," John Bate had said. Here I should find utility.

Turning the pages of a volume of designs for fountains the following picture of extravagance happened to catch my eye:—

"The structure is composed of ten tons of Sicilian Marble with four tons of Red Aberdeen Granite, the latter forming the four corner pillars, which are polished and surmounted by capitals carved in the semblance of flower leaves, etc. The four streams of water come from White Marble lilies into as many polished granite basins, and on the pediments over them are carvings to represent the Queen, the Prince Consort, and the Donor of the Fountain, the fourth side having a timepiece. A Lion and a Brahmin Bull are also among the sculptures. The whole structure rests on three hexagonal granite steps and is surmounted by something resembling a steeple, and giving the fountain at a distance a Gothic effect. It is, however, not confined to any special style of architecture, and it would be difficult to say what

* The site of the New York World's Fair, 1939, where a "Ballet of the Fountains" takes place.

* The Metropolitan Drinking Fountain & Cattle Trough Association.



The opening of the first drinking fountain on April 30th, 1859, at Snow Hill. The original impetus to provide these fountains was as an alternative to the public house.

ideas of taste have been adhered to, or which canons have been most violated in the design.”*

After inspecting a modern drinking fountain in the design of which both architectural extravagance and architect had been dispensed with, and having admired its inviolability to damage, the ready accessibility of its mechanism, the suitability of its height for children, its anti-squirt devices and hygienic principle, I enquired how many fountains and troughs had been provided and when the work had begun. Over 5,000, I was told, and the first in 1859.

Five thousand ceremonies of dedication to use. Five thousand first sips from the cup† by frock-coated gentlemen and eminently charitable ladies. Then the crowd surging round to drink in turns. At least this was so at the opening of the first public fountain at Snow Hill, 1859, amply fulfilling if only for a day the then idea of the Association to offer an alternative to the public house. And when it is remembered that, near the Elephant and Castle, there was at that time one pipe into which you couldn't squeeze a little finger and from whence the water ran only twenty minutes a day and not at all on Sundays, some competition against the beer barons may very well have been desirable.

It seemed to me difficult and probably not essential to separate at once the two themes of ceremony and water. I thought probably that an investigation of aquatic illumination could not reasonably be excluded either. Later in the day I picked up in a library *Hydraulia* an account of London's water works written in 1835 by William Matthews. Here was described a ceremony of a different kind, three centuries earlier, conducted with equal though less self-conscious dignity:

“On Michaelmas Day, 1613, the Lord Mayor of London, the Recorder and many of the worthy Aldermen rode to see the cistern made . . . under the superintendence of Robert Mylne, Esq., then Engineer to the New River Company.”

. . . the first issuing of the river thereinto . . . was performed in this manner:

A troop of labourers, to the number of sixty or more, well-apparelled and wearing green Monmouth caps, all alike, carrying spades, pick-axes, and such like instruments of laborious employments, marching after drums twice or thrice about the cisterns, presented themselves before the Mount where the Lord Mayor, Aldermen and a worthy Company beside, stood to behold them” and one man on behalf of all the rest delivered a rhymed oration. He concluded by enumerating the workers:

* Extract from *The Standard*, August 3, 1869, referring to the Regent's Park Fountain of 1869 presented by Cowasjee-Jehangheer Readymoney, C.S.I.

† The Association discontinued supplying cup and chain fountains eight years ago.

“First here's the overseer, the tried man,
An ancient soldier, and an artisan.
The clerk, next him, mathematician,
The master of timber-work takes place
Next after these; the measurer in like case,
Bricklayer and engineer, and after those,
The borer and the pavier. Then it shows
The Labourer next; keeper of Amwell-head,
The walkers last: so all their names are read.
Yet these but parcels of six hundred more,
That (at one time) have been employed before.
Yet those in sight, and all the rest will say,
That all the week they had their royal pay.

AT THE OPENING OF THE SLUICE.

Now for the fruits then: Flow forth, precious spring,
So long and dearly sought for, and now bring
Comfort to all that love thee, loudly sing,
And with thy crystal murmurs strook together,
Bid all thy true well-wishers welcome hither.”

At which words the floodgates flew open, the stream ran gallantly into the cistern, drums and trumpets sounding in a triumphal manner; and a brave peal of chambers gave a full issue to the intended entertainment.”*

The crowds of 1613 at the New River Cistern must have awaited the issuing of that

* Stow's Survey, 1638.

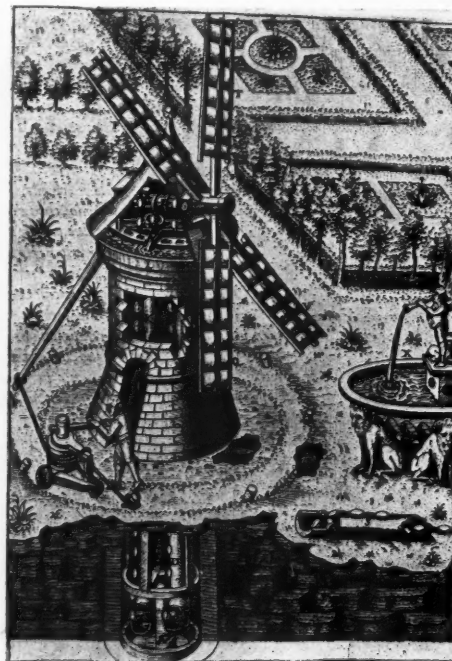
gallant stream with the same expectancy that each evening in the summer of 1939 greets the flowering of the water ballet in America. The reaction, elemental in more senses than one, is probably essentially the same. Crowds have always known the delight of water, which when active demands a generous audience. After all, the Greeks used their springs for “the art of conversation and social festivities” just as we of the 20th Century have used our rivers, though unlike those pagans we are not prone to admit that this idolized element has any but its strictly utilitarian uses. Water is a symbol of life . . . And of infinity. “Derrière la surface plane du lac ne sont pas les peupliers illusaires, mais la vie intense des eaux.”*

Narcissus can see his own reflection, but not the object of his desire. This is the true romantic agony—the blackness of incalculable depth, the illusion which can never be resolved.

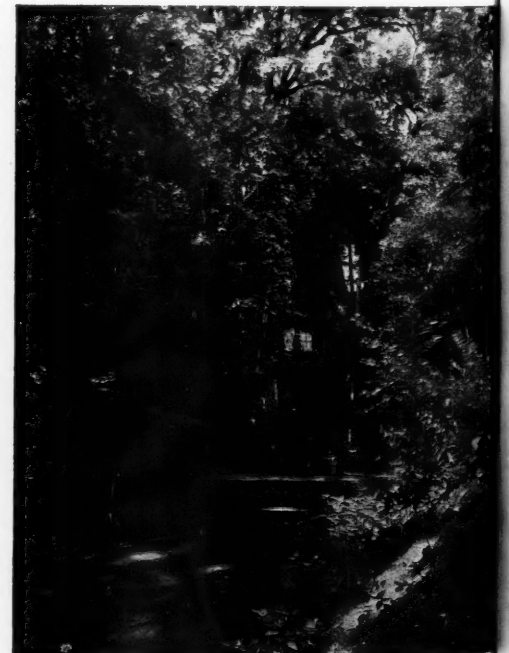
Perhaps, then, some division should be made. Water in agitation—the fertility symbol—is conducive to mass ecstasy or ritual: also to individual exaltation, spiritual or otherwise. Water as a mirror is inviolable, its images are holy, it is an instrument of fearful meaning. As decoration, water has been used in landscape for visual, oral or tactile effect, but its power may often be observed to go deeply beyond the casual impression.

No country has realized the philosophical implications of formal water more readily than France. The 16th century small castle reflected in an ornamental moat led up to the perfection of the canal garden at the height of the French Renaissance. The wide canal at Versailles, 1560 metres by 120 metres, whose cross arms extended to a length of 1013 metres, in spite of its magnificence, occupied less area in relation to the whole than the canals which took the place of gardens at the earlier Fontainebleau, Chantilly, Bury or Dampierre. Sometimes these broad sheets of water were used for naumachia, but it can be assumed that Rapin's comment that they were for the stimulation of the sensible, fine-minded contemplative characters which medievalism was supposed to produce, was in fact a sign that they developed from literary ideas.

* Miroirs-Pierre Mabile.



The garden windmill from “*Le Diverse et Artificiose Machine del Capitano Agostino Ramelli*,” 1588, and right, the water-wheel at Pains Hill, Surrey, c. 1750.



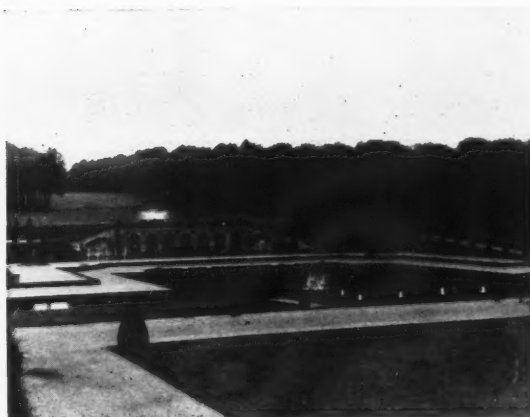


LA TOUR DE GABRIELLE.

N^o 24.

THE ENGLISH STYLE

The first and most celebrated example of the introduction of the informal English landscape garden into France was at Ermenonville. The engraving above is reproduced from Promenade et Itinéraire des Jardins D'Ermenonville, published in Paris in 1788.



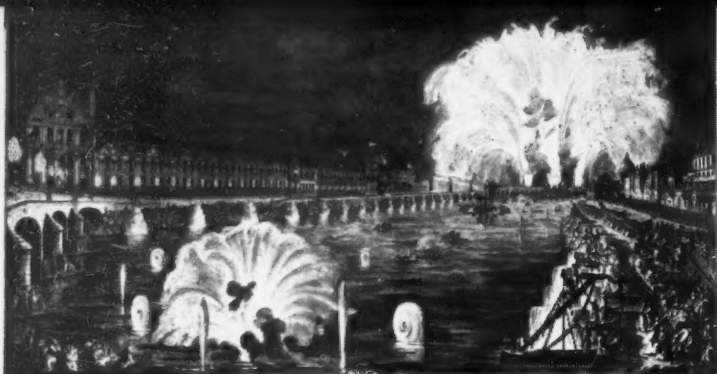
THE FRENCH STYLE

These examples from Vaux le Vicomte show the rigid axial planning of the French landscape garden. Left the gilded fountain. Right, the canal which runs at right angles to the main avenue.

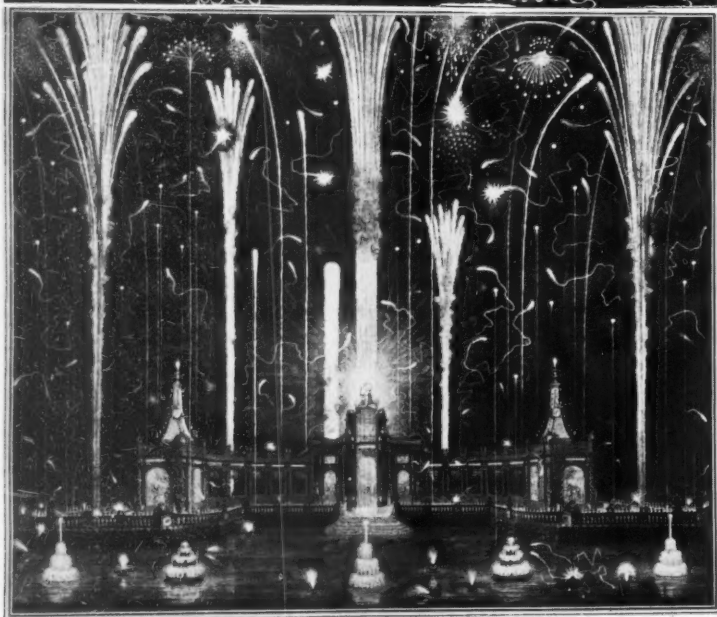
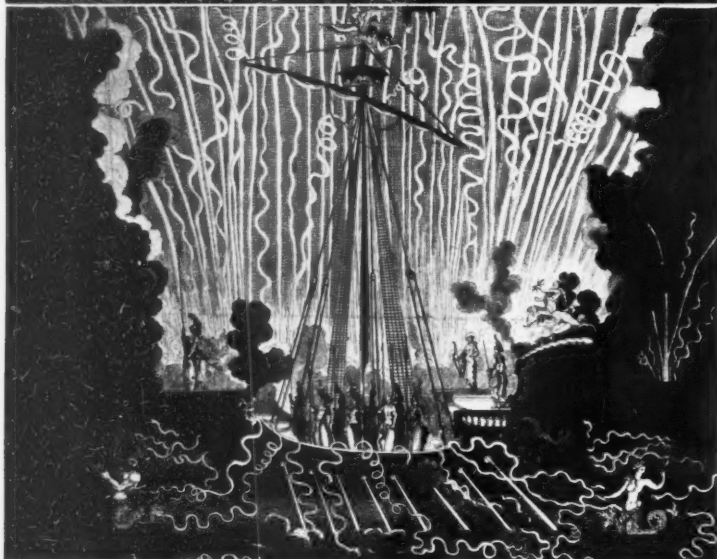
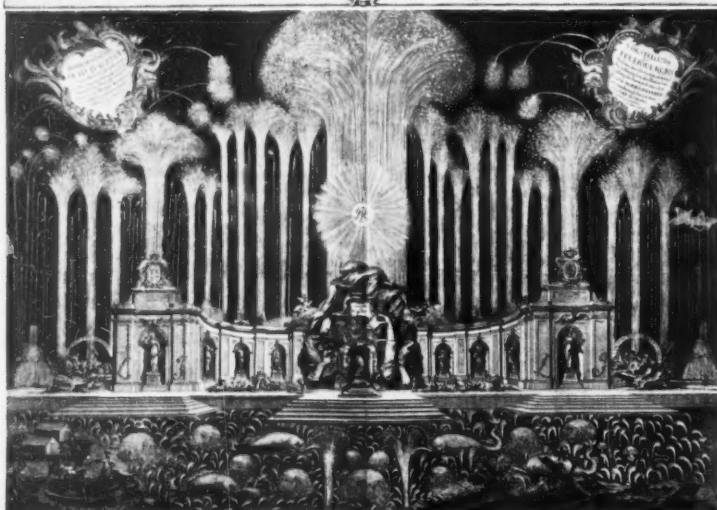


THE ITALIAN STYLE

The free use of water in fountains is characteristic of the Italian style. From left to right, the fontana della Civetta from the Villa D'Este at Tivoli, the fontana della Torre in the gardens of the Vatican, and the cascade in the park at the Villa Aldobrandini at Frascati.



1. Vue générale des Décorations, Illuminations et Feux d'Artifice de la Fête donnée par la Ville de Paris sur la rivière de Seine (en présence de Louis, Roi de France, et de Marie Louise, Reine d'Espagne) le 12 Janvier 1700.



In his informative work on pyrotechnics,* Mr. A. St. H. Brock remarks: "It is worthy of note that even in early times . . . the value of water in enhancing the effect of fireworks seems to have been realized. Many of the larger French displays of the seventeenth and eighteenth centuries were fired with a foreground of water; in those at Versailles full advantage was taken of the wonderful fountains and ornamental water, the display given in celebration of the entry of Louis xiv in Paris after his marriage being given on the Seine, and many of the English displays took place on the Thames. Probably the earliest contemporary account of any length of a firework display in England is one headed 'The Manner of Fire-Workes shewed up upon the Thames' in celebration of the marriage of Prince Frederick (Elector Palatine) with the daughter of James I in 1613, when 'many artificiall concussions in Fire-Workes were upon the Thames performed . . . Where Kings commands be, Art is strecht to the tru depth; as the performance of these Engineers have been approved'."

A hundred years later the Peace Rejoicings of 1713 were the occasion of another display on the Thames off Whitehall, the erection being about 400 feet long on barges chained together in the stream. A feature of this display was the water fireworks, described as "1,500 small and large water Rockets; 5 large water Pyramids; 4 water Fountains; 13 Pumps; 21 standing Rockets, with lights all swimming in the water; 84 of Coll Borgards; large and small Bees swarms, half of which were set with lights to swim upon the water."

An effective marriage of fire

and water was obtained by the gerb a term which had been formerly used to describe the sheaf type of water fountain. The celebrated pyrotechnist Ruggieri describes a variety of the gerb called the "plongeurs" in which small quantities of mealed powder were packed between each scoop of composition to produce an intermittent turning. The recoil of each puff of powder forced the gerb beneath the water. "Skimmer" rockets performed in the same porpoise-like way, but required a considerable area of water for safety's sake, and sky rockets were often fired under water, an elaborate use of waterproofing material being necessary for the preliminary fixing.

The illustration at the head of this column shows the Naumachy, Fireworks and Fair, held in Hyde Park in honour of Peace, August 1st, 1814. The first of August was chosen because it was the centenary of the accession of the House of Brunswick and also the anniversary of the Battle of the Nile. The display in Hyde Park commenced with a naval engagement on the Serpentine between model warships representing the English and the combined French and American Fleets. This item, which lasted three hours, was followed by a display of water fireworks. Charles Lamb, in a letter to Wordsworth dated August 14th, 1814, after describing the havoc wrought in the park by the crowds and booths, remarks that: "... after all, the fireworks were splendid—the Rockets in clusters, in trees of all shapes spreading about like young stars in the making, floundering about in space (like unbroke horses) till some of Newton's calculations should fix them, but then they went out. Anyone who could see 'em and the still finer showers of gloomy rain fire that fell sulkily and angrily from 'em, and could go to bed without dreaming of the Last Day, must be as hardened an Atheist as . . ."

On the left are shown:

1. Vue générale des Décorations, Illuminations et Feux d'Artifice de la Fête donnée par la Ville de Paris sur la rivière de Seine en présence de leurs Majestés le vingt neuf aoust, mil sept cent trente neuf a l'occasion du Mariage de Madame Louise Elizabeth de France et le Dom Philippe, Infant d'Espagne.

2. (Panorama) Representation du Feu d'Artifice tire par Ordre de Sa Majeste a l'occasion du Mariage S.H.R. Madame la Princesse Royale et Electorale Marie Joseph aver Monseigneur le Dauphin le 12 Janvier 1747.

3. La Conquete de la Poison d'Or Par les Argonautes.

4. Representation du Feu d'Artifice tiré à la Hague Ce 13 Juin 1749, a l'occasion de la Paix a Aix-la-Chapelle.

*Pyrotechnics. The History and Art of Firework making. London. 1922.

It was a Frenchman, Bernard Palissy, the persecuted artist of the 16th century, who used water as a direct expression of his natural philosophy. This had its roots in the growing protestantism of the time (his dates are surmized to be 1510-1589) but was tinged with his theories of political liberty for which he had plunged his native town into revolt and been thrown into prison. Water for him was the symbol of freedom, but it was combined in a curious way with religious motifs and with the simple natural materials which Palissy used in his gardens and grottoes dedicated to the pursuit of wisdom in the manner of the Protestant intellectual movement of the time. In spite of this complexity in his work, Palissy's enamelled basins "like meadows strewn with summer flowers" and his gardens, where the saints were to live as shepherds, must have been as charming as any medieval painter could depict. The framework for these creations was the rigid little square of the period into which, unlike his contemporaries, he introduced much that was free and poetic. A stream had usually to cross the centre, dividing the space by wide allées into four equal parts. At the ends of these were cabinets of different shapes and materials. Here rocks, there enamelled stones, further off clipped trees; water distributed everywhere in abundance, flowing in the squares, oozing from the rocks, falling from vaults and arches, spouting from the ground and surging through pipes of varying sizes to play delightful tunes.* He was absorbed with variety and change in natural forms and studied them in the light of his knowledge that "wisdom alone is pleasing to God." Chapels and hermits, rocks surrounded by water are significant characteristics of the gardens of Palissy's time. All the central part of the garden described above is on a small island made by a little stream which came from a hanging rock and flowed round the garden. Its slight interlacing is an artistic fancy developed many years before the coming of the elaborate parterre.

Palissy made the gardens of the Medici at Chenonceaux, particularly the garden on the left side of the Cher, the aviary and the fountain of the rocks. Two beautiful fountains, caves and grottoes mark his influence at the Parc de Franceuil, but Chenonceaux was probably the only place where this predecessor of Le Notre designed the gardens with freedom. This artist, no less than any other who has ever concerned himself with grottoes, linked them with the water theme, in the macabre fashion which nowadays makes grotto architecture and the uses to which it was put, a source of genuine psychopathic information.† Palissy introduced pools for reptiles into all his grottoes and in his garden for the Queen at La Tuilerie, according to a description by a visiting ambassador, was one in which fish, snails and lizards, tortoises, frogs, toads, shellfish and other aquatic animals crawled over the rocks or swam beneath the water. So did a branch of architecture which started in Roman times as a nymphaeum become a vivarium of the lowest form.

These were early days for the development of any consistent theories about the decorative use

* A description from Palissy's *Recepte Veritable* for the garden of a fortress planned on the model of a Coquille du pourpre. Musical waterworks were an Italian invention. Evelyn mentions in the Quirinal Gardens "a grand organ piece with four registers most cleverly made, which if you turn the water on with a tap begins to play by itself just as if a good organist were playing on it."

† Examples: The Duke of Newcastle who built a grotto at Oatlands Park would bathe in the lowermost chamber watched over by a replica of the Medici Venus. Hubert Robert's reconstruction of the Grotto of Apollo at Versailles makes full use of the porcelain-like fragility of marble against the vitality of rushing water. Dali's recently exhibited "Dream of Venus" in grotto form might also be mentioned here.

DECORATION : LANDSCAPE MATERIALS



The diagram above summarizes the various methods of using water in landscape design. From the recent exhibition of landscape design at the R.I.B.A.

of water. People were still occupied with its engaging habits when used for games and practical jokes. Water jokes may have appeared in Hellenistic times, certainly in Roman. At Chatsworth is a copper weeping willow deriving from the Byzantine tree and pineapple fountains which have their oldest remaining example in the Vatican. Water works became a universal delight—even Leonardo designed them and many Italian gardens lay claim to description only for their fantastic tricks. "Never," says the Duke of Wurtemberg, "need a man ask for water if he sits on a bench—he will get it soon enough."

Fountains and watercourses only became leading motifs in Italy when the later perspective devices were introduced in the 17th century. Then they were deliberately introduced, as at the Villa Lante, to help the symmetry and continuity. The citizens of Rome in that century took more delight in water than in trees or flowers and just at that time too the Italians were the first to make headway with another kind of display, the fireworks of their religious festivals.

Three hundred years later, after the water of the landscape period had flowed past in the romantic dream of a few solitary pedants, its architecture rose to new heights and a larger audience in a select London suburb, where

against the Crystal Palace's glittering façade of glass were waterworks laid out on a scale unknown to Versailles.

"There were fountains and terraces, water temples and cascades. An elaborate system of hydraulics supplied water from two high towers for a series of fountains and basins at three different levels. From Chatsworth came the inspiration of a cascade temple, symbol, so visitors were doubtless edified to learn, of abundance gushing from the feet of Fortune."

When in full operation, nearly 12,000 jets were in play and about 120,000 gallons of water were simultaneously displayed per minute. It was these waterworks that involved a great part of the huge expenditure which caught the Palace in financial troubles.*

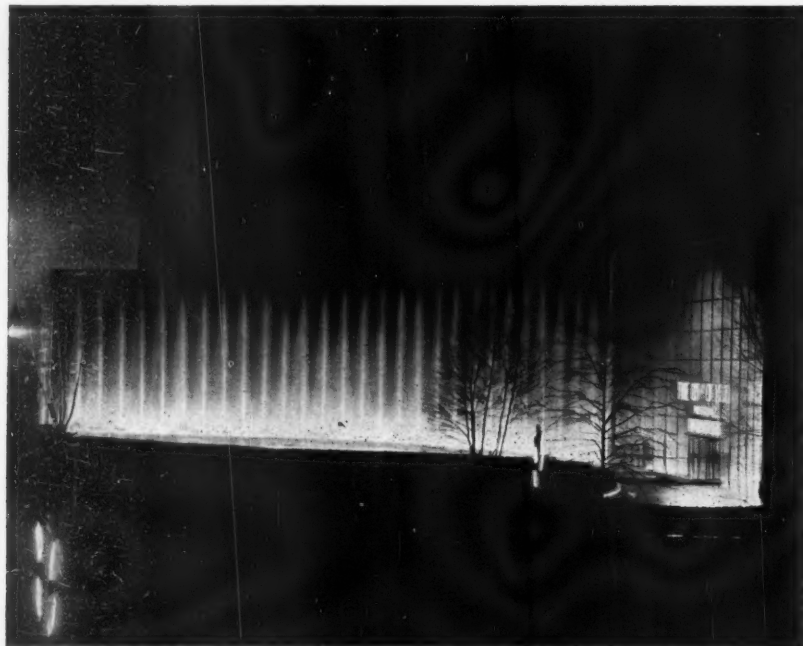
That is why water systems on the scale of the Crystal Palace or Wilhelmshöhe are not lightly undertaken, except sometimes by impressionable potentates.

"What would one do if he were a Duke and had half a million a year?"†

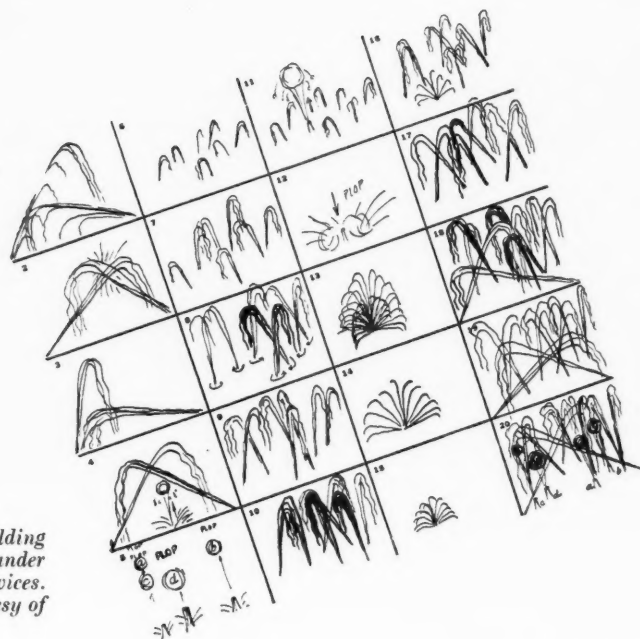
Build waterworks, of course. At least that is what the Duke of Devonshire decided when he gave Paxton a free hand to make Chatsworth an object of pilgrimage from all over the world. The pilgrims reacted in an appropriate manner;

* From "Paxton and the Bachelor Duke" by Violet Markham, 1935.

† Andrew Jackson Downing.



A series of fountains play against the blue background of the Consolidated Edison Company's building at the New York World's Fair. In the pool in front of the building a water ballet devised by Alexander Calder takes place. The effect is obtained by the play of fourteen nozzles controlled by timing devices. The sketches for some of the sequences in this ballet are shown on the right. (Reproduced by courtesy of "Plus.")



here is the record of one from America; describing the last of the great fountains:

"The Emperor fountain plays a sublime single jet, to the height of 267 feet!* It quite takes one's breath away with its living beauty. It is projected upwards with a force which seems almost supernatural, and like the fall on the American side at Niagara, comes down, not like water, but a great shower of diamonds and precious stones. When there is a gentle breeze, it waves to and fro like a gigantic white plume. To see it to advantage then, one should stand at some distance in the park, so that its snowy form, richly variegated if the sun shines, is relieved by the dark background of foliage. When the wind is high, it throws the spray to so great a distance, that they are obliged to shut off the head of water."

For this fountain eclipsed all others in the world. It was to have played for the first time as the Emperor Nicholas crossed the threshold of Chatsworth, but he never came, and was entertained instead at Chiswick by an escaped giraffe swimming across the lake—surely as unique an incident as the one the Duke had intended. However the latter was pleased with all that had been done and when the fountain got to work, wrote in his diary "It is a glorious success—the most majestic object and a new glory to Chatsworth. O Paxton!"

Paxton was indeed enchanted by the idea of water. He had been drenched in the spray of half the cascades of Europe, had visited aqueducts, and climbed into the tank at Wilhelmshöhe to measure accurately the thirteen jets. On the last occasion he reported to the Duke with considerable satisfaction that with enormous outlay the fountains could not be played together, or for more than forty minutes. Mostly he was occupied with elaborate calculations for reservoirs and pipe laying which began by bringing down the scorn of engineers and ended by astounding them with his accuracy. Volumes of water ascending or descending held no terrors for him, he worked empirically and flowered for the first time the giant Victoria Regia lily by a process of mathematics. The Lily House has gone; the

rock garden where he made a great waterfall, and the great cascade remain, and in spite of the criticisms of Loudon, who shared Shentone's somewhat arbitrary opinion that the eye should always look down upon water, the original fan and sea horse fountains must have been superb. On the occasion of the Queen's visit in 1843 these fountains were illuminated with blue, crimson and green lights which at a given signal burst into a blaze of fire; on the strength of this and similar evidence I had sought to connect Paxton with the inauguration of firework displays at the Crystal Palace, but learn that they were commenced only in the year of his death (1865) by C. T. Brock, who succeeded in persuading the directors "that fireworks were not really of an immoral tendency" and pointed out that glass, foliage and fountains provided a background which could not be duplicated elsewhere.

The age that denied itself the privilege of dreams took water as a symbol of greatness, and aped Gargantua and Gulliver in carrying out its curious revenge on Nature. The mid-nineteenth century was afraid to plunge into the darkness of the lake, although it desired rebirth, and the natural rock struck by the perpendicular column or the drooping fountain, overflowing vase and dripping wall (described by Loudon) were manifestations of this stifled wish. It is thus not strange that the artificial display of water should have been most magnificent when disciplined by fear.

Fear of water has partly been conquered since those days by acceptance of its function as a purifier. The crowd is actively participating in the ritual of immersion as unselfconsciously as the medieval court ladies who bathed in fountains surrounded by their male attendants. Hardy's prophecy that the tourist would turn from the Alps to the sand dunes of Scheveningen has been amply borne out by the cult of the sea side, which comes nearest to dissipating that other fear of water, contained in its real and mystical pervasiveness. The dream world of Venice, the romantic city which rises from the waves, the excitement induced by spontaneous eruption of subterranean reservoirs,—all these are sources of fear which prevent the accomplishment of the uninhibited decorative use of water in landscape.

What, then, can we look forward to as a source of pleasure in this instrument? I think if we accept it as an element of the dream world and use it in such fantasies as the night display in New York, where colour, light, and music, the reflections of the opaque black bed from which it springs combine to bring the crowd together in a ritual mood, pleasure will be a result. Art may not be present, comprehension will. An activity of the night, a method of return which all experience may be the result of power used in a moving way. Pleasure gained by ritual may not be desirable but it is surely a product of desire.

That other adventures are possible with this relatively unexplored material it has been the object of these few descriptions to draw attention. Displays of exhibition scale are not often to be seen nowadays except in the gardens of a Du Pont or in some civic place, but the experience of a contemplative kind like that of the obscure potter who because his stained glass was no longer in demand took to creating brilliant water pictures could surely be produced today. The nearest equivalent of Palissy's glittering pools are the glass-floored swimming baths lit by coloured floods. Our water ceremonies too are dull compared with that precious opening of the sluice in 1613. We are as uninquiring about water as the 19th century citizens of London whom a distinguished prelate apostrophized in his verses on the new water supply:

"Amwell! perpetual be thy stream,
Nor e'er thy springs be less,
Which thousands drink who never dream
Whence flows the boon they bless."

(Although as we have seen they had little reason to be thankful for the arrangements of that time and less to attribute them, as did Archdeacon Nares, to "kind Heaven's indulgent plan.")

Perhaps we are now displaying much more than Paxton's ingenuity with water that defies the laws of gravitation, but of the kind that lies darkly romantic between eighteenth century groves we seem nowadays to know very little. The eighteenth century, as usual, knew the material it used and its capabilities. They made it an element of night, the *mara* or demon which flows through the brain.

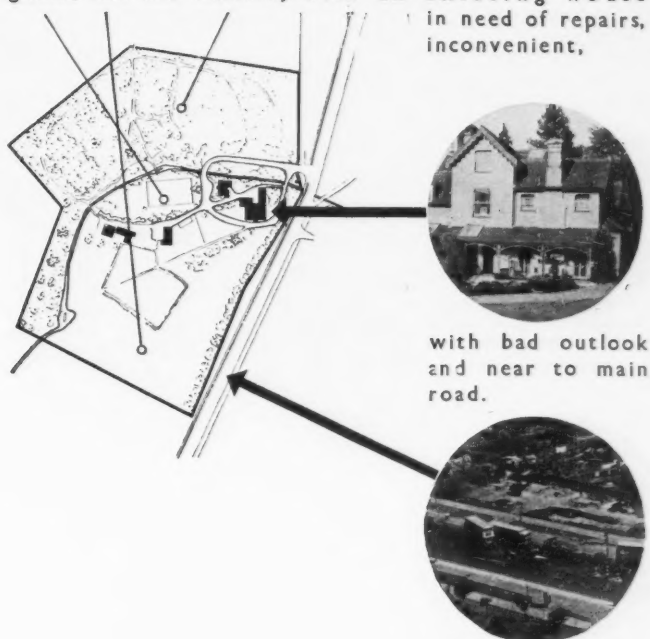
* Table of comparisons:—

Wilhelmshöhe, Hesse Cassel	..	190 ft.
St. Cloud ..	..	160 "
Russian fountain, Peterhof	..	120 "
Old fountain, Chatsworth	..	94 "
Versailles ..	..	90 "

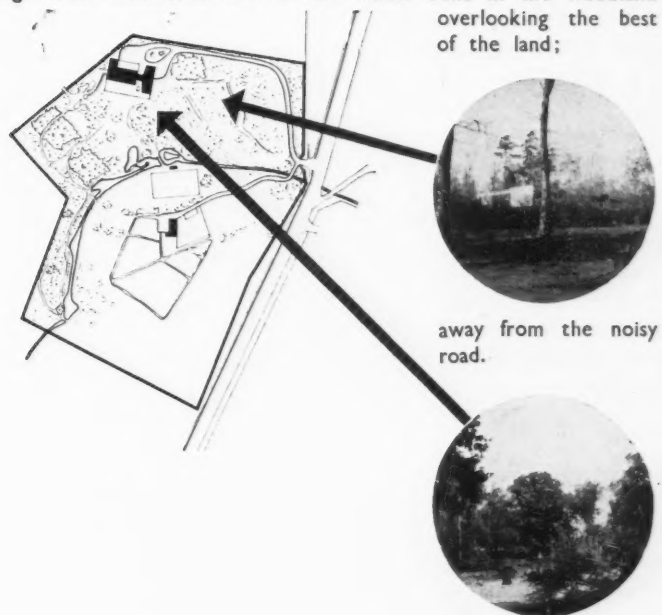
HOUSE AT ESHER, SURREY

PATRICK GWYNNE AND WELLS COATES, ARCHITECTS

THE PROPERTY consisted of about ten acres of garden, field and woodland, with an existing house in need of repairs, inconvenient,



THE PROPERTY is replanned with the existing house demolished and a new house built in the woodland overlooking the best of the land;

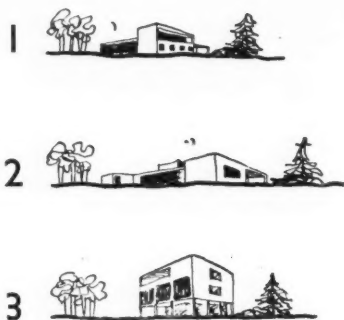


THE site of this house is a little way outside Esher, on the main Portsmouth Road. The existing house had been occupied by the present owner of the property for 25 years, and during that time the gardens and extensive grounds had been carefully developed. But the house was old, inconvenient, in need of repairs, and too close to the main road with its increasingly noisy stream of traffic. Two alternatives presented themselves to the owner: to find a new site in the country, further

away from London, or to find a site on the existing 10-acre property, for a new house. As the second of the two diagrams shows, this alternative was finally chosen, and the original building has been demolished. The result is a country house: a house, that is to say, with country setting and seclusion: but one with remarkably rapid access to London. The design of the house itself is most unusual, and constitutes an interesting experiment in country house

planning. It was only arrived at after the conventional lay-outs had been investigated and rejected. Three rejected arrangements of the required accommodation are summarized in the sketches below. Number one, the normal two-storey type, with living-rooms on ground floor level and bedrooms above, was rejected because the accommodation the client required would have given a ground floor plan of much greater area than the first floor plan, resulting in an uneconomic design, probably with considerable circulation difficulties. Number two, a bungalow plan, was rejected as being expensive, wasteful of site and also because of probably inconvenient circulation. Number three, a three-storey plan, was rightly considered too rigid and formal for a rural situation, and liable to be too inflexible in use, though it had practical advantages; easy circulation and relative cheapness.

The layout finally selected consists of a two-storey bungalow: that is to say, all the rooms (except the owner's study) are planned on the same level, but occupy the upper level of a two-storey structure, the ground floor consisting only of entrances, garages, part of the service accommodation, and a wide covered terrace open to the garden. This plan was found to be reasonably economical, to cover a suitable amount of ground, and to allow a convenient disposition of rooms. The diagram below shows

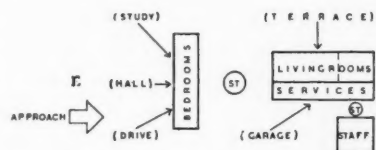


The three conventional types of lay-out, considered and rejected for this house, as described in the accompanying article. 1, the two-storey type, the commonest of all; 2, the spread-out bungalow type; 3, the elevated two-storey type.

that the rooms are planned in two wings at right angles to each other, linked by a small staircase block. The larger of the two wings has an extension at one end containing staff accommodation, which also encloses a service courtyard. This grouping of the accommodation was determined principally by questions of view and sunlight, and the diagrams on the right show the plans analysed in terms of these factors. Arrows also show the very direct and free circulation that this plan allows.

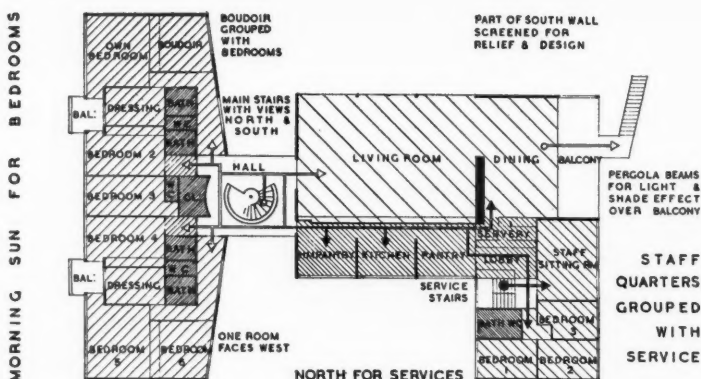
However, of equal importance is the architectural expression of this plan. Although practical considerations led to its adoption, the architects have appreciated that its loose articulation would enable them to produce a character exactly suited to the needs of a country house. It is informal, and suitably linked with the garden, but at the same time sophisticated, in keeping with its advanced technique and use of materials.

Furthermore, the logical grouping of accommodation in self-contained wings suggested a different structural technique for each, which is clearly expressed in the exterior. The character of the house is that of a superstructure on column supports. These constitute a structural frame and are left free where the garden terrace runs under the main wing of the house and where the drive runs under one end of the bedroom wing, under which they are again exposed, the brick wall being set back to emphasize its non-structural nature. In the living-room block the large windows occupy the space between the frankly expressed frame. In the bedroom block the form of construction allows strip windows of a more domestic character. The design of this house represents a remarkably thorough exploration of the aesthetic and practical possibilities latent in the application of new technique to the old problems of the country house: and credit should be given to the owner for allowing his architects the opportunity of experimenting, and breaking so much new ground.

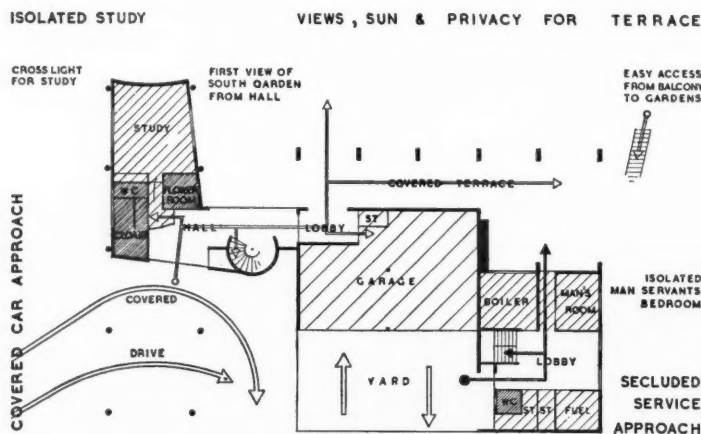


LAY-OUT OF FINAL SCHEME

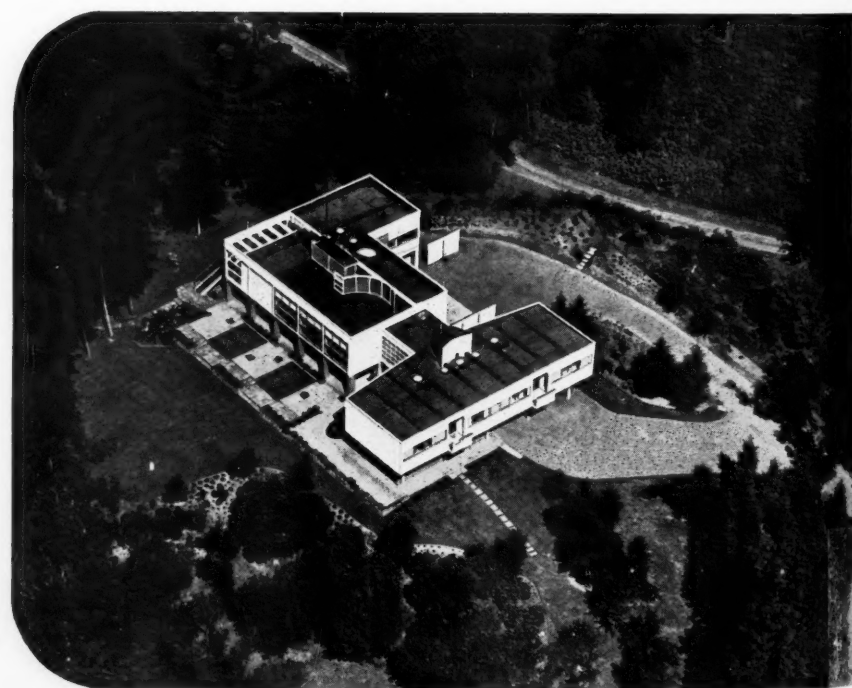
SOUTH SUN SCREENED FROM BEDROOMS BEST VIEWS & ALL DAY SUN FOR LIVINGROOMS



FIRST FLOOR



GROUND FLOOR



Above, an air view, showing the well-screened situation of the house (it is actually only a quarter of a mile from the main Portsmouth Road), and the lay-out of entrance drives and terraces.



The Exterior

All the principal rooms of the house are on the first floor, the ground floor (see facing page) being partly occupied by house and service entrances and garages, the rest of the ground floor space forming a terrace open to the garden. The entrance is reached from a driveway passing right under the house. This is shown in the view from the east, 1. The ground floor walls are of Kentish stock bricks and the upper walls and columns of concrete painted ivory white. The soffit of the overhang and the face of the screen wall on the roof are pale blue, and the recessed walls of

the balcony windows brick red. The windows have grey steel frames in a teak surround. 2, the south façade, seen from the garden. This view clearly shows the concrete framed structure of the main wing of the house, dividing the south façade into five equal bays. Three of these form the large windows to the living-room, the fourth is the end wall of the dining-room rendered in a warm buff colour with inset chocolate lines dividing it into panels, and the fifth is partly open to a dining balcony from which a concrete staircase with teak treads leads down to the garden.

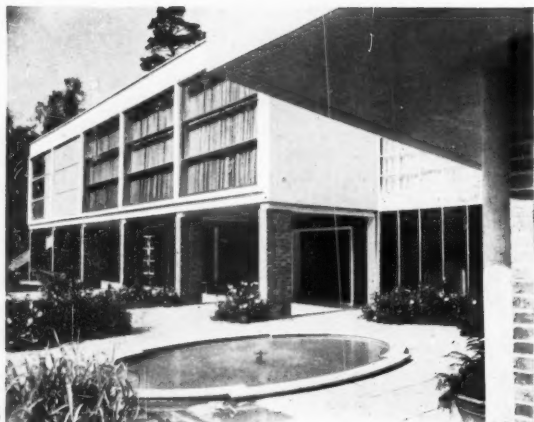




3



4



5

The Exterior

3, an exterior detail, photographed at night. It shows the staircase-hall section of the building which links the two wings. On the right is the window of the ground-floor study. On the left is the corner of the covered terrace. The piers of the terrace, which form part of the concrete framework of the building, are faced in brick. The ground floor walls are also brick. The superstructure is concrete painted ivory white. 4, A view from the south-west showing the large windows of the dining-room opening on to the balcony and stairs to garden, and 5, from the south-east, looking into the covered terrace beneath the living-room.



The Entrance

6, the front door, leading direct on to the covered drive-in, is surrounded by glass-brick walling. The far wall is of matt-surfaced dark red tiles, four inches square. The ceiling is high gloss pale blue and the door itself dark grey cellulose in a metallic finish.

The Staircase Hall

The ground floor staircase-hall and first-floor landing form the link between the two wings of the plan. These halls are walled with glass on the garden side: see the night view on the facing page. 7, looking through the lower hall window at the garden terrace. 8, the foot of the staircase. The floor and the stairs themselves are buff terrazzo. The walls are faced with Japanese grass cloth. The soffit is high gloss pale blue paint. 9, looking down the staircase well, showing the ivory tube balustrade with black ebonized handrail. 10, the upper hall. The ceiling is of acoustic tiles in one foot squares. From it hangs an old blue and white Bristol chandelier. The far wall is completely faced with mirrors of pewter tint, surrounding the buff leather-padded doors to the living-room.



10



9



8



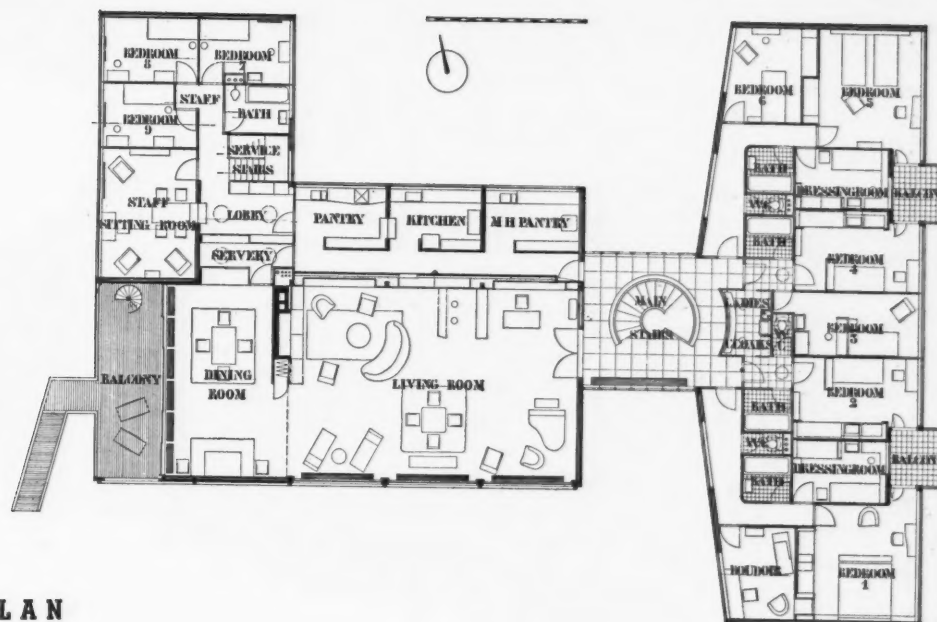
7



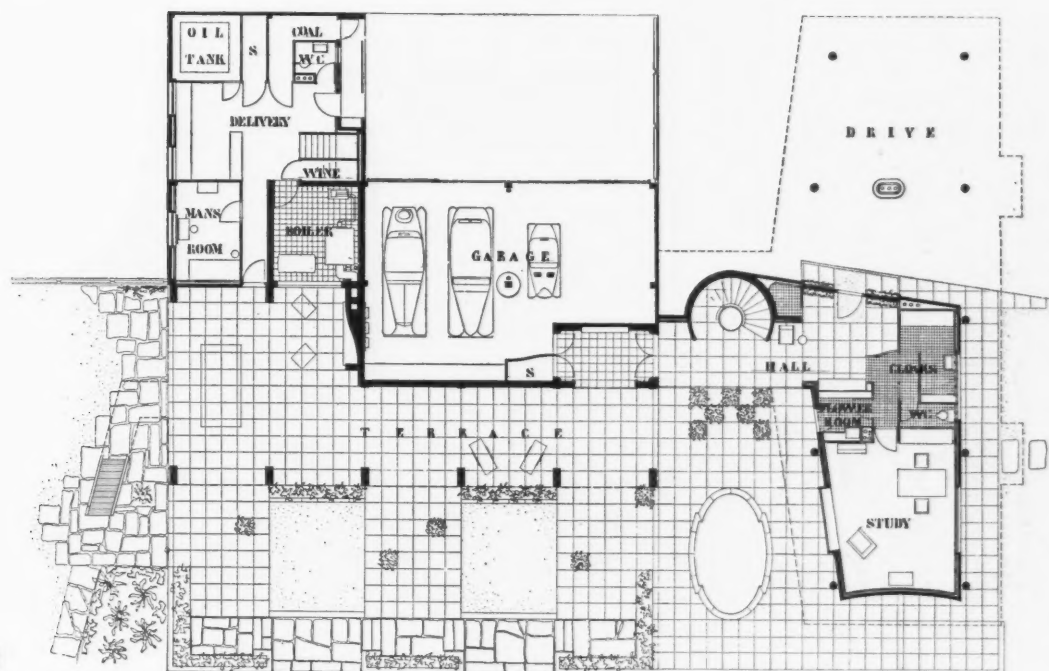
Living and Dining-Rooms

11 and 12, the large living-room which, with the dining-room separated from it by folding doors, runs the whole length of the main wing of the house. 11 shows the large teak-framed windows overlooking the garden. The upper and lower panels are fixed and the middle panel slides upwards. The ceiling and the wall-space beyond the window are finished with broken white paint. The floor is maple. 12, a view showing the opposite wall with its cupboards fitted with maple tambour doors. The edges and interiors of the cupboards are painted pale blue. The wall panelling is of French walnut. The fireplace at the far end is set in a frame of Levanto marble. 13, the dining-room. The sideboard fitment in the far wall connects with the servery. The balcony on the left has a spiral stair leading to the roof-terrace. The dining table and chairs are of sycamore and Brazilian rosewood, with dark red upholstery. Alternative summer and winter arrangements of living-room furniture, and alternative table arrangements in the dining-room, are shown in the analysis of the design on pages 110-111.





FIRST FLOOR PLAN



GROUND FLOOR PLAN

The two photographs on the right illustrate the detailed planning of the bedroom wing. The portion behind the curved screen wall in the centre of this wing is fitted up as a ladies' cloak-room, 14. The right-hand wall is covered with mustard-yellow rough-textured fabric. The shelf is painted light grey with a dark red cork top. The floor is of cork tiles. The bedroom wing is symmetrically planned either side of this point, each bedroom suite being approached from the staircase hall by an identical corridor, 15. The glass-brick wall on the right lights two bathrooms. A typical bedroom is illustrated in detail in the analysis of the design on page 112.



14



15

ANALYSIS OF THE DESIGN

1 The Living - Room

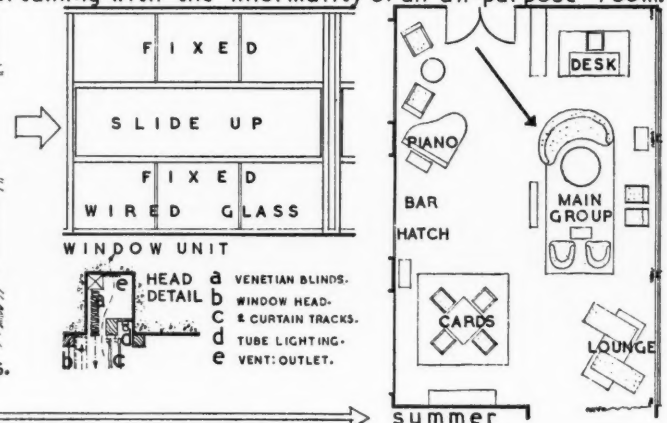
This room occupies the major part of the principal wing of the house, on the first floor level on which all the rooms are planned. It is lit by three large windows on the south wall, which is in fact all of glass except for the very small interruption of the vertical members of the structural framework. These windows have a view of the garden across the ground floor terrace. The living-

room is entered at one end from the staircase hall and at the other end is only separated from the dining-room by folding doors. Below the design of the room is analysed and the alternative furniture arrangements that have been devised for winter and summer are explained. Other photographs appear on page 108.

THE LIVING ROOM is designed to combine a background for entertaining with the informality of an all-purpose room.



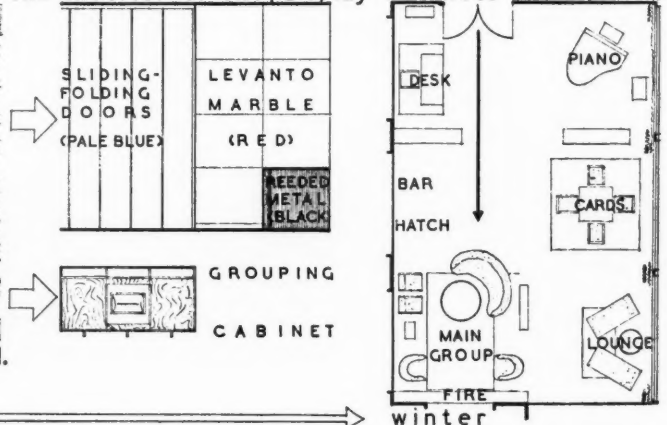
IN SUMMER the main scene is set against the large windows.



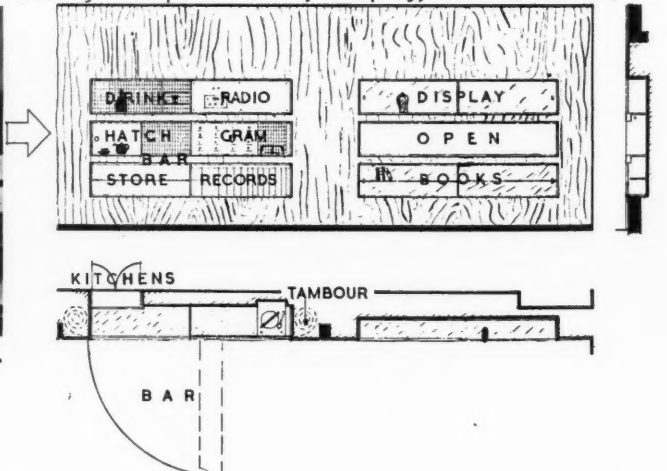
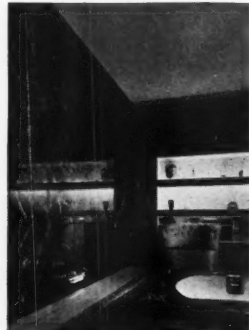
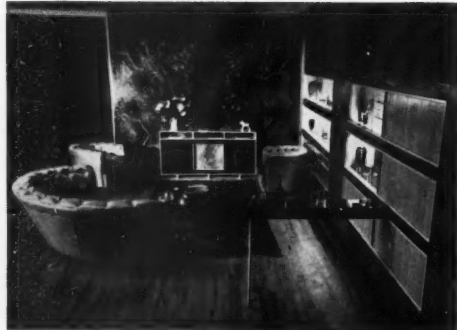
AT NIGHT the room is lighted from the head of the windows and the interior of the display cabinets in the wall.



IN WINTER the main scene is set against the fireplace wall.



THE FITTED WALL is a formalised design of decorative and utility compartments; display, hatch, radio, etc:



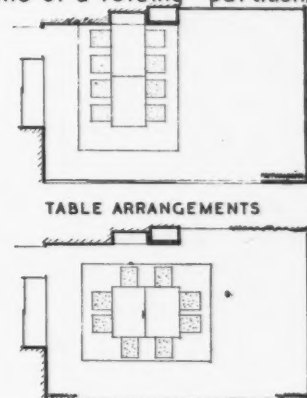
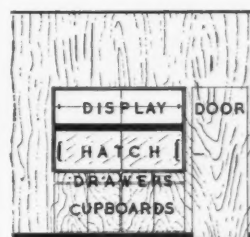
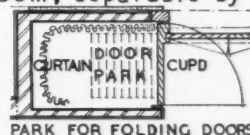
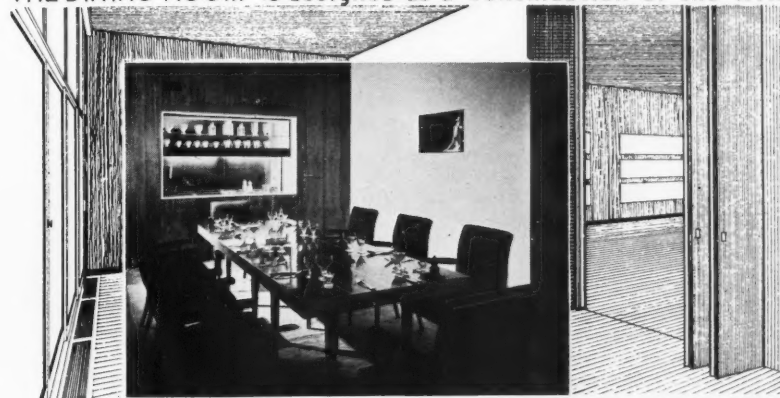
MOVEABLE CABINETS are used to define groups of furniture.

2 The Dining - Room

The dining-room and its out-door terrace occupy the remaining two of the five bays into which the principal wing is sub-divided. The south wall is solid, and the west wall consists of full-height windows opening on to the balcony. A service door and a hatch

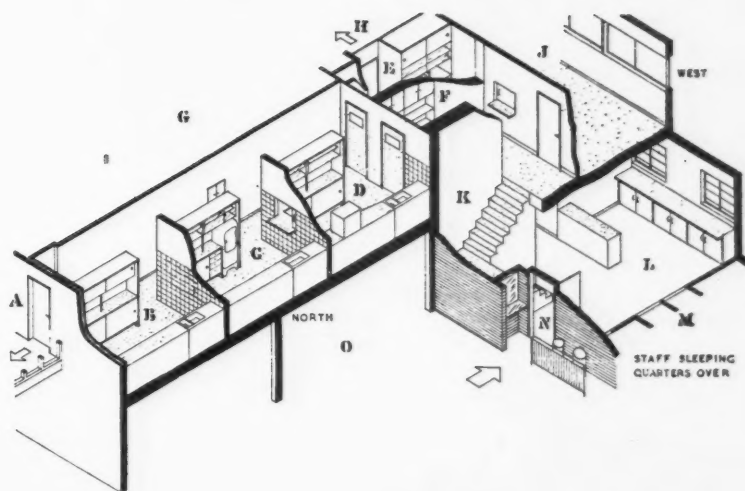
fitment connect with the servery. The photograph below shows one of the alternative table arrangements (see diagram); another arrangement showing only one of the twin dining-tables set for four people appears in the photograph on page 108.

THE DINING ROOM is designed as a continuation of the living room, separable by means of a folding partition.



3 The Service Quarters

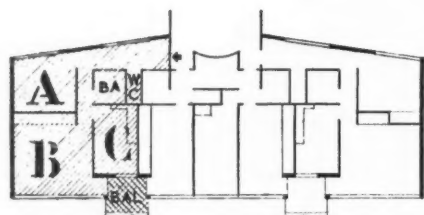
The diagram on the right shows the functioning of the service portion, which is the only section of the house planned on two floors. Two pantries and a kitchen of equal size are partitioned off from the service corridor by built-in fitments which stop short of the ceiling to allow circulation of air. This corridor runs from the upper hall to the dining-room servery, alongside the living-room, in the wall of which is a hatch allowing service direct. The lobby behind the servery leads to the servants' living quarters and down to the service entrance. The letters on the diagram indicate space divided as follows:



- A. MAIN UPPER HALL connects service wing with hall, living-room and bedrooms.
- B. HOUSEMAIDS' PANTRY with heated linen cupboards, sinks, ventilated shoe cupboard.
- C. KITCHEN with electric cooker and refrigerator, sink, ventilated larder cupboard and hatch to,
- D. PANTRY with electric dishwasher, sinks, china and glass cupboards. Access to servery and lobby.
- E. SERVERY with silver and stores cupboards. Hatch to dining-room, sideboard and door access.
- F. LOBBY with general store cupboards, brooms, G.P.O. and house telephones, bells, access to stairs.
- G. LIVING-ROOM, hatchway in fitment to kitchen passage for serving tea and drinks.
- H. DINING-ROOM fitment houses table supplies, etc.
- J. STAFF LIVING-ROOM, hatch to lobby for serving meals.
- K. SERVICE STAIRCASE.
- L. DELIVERY AND STORE LOBBY, cupboards for light drinks, vegetable racks. Wine under stairs.
- M. FUEL STORES.
- N. SERVICE ENTRANCE, covered way with teak slab and instruction slate. Dustbin screen.
- O. GARAGE AND YARD.

4 A Typical Bedroom Suite

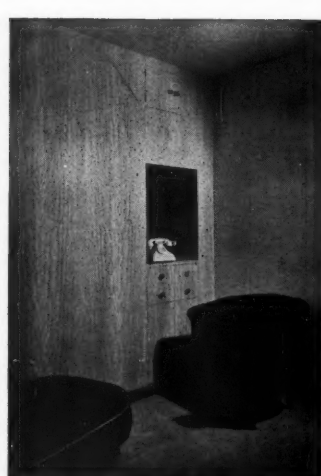
On this page a typical bedroom suite is analysed. It occupies the shaded portion on the key plan on the left. The three units of which it is composed, marked A, B and C, are a boudoir, a bedroom and a dressing-room. An identical suite balances this one at the other end of the wing. This and the bedrooms between are similarly equipped.



BIRCH
PANELLING

HATCHWAY
TO BEDROOM

COUCH



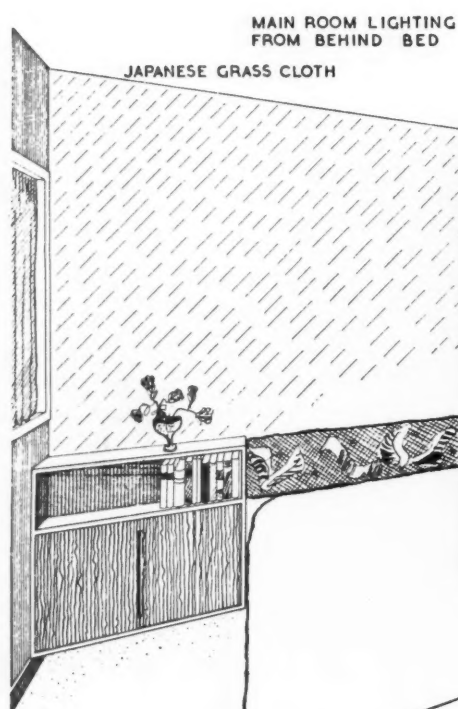
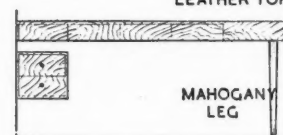
B

JAPANESE
GRASS CLOTH
ON ALL WALLS

BIRCH DESK

LEATHER TOP

MAHOGANY
LEG



A

EACH BEDSIDE FITMENT
HAS ONE CUPBOARD &
ONE FLAP UP SHELF



FITMENTS ARE OF BIRCH & WALNUT

FRENCH
WALNUT

STORAGE

GABOON
MAHOGANY
INTERIOR

HAT SHELF
ON OTHER SIDE

HANGING

BIRCH
PANELLING

TWO SETS OF TRAYS
IN CENTRE

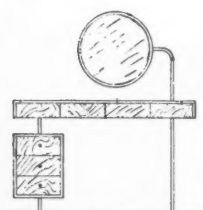
INSULATION

SHOE RAILS

6" SLAT DOORS SLIDE ROUND
BACK OF WARDROBE



BIRCH & WALNUT

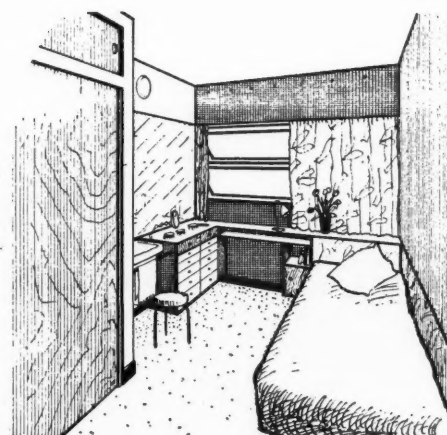


COPPER
FINISHED
METALWORK

BEDROOM
DRESSING TABLE

WALNUT
TAMBOUR
DOORS

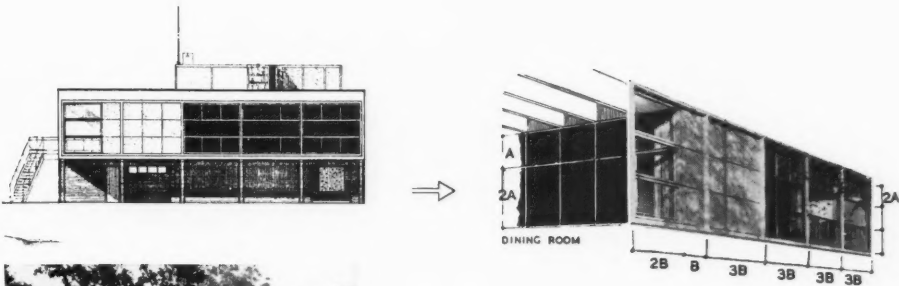
C



5 Facade Design

The design of each façade is based on a grid composed of a standard vertical unit, A, and a standard horizontal unit, B. All wall-lengths and window units are multiples of these dimensions. The arrangement of B units is shown in the diagrammatic plan on the right, and below these units are analysed to show the way the elevations are regulated.

The horizontal unit, B, is 4 ft. throughout. The vertical unit, A, is 1 ft. 8 ins., giving a cill height of either 3 ft. 4 ins. (2A) or 5 ft. (3A) according to requirement, a window-head height of 6 ft. 8 ins. (4A) and a ceiling height of 8 ft. 4 ins. (5A) or 10 ft. (6A) in the larger rooms.



THE SOUTH ELEVATION

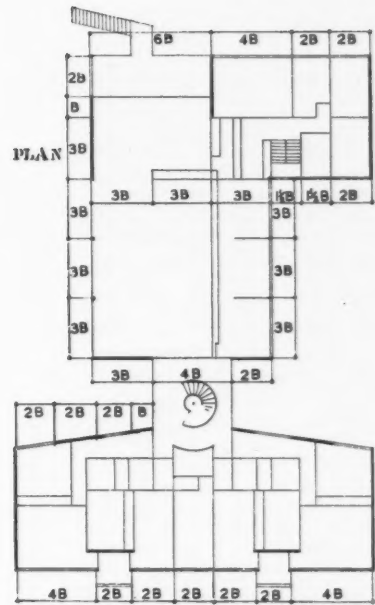
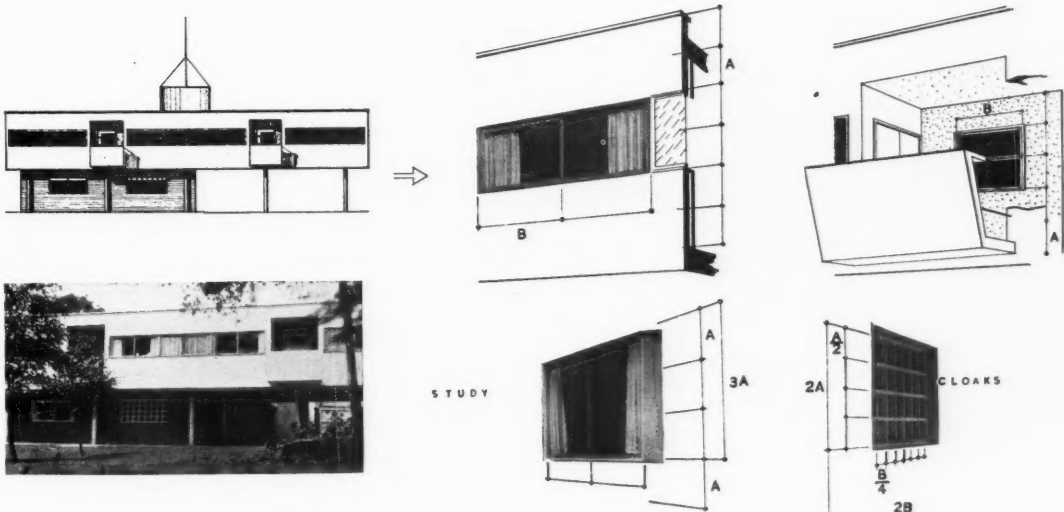


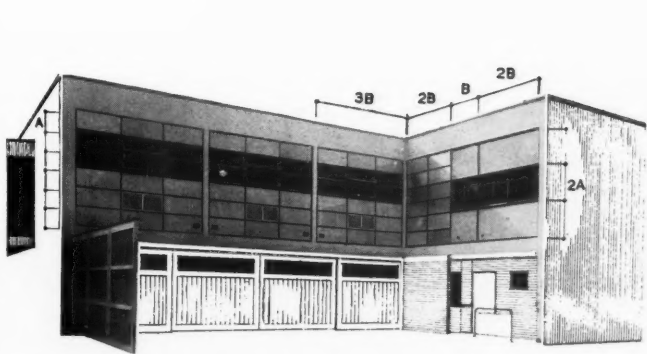
DIAGRAM OF PLAN UNITS (B)



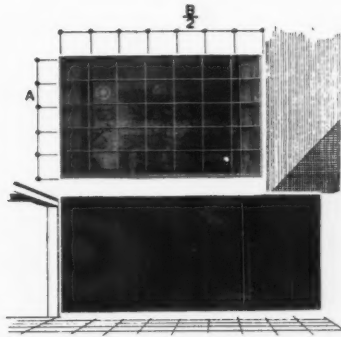
THE EAST ELEVATION



THE WEST ELEVATION



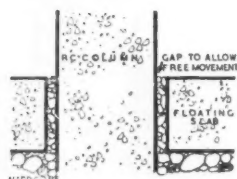
THE NORTH ELEVATION



THE STAIR LINK

The presence of water, 5 ft. below ground level, over the whole of the site necessitated pile foundations tied together with a system of ground beams.

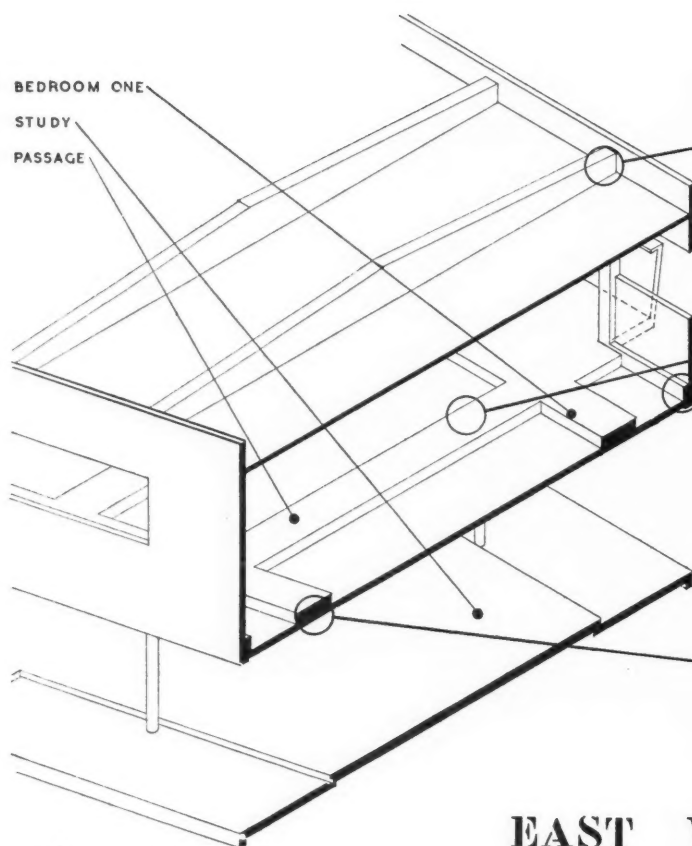
Instead of the normal surface concrete there is a floating slab over the whole area of the house which carries the brick walling. This walling is entirely non-structural, being used for the outer walls on the ground floor only for the sake of its weathering quality and its colour and texture. As it is mostly only $4\frac{1}{2}$ ins. thick and in long runs, Sussex bond is used. The actual structure is a reinforced concrete frame, and where the vertical members of this frame pass through the floating slab they are isolated



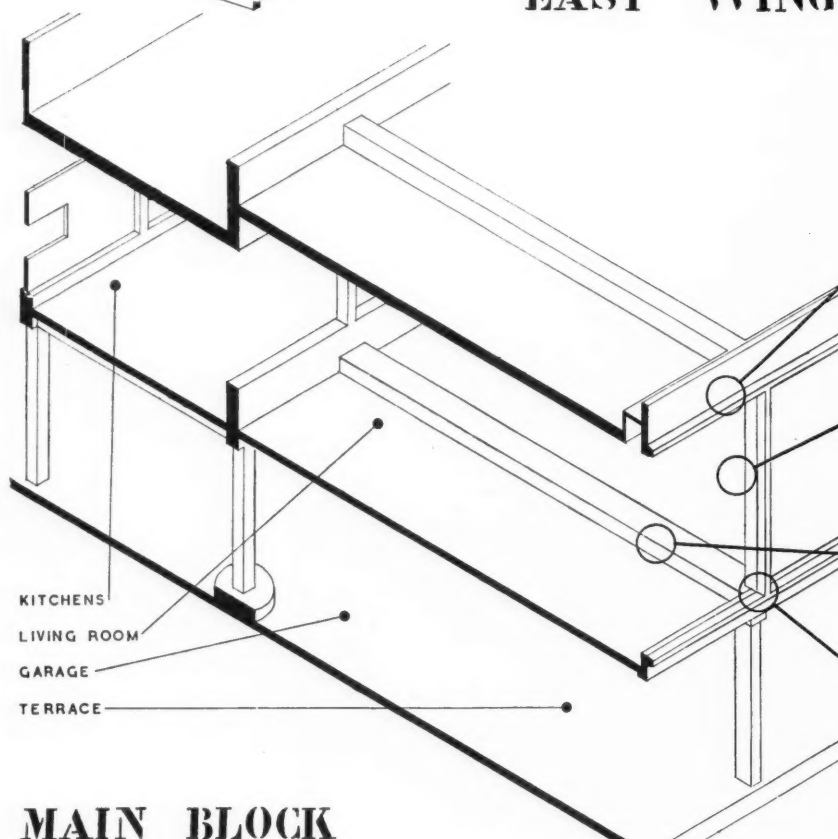
from it by a gap filled with hard-core to allow freedom of movement, as in the sketch above.

The concrete superstructure of the two wings differs, in accordance with different requirements in the way of openings and uninterrupted space. The two forms of structure used are shown in the diagrams opposite, which also show details of the reinforcement at key points. On the facing page finishing materials are similarly shown. The consulting engineers for this building were Felix J. Samuely and Conrad Hamann and the quantity surveyor Cyril Sweett.

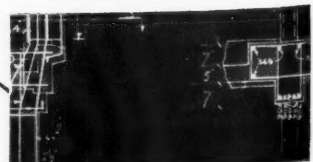
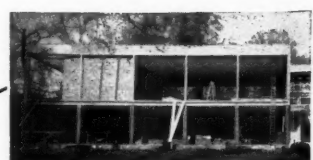
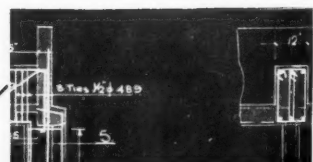
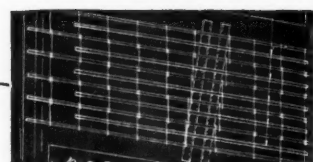
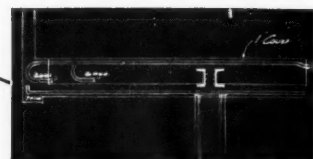
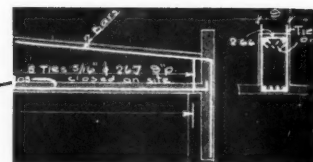
T H E C O N C R E T E S U P E R S T R U C T U R E



EAST WING

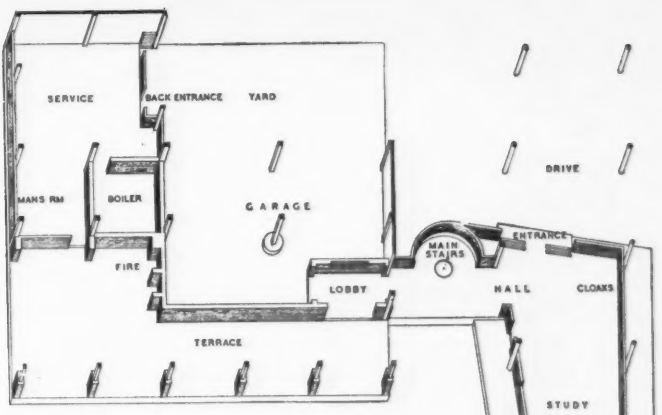


MAIN BLOCK

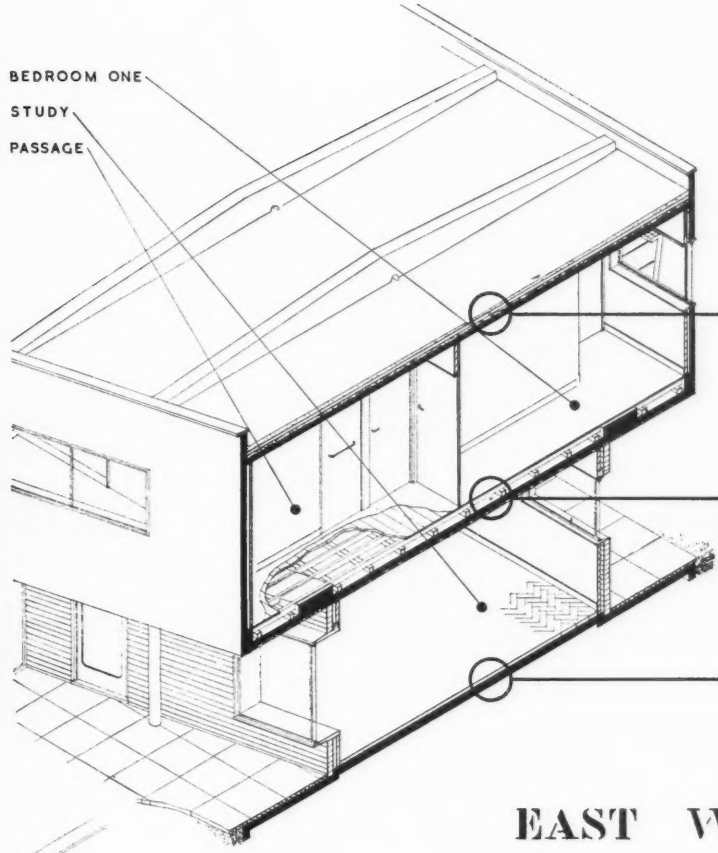


Materials

FINISHING MATERIALS

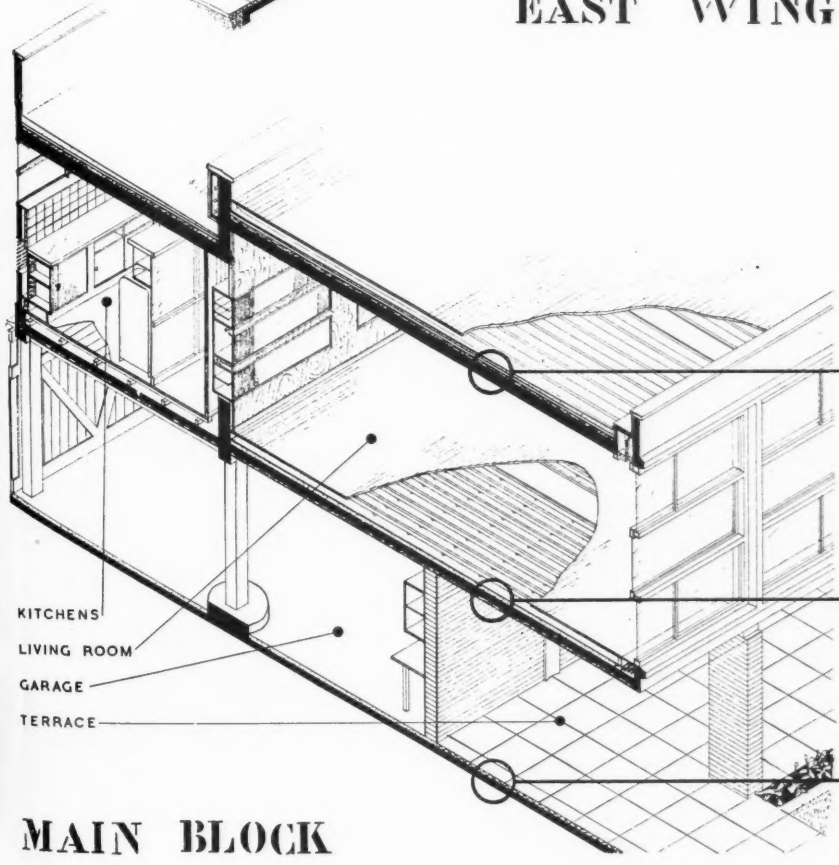


GROUND FLOOR STRUCTURE
SHOWING LAYOUT OF
CONCRETE PIERS AND BRICK WALLS



- ASPHALTE
SCREED TO FALLS
PUMICE SCREED
CORK
CONCRETE ROOF SLAB
PLASTER
- DEAL FLOORING
FLOOR JOISTS
BEARER JOISTS
TENTEST STRIPS
CONCRETE SLAB
HERAKLITH INSULATION
PLASTER
- OAK BLOCK FLOORING
CONCRETE FLOATING SLAB
HARDCORE

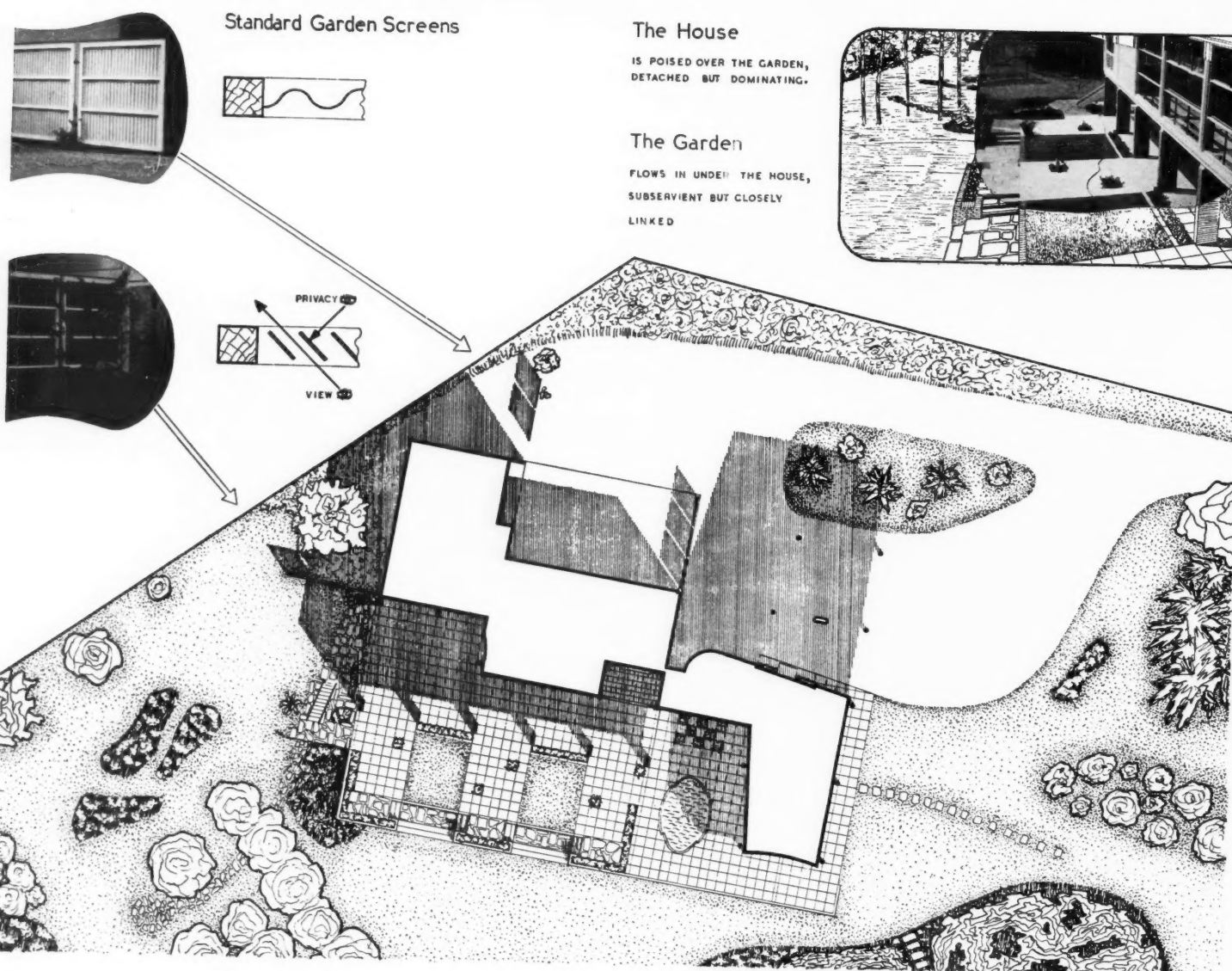
EAST WING



- TEAK SLATS
FIRINGS
ASPHALTE
SCREED TO FALLS
PUMICE SCREED
CORK
HOLLOW TILE ROOF SLAB
PLASTER
- MAPLE FLOORING
JOISTS ON RUBBER PAD
FLOOR CLIPS
SCREED
CONCRETE SLAB
HERAKLITH INSULATION
PLASTER
- ARTIFICIAL STONE SLABS
CONCRETE FLOATING SLAB
HARDCORE

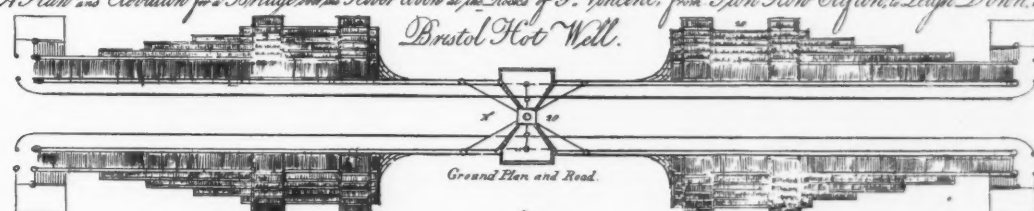
MAIN BLOCK

7 The Terrace and Garden



THE GIANT'S STRIDE

A Plan and Elevation for a Bridge over the River Avon at the Rocks of St. Vincent, from Lion Row Clifton, to Leigh Down, near Bristol Hot Well.



Dimensions The Great Arch 220 ft high 180 ft wide. Base 400 ft Long 140 ft wide. Road on Top 700 ft Long 50 ft wide Each Story 40 ft high. Gallery 6 ft wide. Contents. 1. A Light House. 2. A Toll House. 3. A Chapel, called St. Vincent's. 4. 5. 6. Publick Granaries. 7. Corn Exchange for foreign Grain. 8. Coal Wharf & General Market. 9. A Store Wharf & Water Mill. 10. A Manufacture for Cotton, Wool, &c. 11. A Marine School. 12. A Museum Library. 13. Subscription Room. 14. Engine Room. 15. Vertical Windmill. 16. Twenty Houses in the Side of the Bridge. 17. Tennis Ring for Out Office. 18. Clock Tower & Star Case. 19. Watch House & Bellry. 20. Road and Ground Plan.

By Paul Nash

WHEN I told a few people I was going to Bristol for the first time, I was warned not to miss a number of things: The Theatre Royal, Bristol sherry, Vivian Terrace, Leigh Woods and the Suicide Spot.

But my brother said I wish you would do something about that Suspension Bridge.

The matter was settled out of hand by my cousin, a resident, picking me a hotel bedroom with so shrewd a view of this phenomenon that making pictures of it was child's play.

The double window of the room enabled me to look both up and down the river. On the east side towards the town, the view was pleasant but uninteresting, except for the wooded cliffs immediately in front. But the western angle gave upon an extraordinary prospect.

The sun had already gone down behind the opposite shores but not so long since as to deprive the scene of its influence. A roseate flush mounted from the western horizon, throwing up the crest of trees into a dark barrier like the battlements of a castle. From these heights, the woods sank down the steep slopes of the cliffs into an ever deepening gulf of blue twilight until

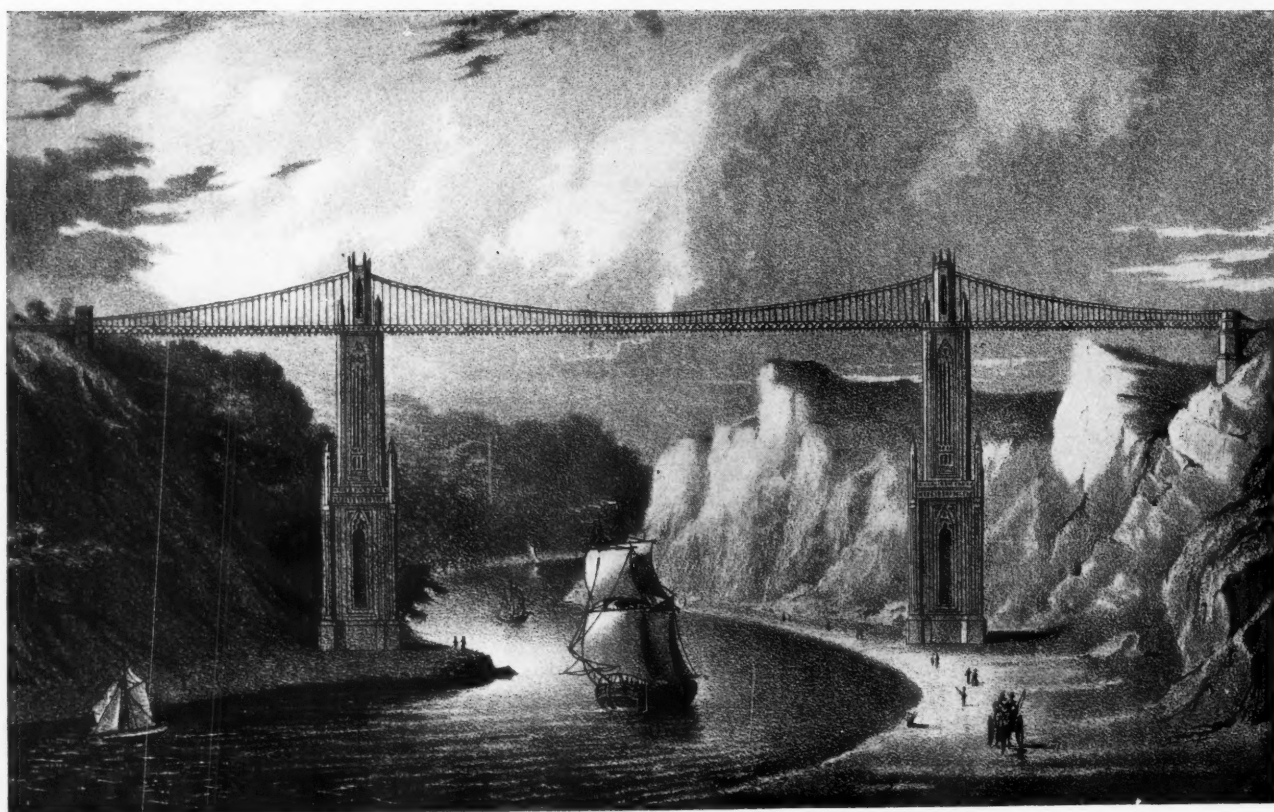
arrested by the level plain of the river banks, where the light revived in livid reflections from the gleaming mud flats and the mirror of the Avon itself.

Far above, at a sickening height, hung a crimson bridge held over the chasm by immense chains which swung across and threaded into the eyes of two strangely shaped towers at the full height of either cliff. These towers had a vague likeness to something out of Egypt, yet recalled somehow the Earl's Court Exhibition. But in the gloaming their quaintness changed to romantic glamour and an indefinite architectural dignity. The whole scene, in fact, set in the pale illumination of the afterglow, had a poetic spell. As the light ebbed from the highest sky the tide of gathering shades flowed slowly over the wooded shore, quenching its forms to darkness and throwing into more salient relief the abutments of the great piers. Meantime, so far beneath, the river, true element of ebb and flow, seemed motionless.

This ghostly water, gleaming in the pit of the vault, enhanced the dizzy height of the bridge, reminding one of the dread reputation of the Gorge. I was turning

DESIGN BY TELFORD

Telford's Gothic design for a bridge over the Avon gorge was submitted after he had rejected all of the twenty-two designs entered in the competition of 1829, which he had been asked to adjudicate. It was in turn rejected as impracticable. This, and the other prints illustrating the article are reproduced from originals kindly lent by the Central Library, Bristol.



from the window when a shrill call sounded from below. I looked down fearfully to see a train running into the tunnel of the rocks. In a minute it had emerged at the farther end, now almost invisible. The white smoke darted and glided into the darkness, like a white snake escaping into a cave.

The next morning I decided to take a close look at the Bridge and the Gorge and learn something of their history. During the night I had been wakened from time to time by the most extraordinary noises; immense voices echoing in the walls of the Gorge. They might have been an argument of giants I thought. Hollow and brazen an overwhelming bellow would resound *O o o U u Ou* and again louder and more insistent *Hu Hu U Ow*. To which another voice replied as loudly but quite shortly, *UG*. The tide was in and the ships and tugs were passing up the Channel.

At a near view by day the Suspension Bridge revealed itself to be about as formidable and baffling as I had expected. Without doubt it was a magnificent feat of engineering. But as an architectural achievement it was less satisfying. Certainly, it reflected Egypt, but by way of the White City. Aside from that, it had an unhappy air like the dream of an ambitious mind, never quite realized. What dream was walled up in this impressive travesty? I felt that something more lay behind the guide book's short record, and I determined to find it out.

I began to discover what I wanted on returning from an inspection of the view

from the far side of the Bridge. The back window of the Porter's Lodge displayed a set of faded views. On examining these I made the curious discovery that they represented a series of bridges over the Gorge, but each of a different unfamiliar design. On enquiry, I was told the prints were not for sale but reproductions were incorporated in a small brochure called *The History of Clifton Suspension Bridge*. I eagerly purchased a copy and began to study its contents.

After reading that the Avon Gorge, five miles from the mouth of the River Avon, is one of the most picturesque spots in Great Britain, I was not surprised to learn that geologists ascribed "this mighty rift in the landscape" to an earthquake; but legend preferred the idea of two giants hewing the Gorge with a pickaxe. Recalling the huge nocturnal voices, I could believe in the latter version; indeed, as I read on the idea of giants obsessed my mind. Strange forces had been at work in the Avon Gorge, I felt convinced, not those alone of honest engineering.

The idea of spanning the Avon Gorge originated in the minds of certain merchant princes of Bristol about the middle of the Eighteenth Century. I found it described as "a natural tendency of the wealthier citizens to locate their homes in the bracing air of the higher lands," and at the same time "obviate the necessity of descent and ascent" without interference with the passage of ships on the river. That was all. No great business involved; no money in it—except what would be sunk in it—

simply a desire for fresh air without too much trouble.

The first step was taken in 1753, when Mr. Vick, a wine merchant, bequeathed a thousand pounds to one of the City Guilds, directing that the money should be allowed to accumulate at compound interest until it reached ten thousand pounds. Between that step and the ultimate stride across the Avon, stretched out a hundred and eleven years and nothing but trouble. Again and again the enterprise failed for want of funds or sufficient enthusiasm. Yet as often "an inhabitant of Bristol" would write "Clifton Suspension Bridge. Sir, I am much surprised and mortified to find that this undertaking has been *again* suspended . . ." It makes a history impossible even to outline in this space of a short essay, but one which is every bit worth reading at leisure from the records. Nevertheless, the records will make no mention of the supernatural, still less of poetry, but it is of some such quality as today we call surrealism—which may combine both—that became evident in my experience.

Some readers of THE ARCHITECTURAL REVIEW may recall a study I made of seaside surrealism at Swanage three or four years back. It is usual in English surrealism for the place to provoke the phenomenon. But in the case of Swanage we owe so much to those eminent mid-Victorian surrealists, Mowlem and Burt, the makers of Swanage, and the process of Pelion upon Ossa, that the significance of the original site is dubious. But here in the Avon Gorge, I had no doubt whatever that



DESIGN FOR A SUSPENSION BRIDGE
Across the River Avon.
By C. H. Capper, Engineer, Birmingham.
Drawn as Exec. by H. Harris.
Printed at the Lithographic Establishment, Queen's College, Oxford.

DESIGN

BY CAPPER

The design entered by Capper in the competition of 1829. An ingenious attempt to clothe an otherwise solid structure with a ruined appearance, a typical expression of the romanticism of the period.



PROPOSED PLAN OF A BRIDGE ACROSS THE AVON FROM ST VINCENT ROCK TO LEIGH WOODS.
The bridge is to be of stone, and is to be of the following dimensions:
Length of bridge 1,000 feet
Width of bridge 40 feet
Height of bridge 20 feet
The bridge is to be of the following dimensions:
Length of bridge 1,000 feet
Width of bridge 40 feet
Height of bridge 20 feet

DESIGN

BY BURGE

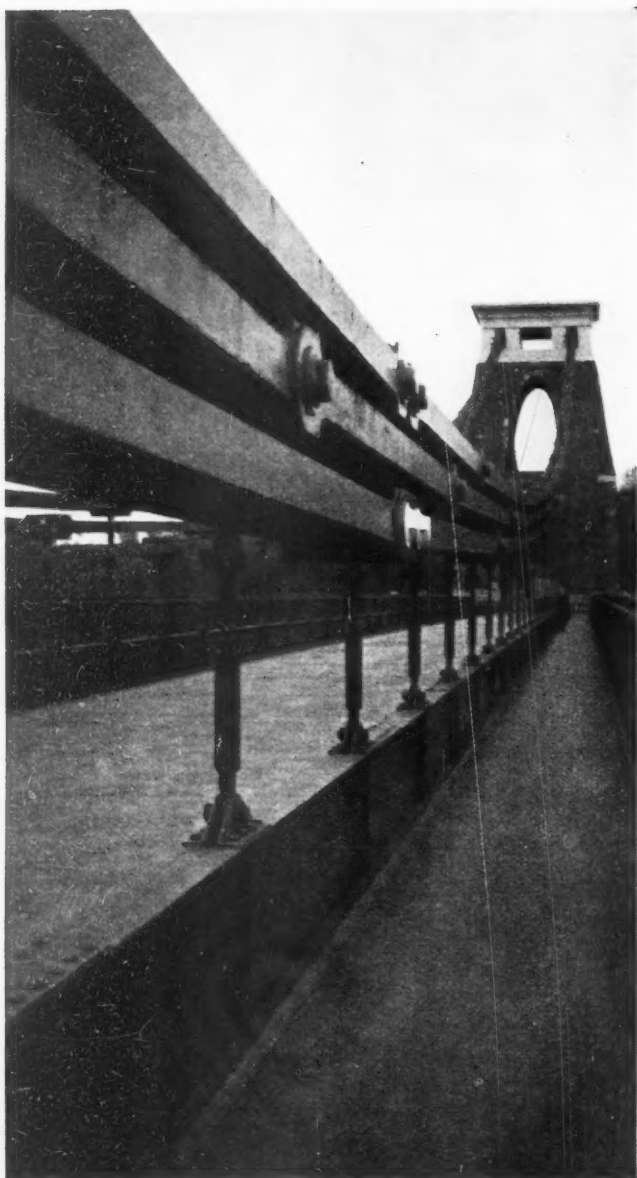
A further design entered in the competition of 1829 by Burge, an interesting contrast to the engraving by Capper reproduced above, showing how each designer has accommodated the landscape effect to the spirit of his structure.



DESIGN

BY BRUNEL

The bridge today, built from the designs of Brunel after many previous attempts, but not completed until after his death. From a drawing by Paul Nash.



A view of the bridge looking along the footway showing one of Brunel's towers, which he intended to complete in the Egyptian style, embossed with figures and with four large sphinxes looking each way across the gorge. Photograph by Paul Nash.

it was the natural features and spirit of the place that inspired irrational dreams. That mighty rift in the landscape, the effect of volcanic eruption or the pickaxes of giants, the convulsive, varicose rocks, the impenetrable woods, the tortuous trees and, withal, beneath, the sundering waters of the Avon; these elements brewed a magic for the imagination which mounted to the brains of our prosaic engineers, unsettling their equilibrium and releasing into their troubled thoughts poetic visions and the schemes of paranoia.

It began at the earliest opportunity when William Bridges submitted the first design in 1793 (see headpiece to this article) which was no less a project than to fill in the entire chasm of the Gorge with a stone structure having a central archway for the passage of ships. As may be seen from the contemporary engraving, this involved the erection of a stone building containing, among other offices, a lighthouse, a chapel, a corn exchange, certain wharves and vertical windmills, a Marine School and a Museum and Library. Had it ever been realized, it

might have looked, with its one hundred and forty odd openings cut in the blood-shot rock of the Gorge, not unlike the façade of Petra. Certainly it would have been among the wonders of Britain yet I found no evidence that the proposition of this remarkable fantasy perturbed the Bristolians at all. "Under what circumstances it was produced we have no knowledge" is all they will admit, and but for the imprint of this design the dream would have faded from memory.

Actually, thirty-six years elapsed before anything else happened; then, in 1829, when the money invested had reached eight thousand pounds, there was a general awakening. A Committee was formed which purchased a site, and began to advertise for designs. Twenty-two were submitted, including four by Brunel, and Mr. Telford, who had just built the Bridge across the Menai Straits, was asked to adjudicate. When Mr. Telford found fault with every design, he was asked to submit one himself with the result that the enchantment of the Gorge began its spell and the cautious Mr. Telford produced a three

THE GIANT'S STRIDE

span Bridge (reproduced on page 118) supported by two colossal Gothic piers rising from the shores of the River. It was condemned eventually as impracticable but one may doubt if any other solution of this strange problem is at once so architecturally and poetically happy. And yet, those dizzy towers with their dark hollow stairways howling in the winter wind while the delicate span swayed far above! How crazy, how beautifully mad, and the cost——

The two other designs shown, by Capper and Burge respectively (reproduced on page 119) are less fantastical than they seem when we consider the period and the tendency of the time towards romantic expression. Even so, Capper's exercise in the ready-made-ruin method is immensely evocative and acutely appropriate to the Gorge. We have only to remove it from its rickety landscape which its own character has suggested to the lithographer and imagine it among Mr. Burge's stern rocks and stones to know how like a phantom it would appear.

And so we come to Brunel. Isambard Kingdom Brunel, Fellow of the Royal Society, one of the greatest engineers of all time: what happened to Brunel in the Avon Gorge? It fascinated him. He seemed determined to span it. He made constant corrections, adjustments, compromises. In the end, he gave up even his dream. Yet he died with the Bridge unfinished "with only the two piers standing gaunt and grey against the sky line and the iron bar laid across the Gorge, and this within a mile of a city proverbial for its wealth." Thus the *History of the Clifton Suspension Bridge*.

As everyone knows, it *was* finished in the end. But how many people know that Brunel's dream was to finish the great towers in the Egyptian Style, in the spirit of the great remains at Thebes, and encase them in metal, embossed with figures, illustrating the whole work of construction at various stages and the different trades employed in the erection of the Bridge and the manufacture of the material. And that on the tops of the towers, staring across the Avon Gorge, were to be four vast images of the Sphinx . . .

Before I left Bristol I made two purchases. One at Douglas Cleverden's bookshop, the other in an antique den on Christmas Steps. The first was an early edition of the *Castle of Otranto*, that surrealist romance of the giant, which, oddly enough, I had never read. My other was an ivory object representing a snake with a curiously plated tail. It was rather dirty and until I had washed it to a smooth whiteness I failed to recognize its significance. At that moment I heard again the startling call from the Gorge and remembered the smoke of the train disappearing into the darkness.



THE MUSEUM OF MODERN ART, NEW YORK



This museum has been established in New York for some years, occupying a converted mansion, but has now moved into its new building which is illustrated on this and the following pages. The site is a whole block in depth, with frontages on West 53rd and West 54th Streets. The building, which contains offices, clubrooms and a lecture hall as well as exhibition galleries, is of steel and concrete

frame construction and is faced externally with white marble. I, the 53rd street façade. The curvilinear canopy with monel metal edging shelters the entrance to the building itself and to a right-of-way passage leading to 54th street. The large window of thermolux glass lights the exhibition galleries. The top floor terrace is part of the club suite.

PHILIP S. GOODWIN
AND EDWARD D. STONE



2



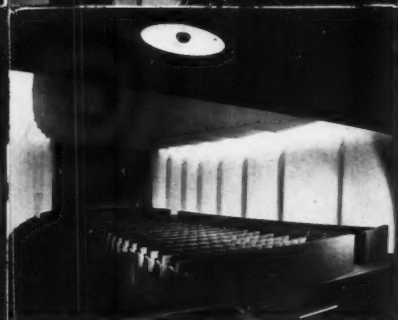
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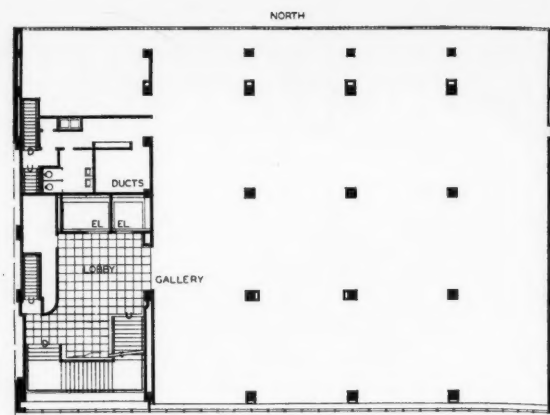
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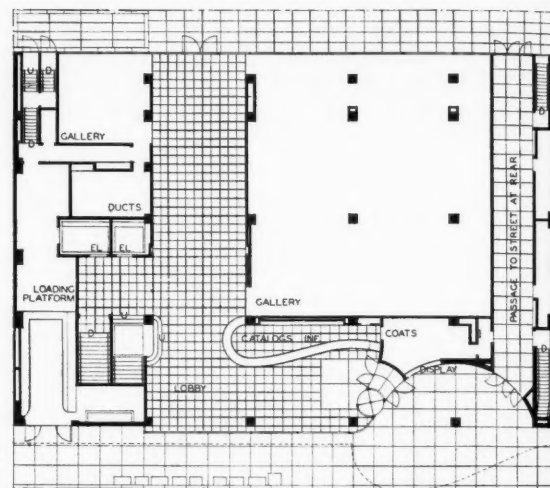
6

2, the entrance hall, looking away from the main doors, showing the catalogue and information counter on the right. The main staircase at the far end is enclosed by a solid wall, which provides effective display space for a large picture. 3, the staircase passing across the first floor window. The ground floor also contains an entrance for exhibits with loading dock and exhibition gallery. Below is a mezzanine floor containing storage, packing and service rooms. The basement contains more service space and a large lecture room, 6, which is used for public lectures and for showing films from the Museum's Film Library, which represents an important side of Museum activities. The foyer to the lecture hall, 5, has its walls decorated with stills from the Film Library. 4, the library and reading room on the third floor. This floor contains also a preview room for the film section. The administrative offices are on this and the fourth floors.

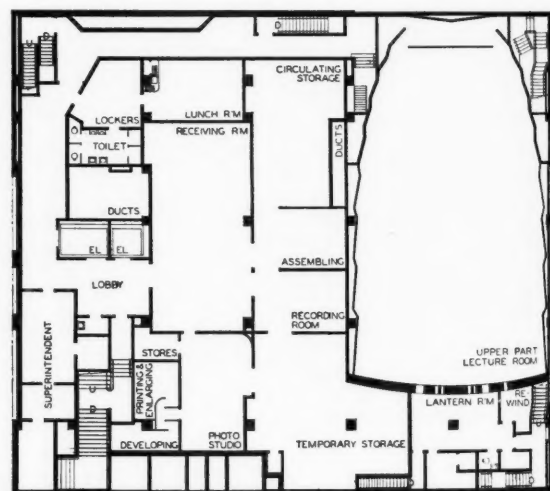
FIRST FLOOR



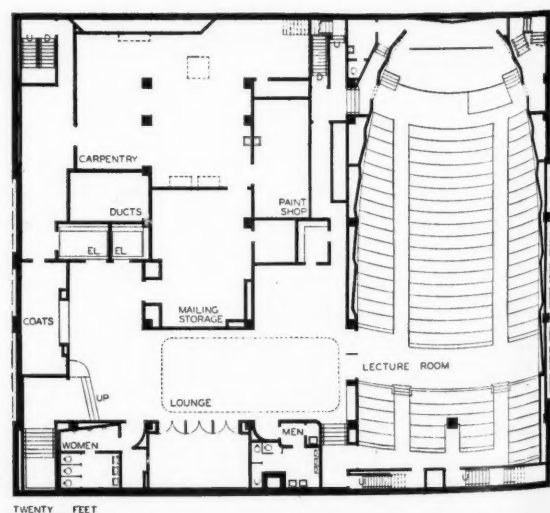
GROUND FLOOR

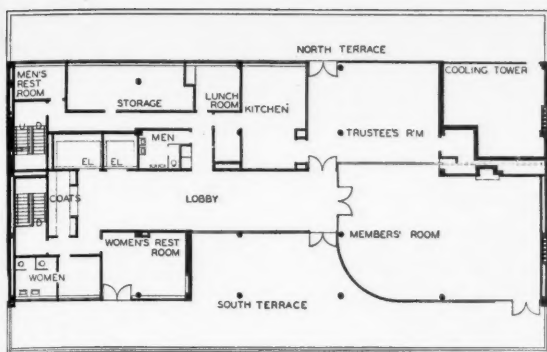


MEZZA- NINE

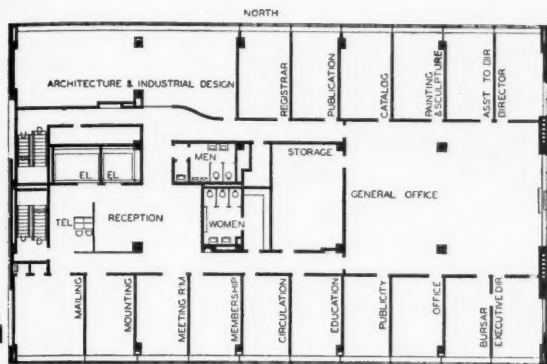


BASE- MENT

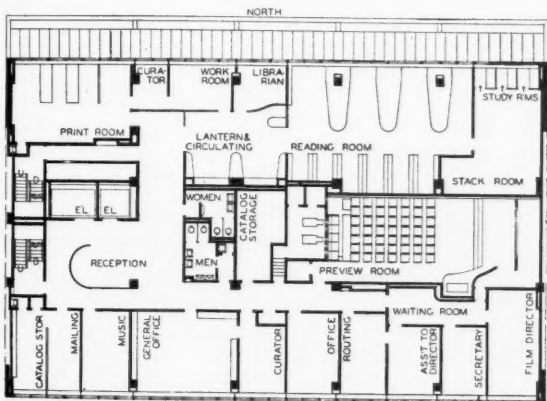




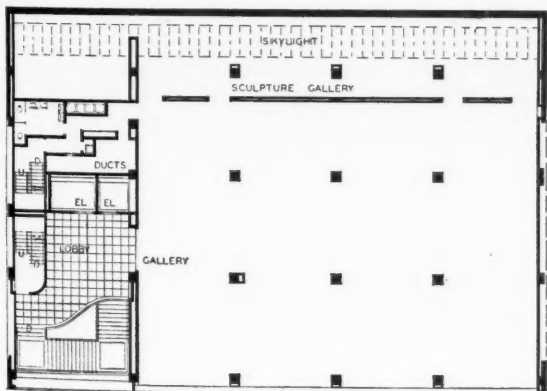
FIFTH FLOOR



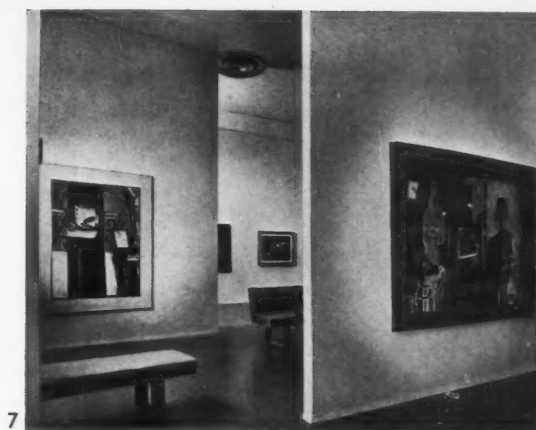
FOURTH FLOOR



THIRD FLOOR



SECOND FLOOR



7



8



9

Except for the staircase and lifts, the whole of the first floor is given over to exhibition space. For the present inaugural exhibition this space is subdivided by screens, reaching the full height of the gallery, 7. On the floor above there is a separate sculpture gallery, 8, with top light only. This is achieved by setting back the upper three storeys of the building along the north side. The rear, or garden, view, 10, shows this set-back; also the glass-brick walling, alternating with clear glass panels, to the first floor gallery, with the solid wall of the sculpture gallery above. The inaugural exhibition also contains an architectural section arranged on the ground floor gallery, 9. It consists of a housing propaganda display, designed jointly by the Museum's Department of Architecture and the U.S. Department of the Interior Housing Authority at Washington.



10

THE MUSEUM OF MODERN ART



11



12



13

The top floor of the building contains a members' club-room, 11, which, as shown on the plan overleaf, can be thrown into the trustees' room to form one large social space running from the front of the building to the back. The members' room looks on to a terrace running across the front of the building sheltered by a canopy (see exterior, page 121). 12, the lobby to the members' room, looking from the lifts. 13, the garden at the rear, photographed from the north terrace. It is gravel paved and has been planted with bushes and subdivided by various kinds of light screens to serve as display space for sculpture.

THE MUSEUM OF MODERN ART

CREMATORIUM CHAPEL

MITCHELL AND BRIDGWATER
ASSISTANTS: E. G. MEMBERY AND L. W. AKED.

SITE

The chapel has been built on waste land behind the crematorium at Golders Green.

PLANNING

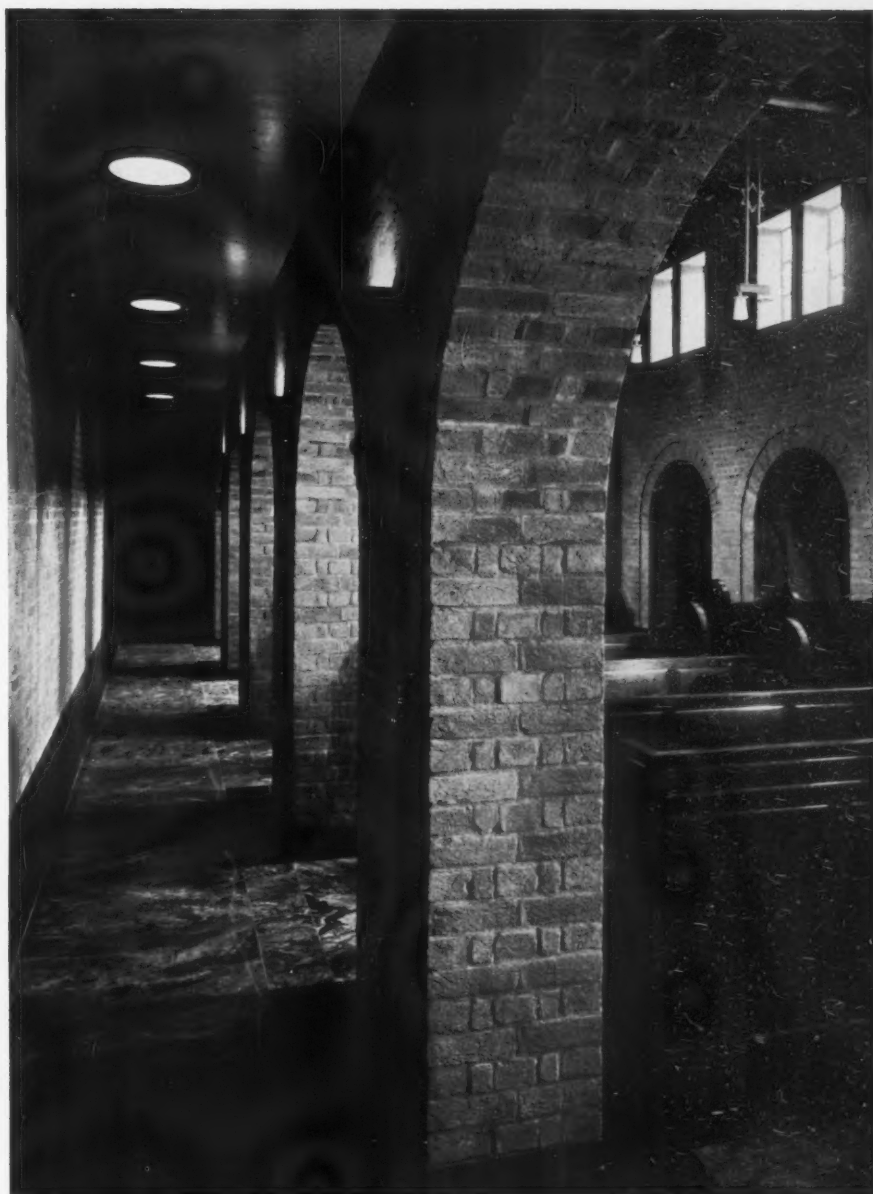
The design of the chapel makes no radical departure in style from that of the existing crematorium buildings to which it is adjacent. Its use is principally as a quiet place for visitors, only thirty seats being necessary.

CONSTRUCTION AND MATERIALS

The chapel is of brick construction with reinforced concrete foundations and floors. The wood roofing is covered with special pantiles. Heating is by low temperature hot water panels in floor and walls.

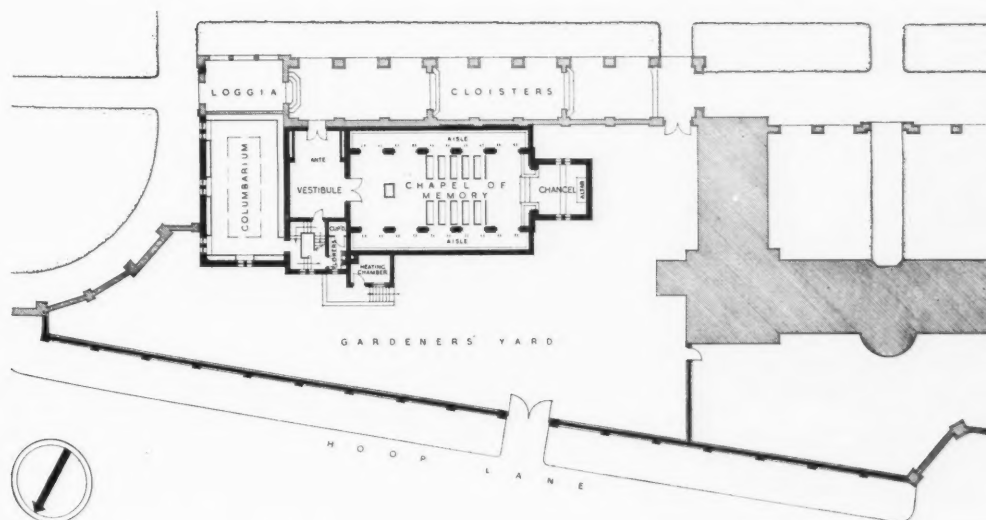
EQUIPMENT AND FINISHES

The whole of the floor except under the seats is covered with a greyish green and brown marble, that under the seats being cork. The interior is faced with a brownish brick. The ceiling of the side aisles is sky blue and the same colour is used on the roof boarding where it shows between the oak rafters and main roof trusses.



1, the entrance vestibule. 2, an interior view looking eastwards along the aisle. 3, the altar. The curtain is of rich blue brocade and velvet. 4, looking eastwards, showing the memorial table on which a book of memory is kept, and

the grille below, behind which further volumes are stored. All joinery is of walnut enriched with silver bronze in the altar and memorial table. Owing to the enclosed position of the chapel exterior photographs were impracticable.



FLATS

HOWARD LEICESTER AND PARTNERS

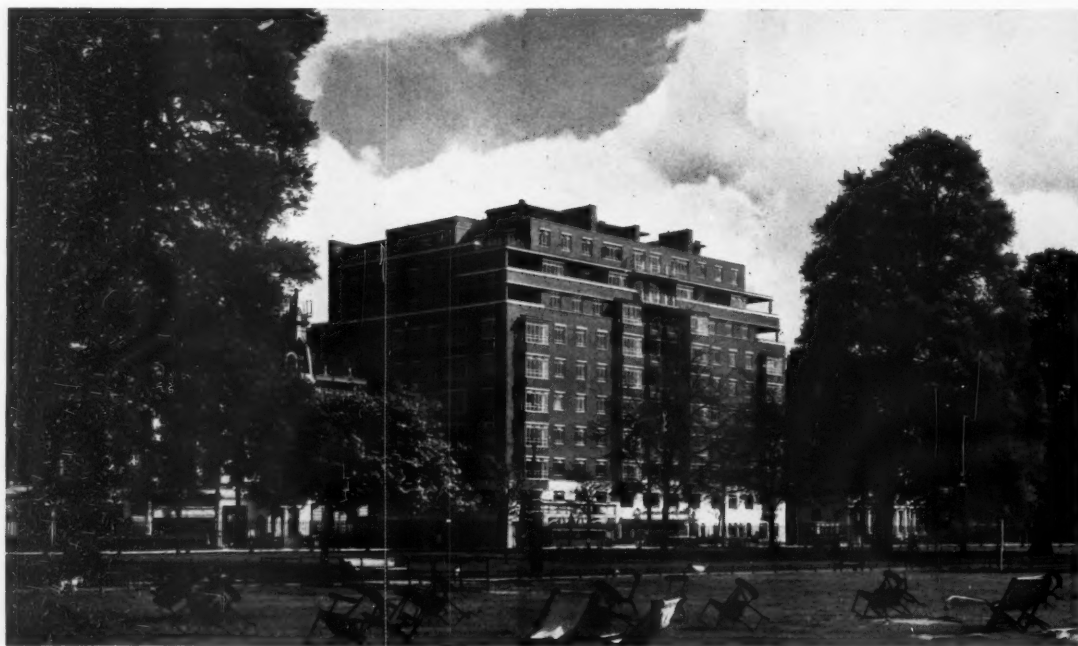
THE SITE

The south front overlooks Bayswater road and Kensington Gardens and is bounded by Inverness Terrace on the west and Queensborough Terrace on the east.

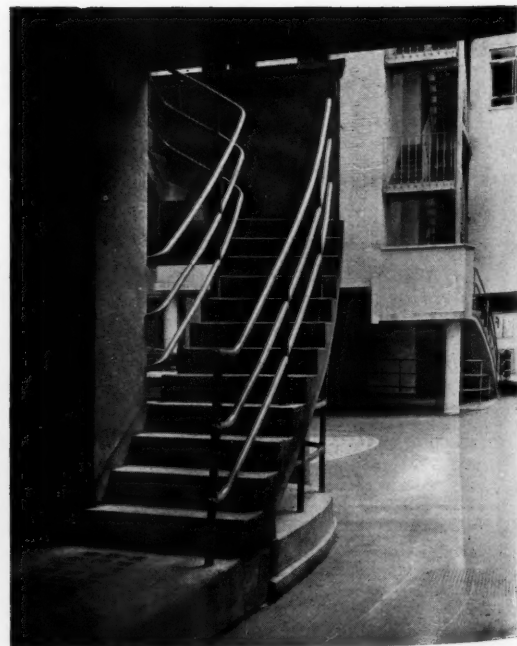
PLANNING

To obtain the maximum development of the site the building follows the lines of the adjoining streets with a large central courtyard. A view of Kensington Gardens can be obtained from at least one window in every flat; on the east and west sides from the projecting bay windows. To avoid excessive corridor space access to the upper floors is provided by four lifts which are linked at ground level only. In most flats living and dining-rooms are divided by double doors. On the south side terraces are provided to the central flats and those on the upper floors. Dressing-rooms with built-in cupboards are provided in some flats, giving access to bathrooms. In all cases the entrance halls are of sufficient size to allow for their use as living space.

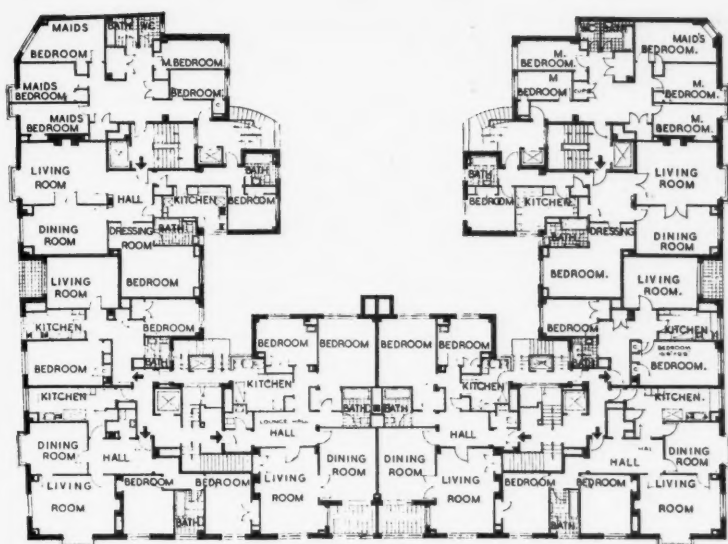
1, the south front and part of the western façade. 2, a view from Kensington Gardens. 3, the internal courtyard.



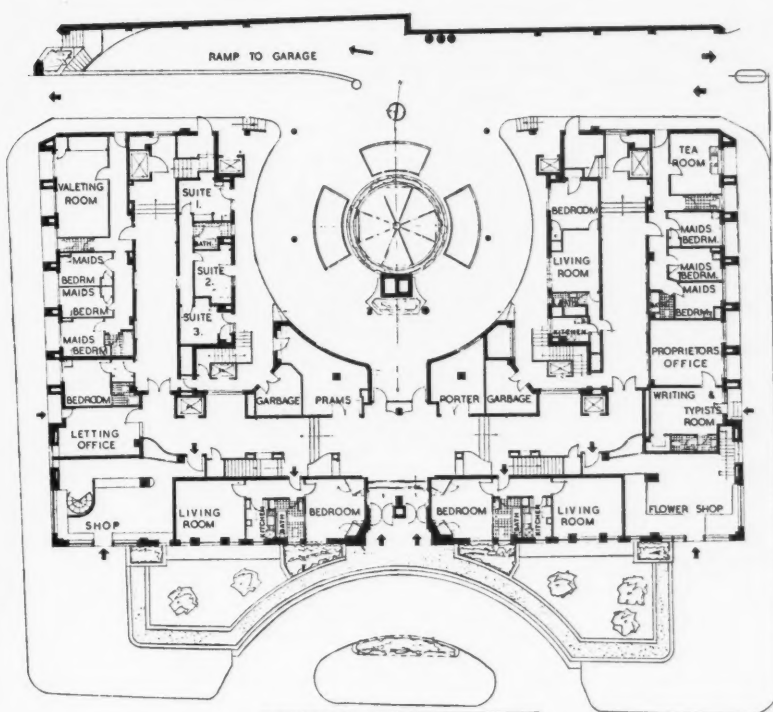
2



3



TYPICAL UPPER FLOOR PLAN



GROUND FLOOR PLAN



One of the balconies, about 7 feet wide and 10 feet long, forming part of the centre flats overlooking the park.

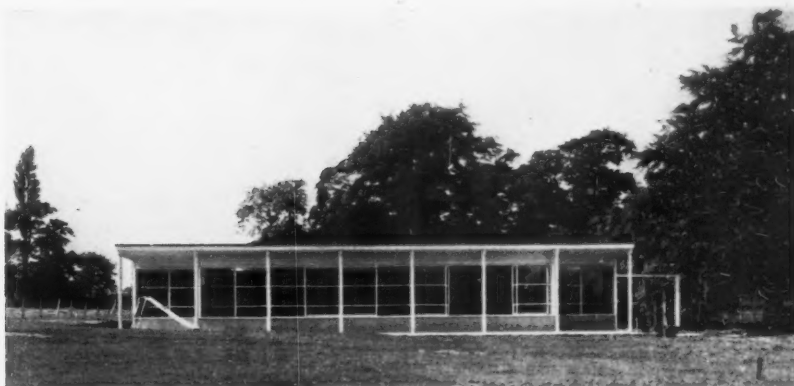
STRUCTURE AND MATERIALS

Steel framed with hollow tile floors. Walls are 9-in. brickwork, with $\frac{1}{2}$ -in. rough waterproof rendered on the back, and then faced with $2\frac{1}{2}$ -in. hollow partition block. Staircases are in reinforced concrete. Internal walls are 3-in. hollow T.C. blocks. Walls between flats are two-skin 3-in. block walls with 1-in. cavity, into which a $\frac{1}{2}$ -in. lapped wallboard is placed as a sound insulation. The flooring battens are bedded on thick insulating felt and held down by struts until the screed between battens has set sufficiently to hold them down. Floors in principal rooms are strip oak and deal elsewhere, for close carpeting. Mass concrete bases were substituted for the reinforced concrete bases as, at the time, difficulty was experienced in obtaining supplies of rods in a reasonable time.

SCHOOL

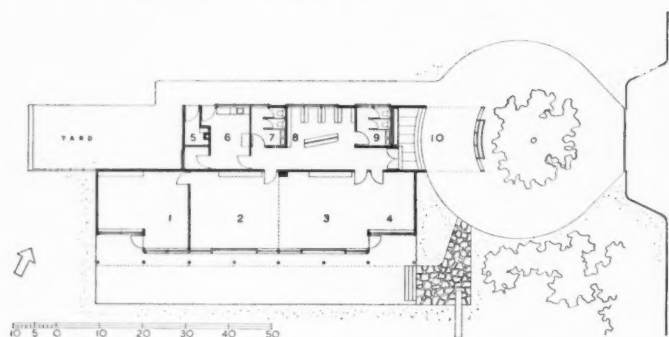
J. L. MARTIN AND S. SPEIGHT

A kindergarten near Northwich, Cheshire, of timber frame construction. The view on the right shows the south front to which all the classrooms are orientated and which overlooks the remainder of the site, consisting of playing fields.



SCHOOL

J. I. MARTIN AND S. SPEIGHT



- | | |
|-------------|---------------------|
| 1 Classroom | 6 Kitchen |
| 2 Classroom | 7 Girls' Lavatories |
| 3 Classroom | 8 Cloakroom |
| 4 Classroom | 9 Boys' Lavatories |
| 5 Heating | 10 Covered Porch |

THE SITE

At Hartford near Northwich, Cheshire. A triangular site of which the north boundary forms the base, well screened from the roadway by trees and bushes.

PLANNING

Four classrooms were required, and also a larger floor area for eurhythmics and play, the latter being provided by removing the screen partitions which divide three of the classrooms. Lavatories, kitchen, store and cloakroom space is on the north side and the slightly lower roof level allows cross ventilation for the main classroom block.

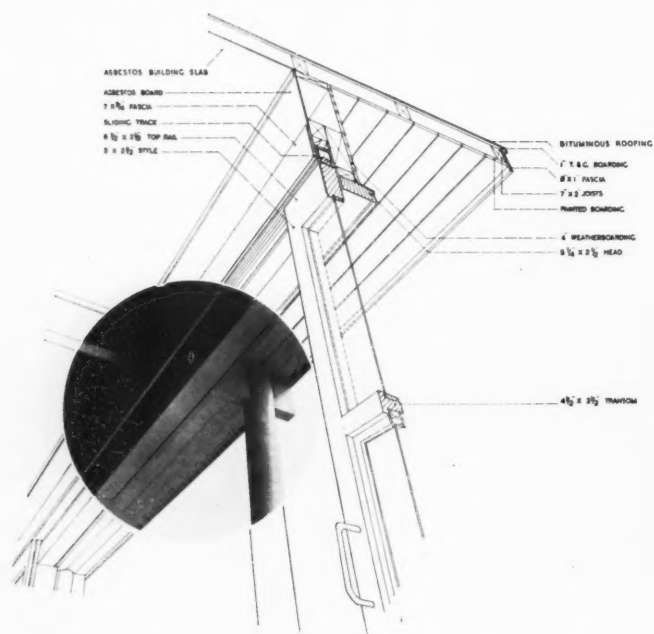
STRUCTURE AND MATERIALS

The construction is of timber throughout, lined internally and externally with standard asbestos sheets. Standard metal windows have been combined with sliding wood frames allowing large areas of window to be thrown open with a careful control of ventilation.

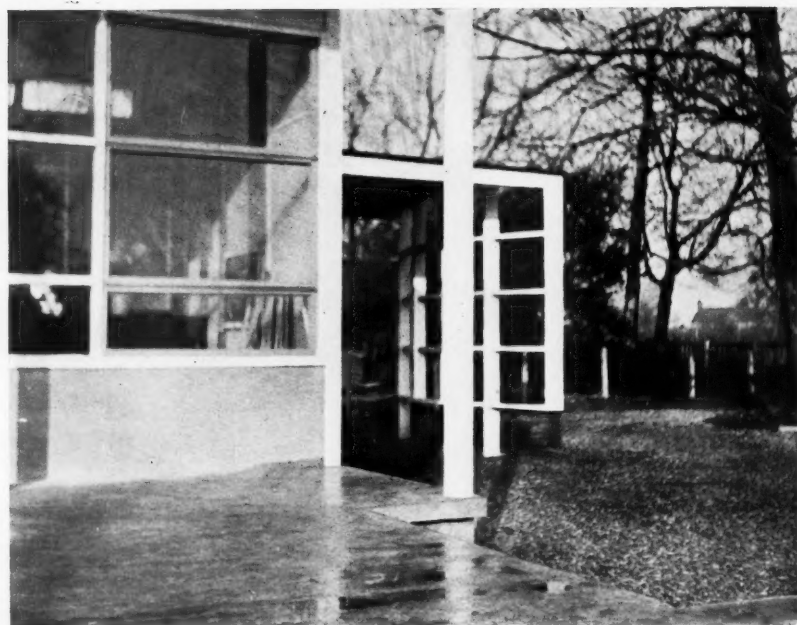
FINISHES

Woodwork to door frames, window frames and trellis is painted white; metal window frames are painted grey-green. Doors from classrooms to terrace are bright yellow, the front door is pot red. The classrooms have a maple floor.

1, a corner of the building, showing the curved entrance screen. 2, a detail of the south front showing the free standing wooden posts which carry the cross supports of the roof allowing an uninterrupted window space to the classrooms. 3, the playground which occupies the remainder of the site on the south, seen from the large room which for ordinary use is subdivided by screens into three classrooms.

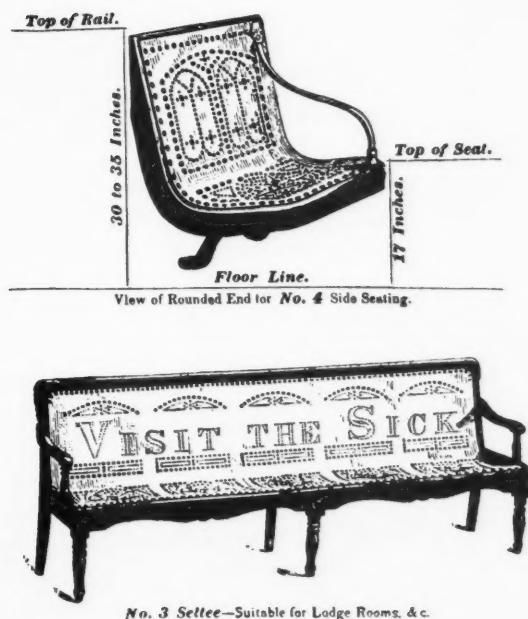


A DETAIL OF ROOF AND WINDOW CONSTRUCTION



In an article in THE ARCHITECTURAL REVIEW of August 1938 **NIKOLAUS PEVSNER** dealt with the early history of plywood furniture. In that article he asked for any additions which might be made to the scanty sources of information available on the subject. From the replies of some correspondents* and further research he here endeavours to trace **THE HISTORY OF PLYWOOD** up to 1914. Its technical advances since that date and its widespread contemporary use are noted and illustrated in a plywood supplement in this issue.

* In addition to a letter from Mr. Walther Prokosch, of Stamford, Connecticut, printed in the October 1938 issue of THE ARCHITECTURAL REVIEW, others have been received from Mr. Fred Cohen, Herr W. Hertner, Mr. H. Michalski and Mr. G. L. Reid.



One of the common uses of plywood in the nineteenth century was for chair seats and backs. The above early American examples are from Gardner & Company's catalogue dating from 1875.

THE following is, I am afraid, a very inadequate attempt at a history of plywood before the war. According to the information that I have been able to gather, this is what it appears to be.

The idea of using three layers of veneers plied together with grain running cross-wise so as to give additional strength and resilience to a piece of timber belongs at least to the 18th century. Percy Macquoid in his *Age of Satinwood* was, I think, the first to mention that Chippendale's dining-room chairs for Osterley Park, designed by Robert Adam in or before 1773, have back splats "composed of layers of mahogany in three plies." Other similar cases are supposed to exist in the masterly art of English Georgian chairmaking. No traceable development seems, however, to have proceeded from these early occasional discoveries.

The next episode—for episode it remains—was the discovery of Michael Thonet, a small cabinet-maker of Boppard on the Rhine*. In 1830 he began making chair-parts and soon whole chairs of narrow, thick strips of veneers bent in wooden moulds under heat and glued together. The chairs illustrated which were made at Boppard between 1836 and 1840 are

* Cf. H. Heller: Michael Thonet, Brunn, no date, approx. 1924.

more akin in principle to Aalto's post-war furniture than anything constructed later in the 19th century. In 1841 Thonet was able to show his chairs and their principle to Prince Metternich, the great statesman, whose country house was near by. He suggested that Thonet should go to Vienna, invited him to travel with one of his couriers and arranged for him to be introduced to the Emperor. Thonet then made—still entirely as a craftsman—furniture for Prince Liechtenstein in Vienna. This was done at the request of the English architect P. H. Desvignes who, on his return to England tried in vain to persuade Thonet to follow. In 1851 Thonet furniture was shown at the Crystal Palace Exhibition. In 1853 42 workmen were employed, and the first steam-driven machine was installed. In 1856 the first of the Moravian factories was built. By the end of the fifties, however, Thonet had discovered a method for bending solid bent-wood, the one which made his chairs famous all over Europe, and there his connection with the history of plywood comes to an end.

In fact, one can hardly speak of a continuous history at all, until the time when the earliest American patents were taken. One of them, dated 1874, formed the contents of Mr. Prokosch's letter. Some more grouped with other important early

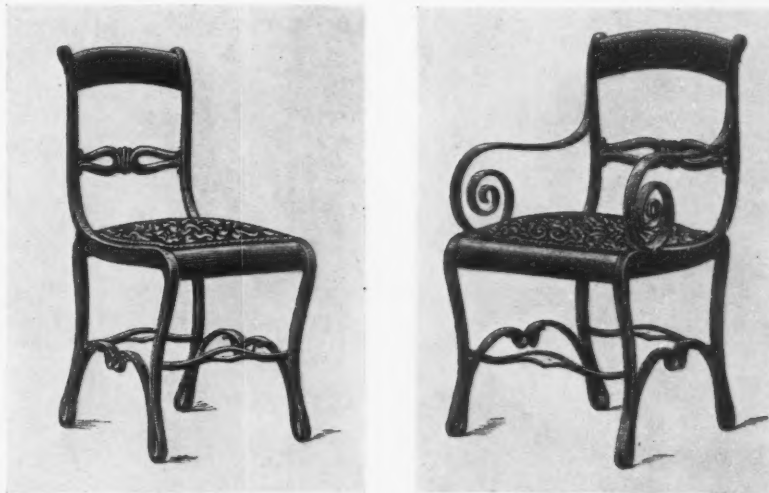
data are quoted in an article by T. D. Perry to which my attention was drawn by Herr W. Hertner of Pratteln (Switzerland). According to this article which appeared in the *Hardwood Record* of May 1932, the first American patents for plywood (then called scale board) were issued to one John K. Mayo in 1865 and 1868, the next to W. Gardner in 1872 and 1876. Mayo's referred to plywood as such, Gardner's to the use of bent and perforated sheets of ply for chair seats and backs. The type illustrated from a catalogue of Gardner & Co. of about 1875-1880 is familiar to all from out-of-date railway stations and hospital waiting-rooms. Gardner's were soon succeeded by Frost & Peterson, later the Frost Patent Veneer Company, and several other American firms.

European developments seem to have originated from the famous Thonet chair factories. When Thonet's heard of the Frost seats about 1880, they started using them. A few years later, in 1884, Christian Luther head of a firm of timber manufacturers at Reval in Russia (now Tallinn in Estonia) came across these American plywood seats. He was a very enterprising man and visualized at once the great future of plywood. Machinery was devised and built, and in 1885 production set in. His seats, and after 1889 his bent ply panels forming backs and seats in one, were successful, above all—and this is the next important step in the history of plywood—when he had introduced a new waterproof casein glue (1892).

In the meantime, however, American firms had started using the most primitive kind of plywood for cabinet-work. According to the article quoted, desk tops were made by the Indianapolis Cabinet Company in 1883 and by the E. D. Albro Company for Globe-Wernicke about 1890. About the same time the Sauer Company, New York, began producing dining-table tops and plywood doors. All these, however, were made with, what the Americans call, lumber cores, i.e., solid battens inside, covered with veneers.

Europe does not seem at first to have taken much interest in these innovations. Herr Karl Schmidt's experiments, discussed in my article last year, were the result of independent thought. So was Mr. E. H. Archer's discovery of the possibilities in plywood for the making of tea-chests. He went to see Luther's in 1896, and this led to the foundation of Venesta Ltd. in this country and the eventual amalgamation of Venesta and Luther's.

The manufacturing of plywood panels for cabinet and joinery work dates back only to the beginning of our century, as far as Europe is concerned. Central and Eastern Europe appear to have been leading before the war. Blockboard plywood, i.e., plywood with an interior composed of strips of solid timber, was first industrially produced by Kümmel's at Rehfelde near Berlin about 1902. Kümmel's became later incorporated into Brüning's, the maker's of the famous Ibus boards well known



Bent plywood furniture a hundred years before Alvar Aalto. These chairs made by Richard Thonet between 1836 and 1840 are constructed of strips of veneer glued together and bent. Thonet's subsequent discovery of a method for bending solid wood led him to drop any further experiments with plywood.

to British furniture manufacturers. Laminated board, the next and up to the present the last of the fundamental plywood inventions, originated from Moralt's of Tölz (Bavaria) in 1925. The importance of this new technique for the development of the modern style in cabinet-making need not be stressed. It is obvious that it came in exactly as usefully as cross-rib vaulting invented by twelfth century techni-

cians came to the creative architect of the age desirous to evolve a new idiom later to become known as Gothic. Just as he recognized the cross-rib vault and the flying buttress as appropriate means to his aesthetic end, so the modern designer soon began to realize that plywood was the very material for achieving those flush surfaces without which his aesthetic ideals could not be expressed.



St. George, Oberzell from the south-west. The nave, aisles and western apsis date from the ninth century and the remainder is largely of the tenth century. Reproduced in Early German Art and its Origins reviewed on this page.



Left, a miniature from the Gospels of Otto III, c. 987, of the school of Echternach, showing Eastern influence. Right, a portrait of Otto II or III, c. 983, from Trier showing Classical and Early Christian sources.

BOOKS

Humanism and the Teutonic Genius.

EARLY GERMAN ART AND ITS ORIGINS: from the beginnings to about 1050. By Harold Picton. With a Foreword by Josef Strzygowski. London: Batsford. Price 21s.

MR. PICTON is a disciple of Professor Strzygowski, and all the Strzygowskian leitmotifs make their appearance in his book. The anti-humanist, anti-Mediterranean bias is not so pronounced as in some of the master's own work; but it is quite clear where Mr. Picton's sympathies lie. He feels that the Mediterranean element in German art has spoiled it. The German imagination can learn with profit from the East: Syria and Armenia can nourish it, but the Roman genius gives it indigestion and nightmares. This is a familiar doctrine; but the impartial reader must ask whether it is a true one. If the German mind did not require the influence of the South, why did it show such a persistent hankering after Southern forms and such a morbid susceptibility to Southern ideas? Why did it endure this alien tyranny with such enthusiasm?

Mr. Picton shows without much difficulty the survival-power of certain Germanic forms from prehistoric times until well into the Middle Ages. What is not less interesting is the modification which the knowledge of Mediterranean art effected in the North. For it is not merely a question of iconography and technical assistance: the formal sense of the Southern peoples affected the North in a much more intimate way. Articulatness and eloquence are qualities which German art owes to the South. Without these lessons in intellectual order the Germanic fancy would have continued to riot; once disciplined and canalized, it produced masterpieces of expressive form. Incoherence turns to intelligibility; mere rhythmic noise becomes counterpoint. It is no service to German art to maintain that it is best when purest: its real triumphs are those happy marriages of Teutonic exuberance and Latin elegance which bear their first fruit in Ottonian miniatures, and whose most splendid offspring are the sculptures of Naumburg and Bamberg.

This is a valuable, but an unprepossessing book. Mr. Picton has not been kindly treated by his publisher, who candidly told him: "We are used to getting a quart into a pint pot, but you are asking us to get a gallon into it." Hence, as he with equal candour admits, the small illustrations and the small type. These make the book difficult and fatiguing to read; which is a pity, because on almost every page Mr. Picton gives evidence of a lively and enterprising mind. Moreover, among the four hundred and more illustrations are very many which every student will be glad to possess, and all the more because they are arranged in a context which often provides in symbolic form a key to the connections in the author's mind. So when the careful reader feels discouraged (as he often will) by the congestion of the text and the compression of the visual commentary, he must remember with gratitude that his guinea has bought him a varied and substantial, if not a very digestible meal.

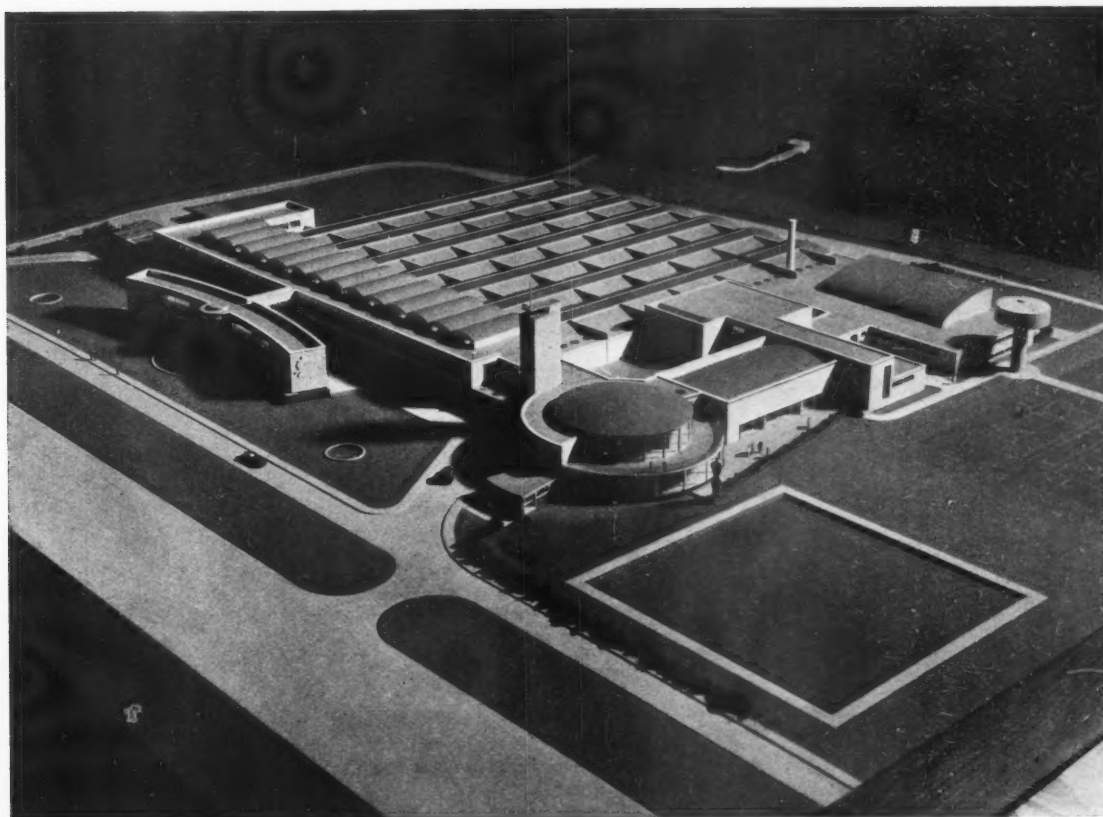
ROGER HINKS

The Economics of Art.

ART LIES BLEEDING. By Francis Watson. London: Chatto and Windus. Price 7s. 6d.

THIS is in many of its aspects an unfortunate book. It is, for instance, apparently committed to the theory that the health of an art may be judged by the material prospects of its practitioners, a theory hardly worth discussing. Leaving on one side this conception of the muses as a bunch of gold diggers it may be said that the book is mainly concerned with the fact that the State, Provincial Galleries, moneyed institutions and societies, and the public, do not buy pictures by living artists, that it is difficult for an artist to earn even £180 a

A Factory on the Bath Road



Post-war industrial development in the London area has been to a large extent concentrated around its western exits, and now extends along most of the Bath road to include the Slough Trading estate. Architecturally the prevalent style has been "moderne" with very few rational buildings marked by coherent planning. This project, by Raymond McGrath, is certainly the first large scale

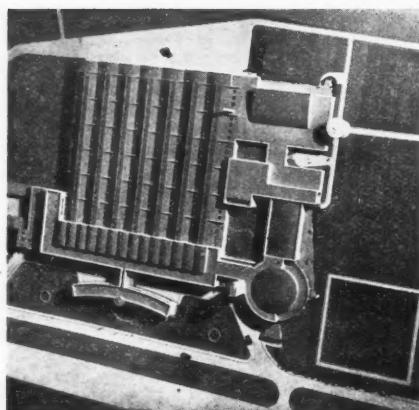
piece of factory planning and may well set an example for future industrialists who establish factories in the area. Apart from the main works block there is a general office block and a partly detached block of executive offices. Staff amenities include canteens, lounges, a concert hall, gymnasiums, squash courts, a swimming pool and an air-raid shelter. The site is an extension of the existing

year, and certain remedies for this situation. As one reads the thought inevitably occurs to one that there is something in the technique of modern advertising, the whiskey company faced with falling sales does not come out with publicity slating the public taste, the cigarette manufacturer in the same circumstances does not fill his advertising with acid remarks about "people who like to suck the fumes of alfalfa grass and straw down their stupid throats": no, not a bit of it, they appeal to "the connoisseur," "the smoker with discrimination," "men of taste," and so on. The appropriations made by Provincial Municipalities for the purpose of buying pictures are voted by the councillors, it is, to say the least of it, an error in tactics to abuse them for being mean, stupid, and unfit to buy pictures. Jeering at them will not make them more disposed to abandon their standards in favour of more advanced ideas. Again, in discussing the administration of the Chantry Bequest suggestions that a good thing is being made out of it by the Academicians are not really likely to do more than annoy and at most to produce a stiffening of attitude: the purchases made by the Chantry Bequest represent a genuine taste and if that is dictated by the taste fashionable at the Academy it is only the natural consequence of appointing the President and Council of the

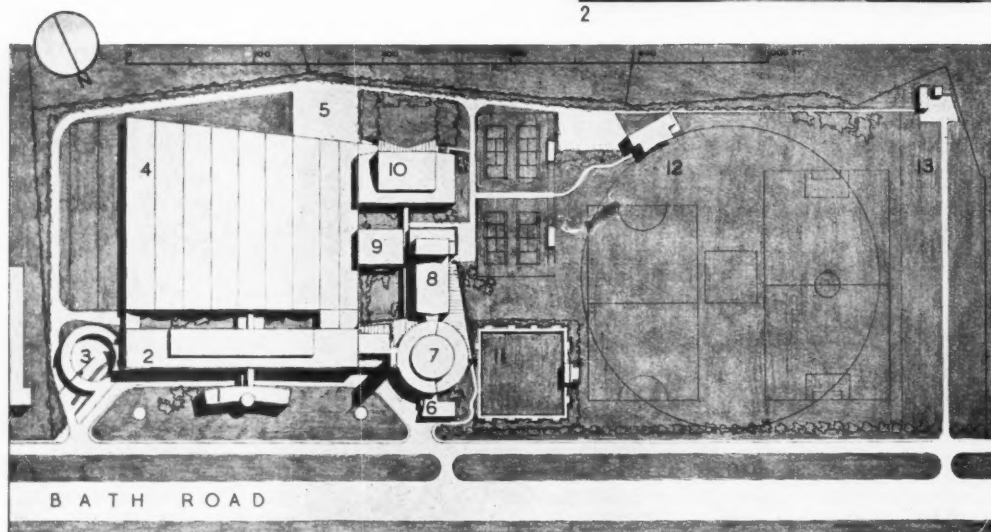
Academy as purchasers. It is fantastic to expect them to purchase work that they would reject if it were submitted for their summer exhibition. Nor is it more reasonable to gird at the National Art Collections Fund for purchasing antiques in preference to the work of living artists; the fund is maintained by subscription and the purchasing policy admirably reflects the taste of the subscribers. If they wished their money to be spent on the works of living artists they would subscribe to the Contemporary Art Society. In these two funds we have an index which gives us some insight into the taste of people who are interested in art. The Contemporary Art Society has a purchasing fund subscribed by the public at large in the same way as the National Art Collections Fund, it produces an income in the neighbourhood of £1,500 as against nearly £16,000. One may conclude that people who are interested in art are in the main uninterested in modern painting. It is easy to find reasons of the paranoiac kind, dealers prefer to sell the work of the dead, the public like to play safe with established reputations, and so on. It is possible to listen to the remarks of the public, to attend to the naive expressions of the less intellectual critics, and to come to a different conclusion. The public do not like what they are offered by most modern painters, they are

suspicious of the slap-dash technique to which the Impressionists opened the door, the post impressionist picture purged as it is of sentiment, story and sensuality is almost meaningless to them. They have not travelled the amazing road that the artist has followed since Delacroix, they rarely look long enough at pictures or photographs to discover the trap in photographic realism, their minds are not filled with references to the arts of Syria, Greece, Africa, Annam, Spain, France, Germany, and Italy; most modern painting is thus as mysterious to them as modern English would be to a Saxon. It is no use calling them fools for this, no use sneering at them for liking their nudes to represent pretty women when Velasquez' Venus and Boucher's Murphy are to be seen, no use telling them that subject is unimportant or trivial if they want it and get it from the old masters. The fact must be faced, the public taste is satisfied by Traditional European Art, and it is not by the highly experimental work that is at present being done: any scheme for "providing artists with better living conditions" must take it into account. Mr. Watson is extremely violent in his remarks about the public taste and extremely rude to anyone so incautious as to consider it, yet he wants grants of public money for the fine arts. In an essay called "How Shall I word It," Mr. Max.

playing fields for the company's staff on which a small bowls pavilion designed by the architect already stands. Approximately half of the present site is devoted to playing fields the buildings having a frontage of 625 feet to the Bath road; well set back with an approach of lawns and landscape planting. The works are on the ground floor and the general offices on the first floor while the Directors' offices are in the free-standing curved block connected to the main building by a bridge corridor at first floor level. The canteens look over the playing fields and the staff lounges face south overlooking an internal courtyard. The whole of the buildings are of reinforced concrete frame construction the main façade having a precast slab facing. The roofs of the works have special diffusing and insulating glazing which is estimated to provide a daylight factor of 10-15 per cent.



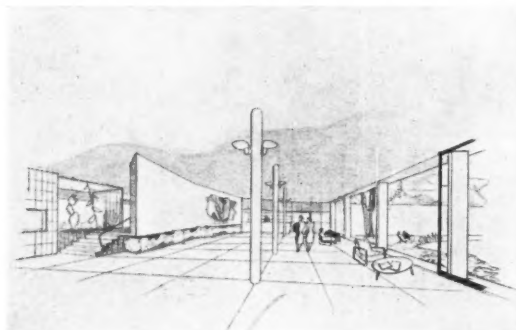
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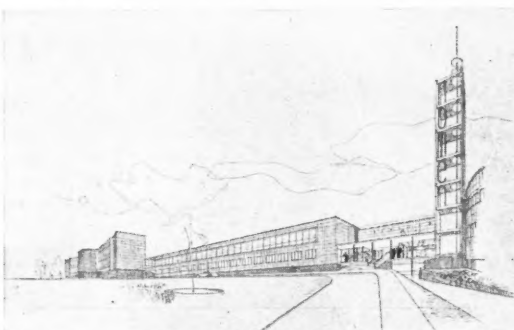
KEY TO PLAN

- | | |
|------------------------|-------------------|
| 1 Directors' Offices | 8 Concert Hall |
| 2 General Offices | 9 Gymnasium and |
| 3 Garages | Squash Courts |
| 4 Main Works | 10 Swimming Pool |
| 5 Yard | 11 Bowling Green |
| 6 Caretaker and Stores | 12 Playing Fields |
| 7 Canteens | 13 Kitchen Garden |

1 (overleaf) and 2, a model of the preliminary lay-out. 3, works staff lounge with the courtyard on the right. 4, main office staff entrance from the Bath road. 5, the bowling green and pavilion by Raymond McGrath.



3



4



5

A Factory on the Bath Road

Beerbohm gives a specimen letter for a young man to write to his tailor which includes the following passage: "Let Mr. Yardley cease from crawling on his knees and shaking his fist. Neither this posture nor this gesture can ring one bent farthing from the pockets of Mr. Davenant . . ." Just to make sure Mr. Watson throws in a defence of the artist's right to be a homosexual . . .

And yet the case behind *Art Lies Bleeding* is in the main sound, the State makes a generous annual grant to the upkeep of fine art collections but spends little or nothing on the acquisition of contemporary work. There is a great deal to be said for an annual grant in aid to the Contemporary Art Society and for a grant to enable more enterprise to be shown by the Tate Gallery; at the same time it is

asking a great deal to demand these things on a sectarian ground. That is to say the grants should form part of a policy embracing the Fine Arts and based on wider use of the term than Mr. Watson would allow it; music, the theatre and the applied arts need more official support than they get at present. Grants towards the purchase of work by contemporary artists must be associated with grants to Provincial Orchestras, an opera company, the Sadler's Wells Ballet, a National Theatre, and there should be prizes for Industrial Design, Printing, and so on. All this calls for an equivalent of the French Ministry of Fine Arts and it will not be easy to achieve. It is safe to say that it never will come into existence if its formation is approached from Mr. Watson's point of view, neither the public

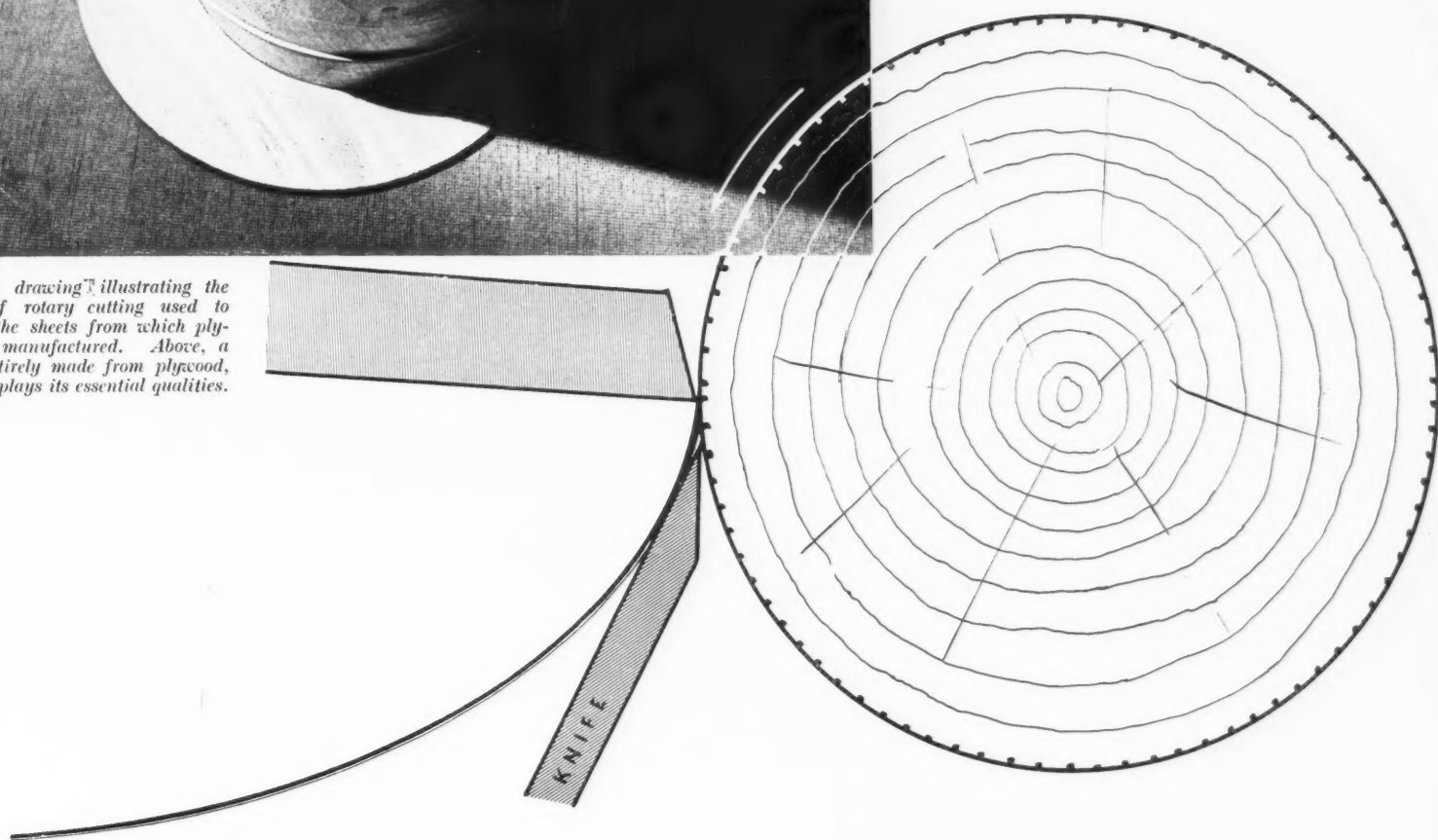
nor their elected representatives are likely to succumb to the argument that as they do not like pictures the State should buy them. It will do still less good to justify the campaign by saying that it is designed to make the arts remunerative. There is a certain intrinsic merit in the Fine Arts, a culture finds its expression in them; the State can claim its justification in supporting them in the enrichment of the National Life. It is not the function of the State to guarantee the status or income of members of the upper middle class to any group of citizens, to suggest that the State owes such a guarantee to artists, or to suggest that the State should purchase contemporary art with that end in view, is to prejudice an excellent cause.

ANTHONY WEST



The last supplement in this series, in THE ARCHITECTURAL REVIEW of June 1939, dealt with timber as a solid material. In this, the sixth of the series, plywood is discussed and its uses illustrated. In these supplements emphasis is laid on the decorative possibilities of the material but they are also planned as a continuation of the special issues on materials that have been periodically published by THE ARCHITECTURAL REVIEW during recent years.

Right, a drawing illustrating the method of rotary cutting used to produce the sheets from which plywood is manufactured. Above, a chair, entirely made from plywood, which displays its essential qualities.



P L Y W O O D

A R E V I E W b y B R Y A N W E S T W O O D



Pre-plywood craftsmanship



Laminations



Plywood as a backing for veneers

A NEW TECHNIQUE

Plywood as a material

Wood is a live material which even after seasoning and fabrication retains its vitality for an indefinite period of time, always ready to twist or warp if sudden atmospheric changes take place. The system of framing and moulding which one always associates with woodwork is solely the expression of the joiner's ingenuity in keeping this lively material within bounds, allowing it to move without upsetting the structure as a whole. In plywood the composite construction serves to tame the wood to such a degree that it is in effect an entirely different material; one about which there has been a good deal of misunderstanding, and which in the minds of many is still a cheap substitute for something better. This is a double fallacy because, in addition to being fundamentally different from solid wood, it is not in fact a particularly cheap material.

The strength of wood is many times greater across the grain than with it, and as a corollary it is liable to expand and contract transversely with differences of moisture content. Movement longitudinally in most woods is hardly noticeable. Writing a few years ago Oliver Bernard gave some interesting figures about the shrinkage of wood. He stated that solid timber shrinks about 3.50 per cent. in width by 0.15 per cent. in length. Veneers shrink about 3.00 per cent. across grain by 0.12 per cent. with the grain. In plywood three or more layers of wood are glued together with the grain in each layer lying at right angles to the one beneath. Owing to the fact that the fibres in each lamination counteract movement in the ones above and below, the figure for "across grain" movement is reduced to less than one-tenth of the corresponding value for solid wood, and even the value "with the grain" is reduced by 20 per cent. The respective figures are 0.200 per cent. and 0.100 per cent., and the strength in both directions is even more nearly equal than would be expected.

Owing to the rotary method of cutting, the

component veneers (described in detail hereafter) of the plywood are twice as hard as ordinary timber. The reason for this rather remarkable fact is that the annular rings are left largely intact in the surface of the veneer.

Returning to the comparison of plywood with solid timber it should be emphasized that whereas the latter relies for strength on fibre alone, the composite structure of plywood derives its strength from the position and strength of specially chosen layers of wood glued together with remarkably hard and tenacious adhesives. The glue is no small factor in the composition of this remarkably strong and light material. In some cases it is stronger than the fibres themselves.

It has taken generations of craftsmen to perfect a technique to tame the movement of their material, and in designing anything to be constructed of solid wood this aspect is of primary importance. When thinking in terms of plywood construction, unless very large plain surfaces are required, the designer can assume that the manufacturer has already solved this problem in the factory and the possibility of movement is no longer a matter of serious concern to him. However, this is not to suggest that adequate grounds and fixing are not required. In practice it is found that these need to be of much the same size as when using panelling in the solid.

The processes of plywood manufacture are strictly controlled, and the finished product is carefully graded under standard rules for knots and other blemishes. As a result the designer is provided with a material whose properties are known almost with scientific exactitude, and which can be used with confidence. Identification means only a reference to a grading designation instead of the old-fashioned clauses about seasoning and freedom from "large, loose, dead knots, cup shakes and waney edge." Since movement is largely eliminated a greater range of timbers can be used in ply form than in the solid, and in fact a multi-ply base may be faced with almost any wood from which veneers can be cut.

Historical note*

Various writers refer to the use of some form of plywood in ancient Egypt and a mural painting in an Egyptian tomb is evidence that the art of veneering was known in very early times, but it was not until the latter half of the last century that it was pursued on a large scale. The reasons for such a tardy development of plywood from the process of veneering which was so well known in Western Europe two centuries before, were twofold: (1) the width of veneers was limited to the width of the tree; (2) there was not available an adhesive material sufficiently strong and lasting. These two essential prerequisites were satisfied when, between 1880 and 1890, the rotary cutter was perfected in France, and a mixture of blood albumen and casein was discovered in Russia to be a suitable adhesive. One of its early commercial uses was to supersede thin cheap boards for making tea chests for shipment of tea from the East. It was ideal for this purpose. The component parts of the chest occupied little space and were strong and light, and easily assembled. Perhaps it was the extensive use of the new material for this and kindred purposes that established the idea, later so deeply ingrained, that plywood was a cheap substitute material

* An article on the early history of plywood by Dr. Nikolaus Pevsner appears on page 129 of this issue.

only to be used when "proper" materials were too expensive.

It was not until the Great War that plywood really came into its own. Aircraft constructors were not slow to appreciate its possibilities as a covering material, and its adoption by engineers working to fine limits at once raised its status, and the stage was set for its development and wider application. "Laminated board," "blockboard," metal faced boards and all the other variations of the original principle have followed as a logical sequence. There is no reason to think that this development has ceased. Still further variations are on the horizon. As a forerunner Corrugated Steel Ply has recently appeared. This is a blockboard which has corrugated steel sheeting incorporated in the core, and is claimed to be splinterproof. The idea of combining other materials with wood in this way is surely a new conception, and one which is likely to continue to give rise to new and useful variations, but it is to be hoped that perversity will not be carried further than the marble-faced ply which appeared in France some time ago.

There is still scope for improvement in board intended for use in very large sizes. The French Ribbed Ply described later is a step in this direction. At present as far as we are aware specially made sheets with chestnut cores have to be made if really large sizes are contemplated.

The components of plywood

1 Veneers

For conversion into plywood timber must have firm and even grain, must be pliable and reasonably free from knots, and of course must be readily obtainable in suitable sizes. Among the hundreds of timbers available and capable of being cut into suitable veneers there are comparatively few which fulfil all the desiderata. Birch is one of these and although suitable trees are only found in commercial quantities in quite a limited area, in Sweden, Finland, Latvia and Esthonia, the species seeds itself so efficiently that there is not likely to be a shortage of timber. Birch is light and strong, very free from knots, and is eminently suitable for rotary cutting and when cut in that way has an interesting but not too assertive grain, and being light in colour is an excellent base for staining.

Gaboon is another timber which is extensively used for plywood. The recently opened Tyne Plywood Works, which are the largest in England, use it exclusively except for special orders. Coming from French Equatorial Africa it has long been widely used in France. It is a pleasant pinkish coloured wood which is light in weight and has an even texture and is obtainable in large logs, but it is not as strong as Birch. On account of its resemblance to mahogany it is often called Gaboon Mahogany, but the fact that botanically it does not belong to the same genus as true mahogany is apparent from close inspection of the rather coarse grain. Pine plywood is made in Sweden, and Oregon and Columbian Pine come from North America. Alder is also commonly used and is similar to Birch. Other woods, such as Beech, which might be expected to provide suitable veneers, absorb too much moisture or are unsuitable for other reasons. Oak when rotary cut has not the same beautiful grain as it has in the more usual quarter cut veneers, but some all-oak plywood is produced.

All kinds of woods are used as facing veneers, but the basis is usually one or other of the timbers mentioned above. Provided the wood is structurally sound cores can be composed of sheets with slight blemishes or narrower strips jointed together longitudinally by special machines. In this way waste is greatly reduced without loss of quality in the finished product.

2 Glues

The adhesive substance is the key to the success of plywood as a practical material. It has to be far more than a means of sticking layers of wood together. As a component part of a commercial product which may be used anywhere in the world and under most exacting conditions it must be resistant to warm humid conditions and bacteriological attack which is liable to accompany such conditions, and above all it must be strong. Aircraft construction is particularly exacting in this respect and glues evolved primarily to satisfy the needs of aircraft engineers gradually appear on the market for universal use.

Recently the Forest Products Research Laboratory carried out an investigation of four types of glue commonly in use. These were (1) an animal glue of the Scotch blue type; (2) a Casein (cold water) glue; (3) a Blood Albumen (hot press) glue; (4) a synthetic resin of the film type. The results were discussed in detail in *Wood** recently. Summarized, the findings were as follows:

Animal glue, Casein and Blood Albumen were all found to be unsuited for prolonged use in warm humid conditions. The first two were found to be insufficiently proof against moisture and lost adhesive power so that the material broke down into its separate laminae. The Blood Albumen withstood the conditions of the test for six days as against one day for animal glue and three for Casein, but it collapsed eventually under bacteriological attack. The synthetic resin emerged after one month apparently unaffected. Synthetic resin, as would be expected from these test results, is widely used, but various other glues are used for special reasons. In some cases, such as a board which is to be "fireproofed," glue in the form of a film like mounting tissue is used, the application of heat melts it and after it has set the application of further heat in moderation has little effect.

The development of adhesives has progressed so far that in the case of some of the patent synthetic glues the manufacturers claim that samples of plywood where they are used, if tested to destruction, will always fail in the fibre and not in the glue.

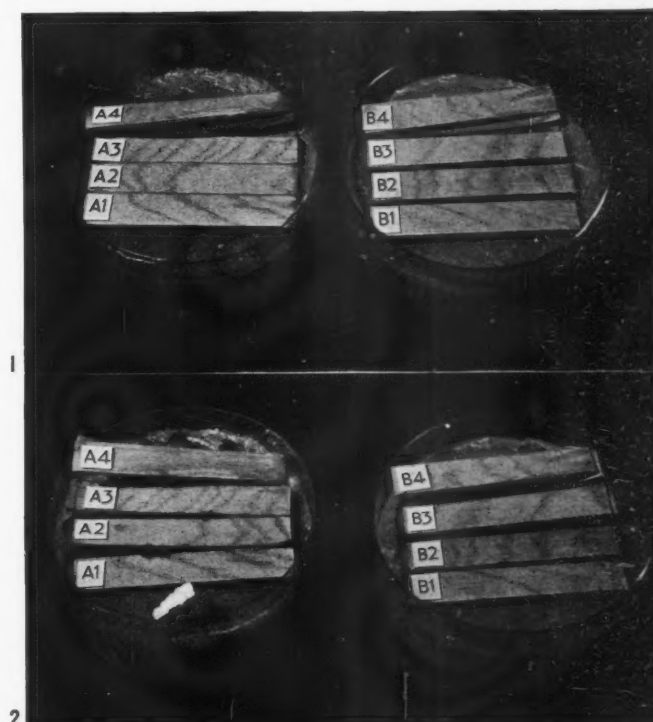
* "Adhesion in Plywood"—E. C. M. Ernest & C. B. Pettifor—"Wood," February 1939.



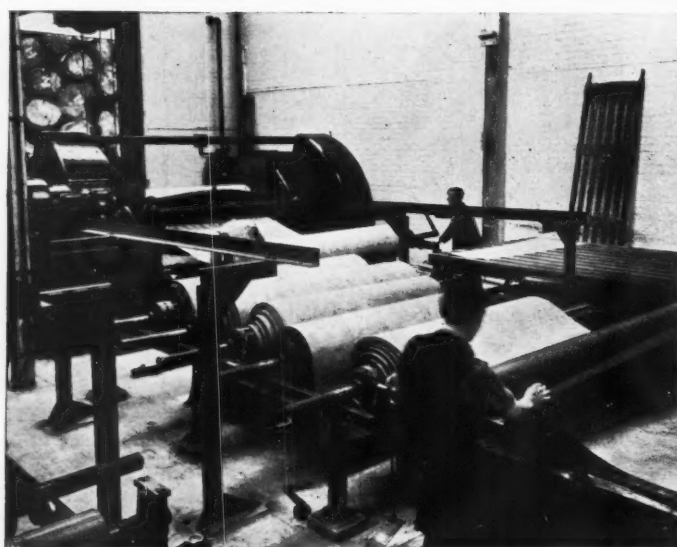
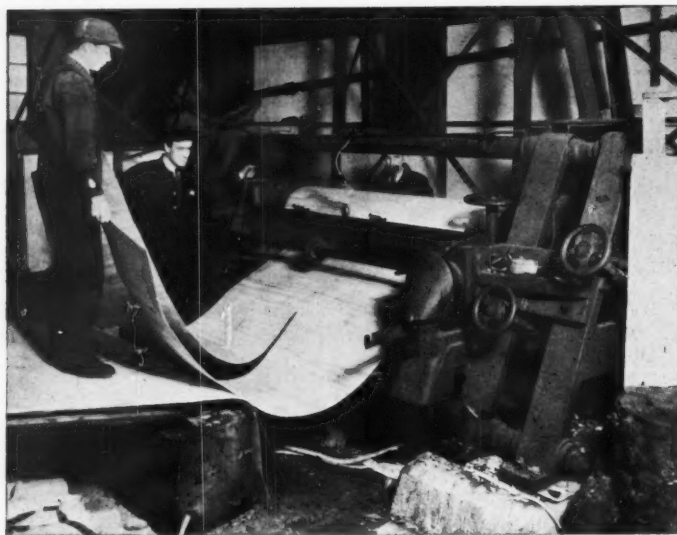
Birch trees in Sweden. The raw material for some of the finest plywood.



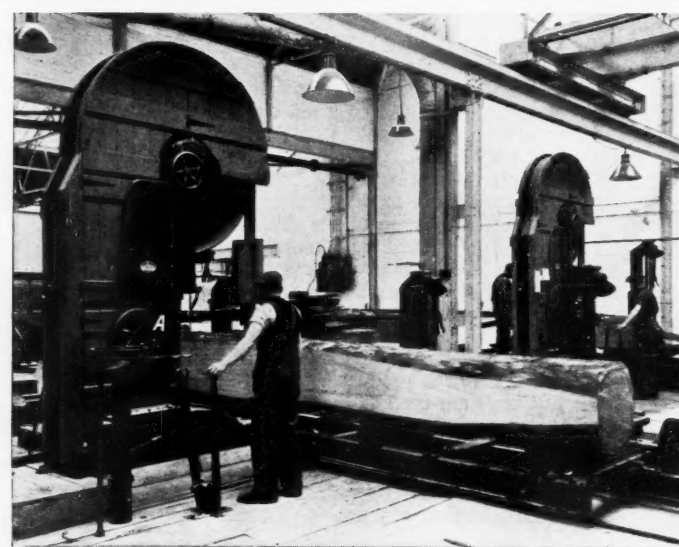
Gaboon logs being cut to length with portable electric chain saws ready for passing to the rotary cutter or "peeling machine."



Strips of plywood with different adhesives tested by the Forest Products Research Laboratory. 1 after one day and 2 after seven days' exposure to warm humid atmosphere. Specimens "A" were exposed under sterile conditions and "B" under conditions conducive to attack by micro-organisms. Synthetic resin was the only adhesive tested which emerged without serious loss of strength.



1 Front view of a rotary cutter with the veneer being "unpeeled." 2 Back view of cutter. There is a fixed vertical knife and also side cutters to trim the veneers to width. 3 "Peeled" veneers



passing forward to the "clipper" which cuts the sheets to size. 4 Large handsaws converting logs into boards to make cores for block boards. At "A" is the gauge controlling thickness.

Manufacture

Notes on the manufacture of plywood have previously been given in THE ARCHITECTURAL REVIEW, and more detailed articles have recently appeared in the timber trade press,* but in order to stress the importance of plywood as a material distinct from solid wood a brief description of the process involved is included here.

(1) The logs are cut to length, barked and thoroughly soaked in water to make them pliable. In the Baltic countries they are floated down from the forests to the mills and may be in the water for years, so the sequence above is reversed. In other cases, such as the Gaboon imported into this country, the logs are given a prolonged soaking in "steam pits" which are huge vats heated by means of hot water pipes at the bottom.

(2) The logs, if they are to be rotary cut, having had the bark and any large projections removed, are put on to the veneer lathes. A few revolutions suffice to remove the rough outer wood and then the veneer is peeled off in a continuous ribbon about $\frac{1}{8}$ in. thick. The log is, so to speak, unwound, by

a method similar to the action of peeling an apple, until there is only a small roller left. The ribbon is wound on to bobbins by hand, and a sliding knife cuts it to the size required. Faulty pieces have to be cut out and if the remaining sheets are not wide enough they are joined together edge to edge in special edge-joining machines and used for core sheets.

Some woods, such as oak, do not show any interesting grain when cut in this way, so they are converted in a slicing machine in which a moving blade planes off slices of the thickness required. This varies from $\frac{1}{100}$ in. to $\frac{1}{4}$ in. thick. Cores for block boards and laminated boards are prepared from stacks of boards glued together and clamped, and later sawn longitudinally.

(3) The sheets roughly trimmed to size are passed on rollers through drying machines. These are huge ovens heated by hot water pipes and the veneers are fed in at one end and the speed of the rollers is adjusted so that they take the correct time to pass through and out at the other end. Thickness is one of the factors governing the time required, a normal time is about a quarter of an hour.

(4) The core sheet is covered with adhesive by passing between rollers, either dipping into glue, or fed by gravity. For reasons of economy the rollers are patterned and it

is not until the sheets are pressed together that the glue is squeezed evenly over the surface.

(5) The cores and facing sheets are placed together in an hydraulic press, consisting of hollow heated plates. The composite sheets are separated from the plates by sheets of aluminium so that the surfaces are protected. After a few minutes in the press, during which the pressure is gradually built up, the glued sheets are removed.

The cores of laminated and block boards are carefully dried before and after glueing and are then planed before passing through the same kind of press as the ordinary plywood described above.

(6) The sheets are left for a day or more for final drying and are then scraped and trimmed, and in many cases sanded as well. Scraping is done by means of a machine with a thin vertical cutter and the veneer is carried forward against it by means of rollers.

The reason for the very existence of plywood is its reliability and freedom from movement. The whole process of manufacture is simple in essentials, but in order to insure uniformity it has to be conducted throughout with great care and scientific precision. Necessary variations and allowances must be made for the particular woods which are being converted.

* See *Wood* January 1936, May 1936, November 1937 and August 1938, from which the illustrations on this page are taken.

See also THE ARCHITECTURAL REVIEW, February 1936.

The Varieties of Plywood

SIMPLE PLYWOOD

Commonly available in Birch, Alder, Pine, Gaboon and Columbian Pine. Thickness—Minimum $\frac{1}{8}$ in., Maximum 1 in. (Special thin boards down to 1 mm. can be obtained in Birch.) Boards can be obtained up to 8 ft. 0 ins. by 7 ft. 0 ins., and 6 ft. 0 ins. by 9 ft. 8 ins. by special order, but the usual maximum obtained by scarf jointing is 9 ft. 8 ins. by 4 ft. 0 ins. For details see manufacturers' handbooks. Boards are graded according to the number and size of knots and other defects on both sides. Surface may be first scraped or sanded and scraped. Obtainable in a limited range of sizes with waterproof glue. Hardwood face-veneered boards of all kinds, and Birch with a special surface treatment, for use as shuttering are available.

LAMINATED BOARD

Birch, Alder and Gaboon veneers with core strips of Pine, Alder or Gaboon. Laminations are usually about $\frac{1}{4}$ -in. wide and the thickness of the finished board ranges from $\frac{3}{8}$ in.—2 ins., though in the majority of grades $1\frac{1}{2}$ ins. is the maximum thickness. 5 ft. 0 ins. by 15 ft. 0 ins. is a standard size.

BLOCK BOARD

The blocks are usually about 1-in. wide, otherwise similar to laminated board.

METAL-FACED PLY

Metal sheets are fixed to one or both sides of plywood with insoluble cement. The separation of the metal sheets by the rigid core gives great strength and rigidity on the same principle as the flanges and web of a steel joist. The sheets are not likely to warp except under extremes of moisture or unequal heating, and the surfaces are hard and smooth and not likely to sweat. Acoustic properties are similar to wood of the same thickness and it does not ring like metal. The metal most commonly used is 28-30 gauge galvanized steel, but Aluminium, Copper and Bronze are in common use and a number of other metals are obtainable. Thicknesses are "Thin" $\frac{3}{16}$ in., "Medium" $\frac{1}{4}$ in. and "Thick" $\frac{3}{8}$ in.— $\frac{1}{2}$ in. Edges should be sealed by turning over the metal and soldering where exposed, and in very severe conditions even rivet holes, etc., should be bushed and soldered. Sheets thus sealed can be plated, but the size of the sheet is limited according to the exigencies of the plating process, thus nickel plated sheets range in size up to 8 ft. by 3 ft., while the largest chromium plated sheets measure about 4 ft. by 2 ft. "Anodised" Aluminium sheets are available up to 6 ft. by 2 ft. 6 ins.

BAKELITE-CORED PLY

The Bakelite is cemented between the veneers in order to give extra strength. Various other materials are similarly used as a core for special purposes. For instance, lead is placed between veneers for panelling X-ray rooms and Balsa wood forms the core of block boards which are being experimented with for floors in aeroplanes. Bakelite, too, is commonly used as a plywood facing material.

CORRUGATED STEEL PLY

This is really a block board in which the wood core is moulded to fit the corrugations of an additional core of iron sheeting. Any small inaccuracies of fitting are not material as the pressure to which the board is subjected during manufacture is sufficient to cause the materials to be moulded to each other. Sheets can be made up to a maximum size of 7 ft. by 4 ft. and the thicknesses available are $\frac{3}{8}$ in., 1 in. and $1\frac{1}{2}$ ins. Owing to the weight of very large sheets the normal size sheet is 7 ft. 0 ins. by 2 ft. 2 ins. This is probably the strongest form of plywood obtainable and it was evolved for A.R.P. purposes, but it is likely to have many other applications and is already being used for flush doors where special strength is required.

SLOTTED-CORED PLY

Board of this kind is sometimes used where sharp bends are necessary. It has, for instance, been used for circular casings for columns.

RIBBED PLY

This is a French invention and is a method of giving rigidity to large sheets with only a slight increase in weight. The reinforcing members can be on one or both sides.

MOULDED PLY

This is similar to ordinary plywood but the surface veneer is formed of moulded material. It is obtainable in thicknesses of $\frac{1}{4}$ in. and upwards and in a variety of woods and patterns.

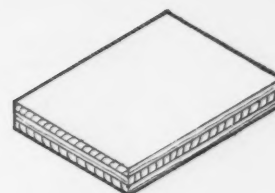
SPECIAL TYPES

The forms of plywood described above are by no means the only ones in use. The list of materials which could be used with plywood to form composite sheets is endless. Asbestos, linoleum, cork and even marble have been used, while various treatments and different glues are used to fit the normal birch plywood for different uses. Thus waterproof plywood has a special adhesive, and a special variety for shuttering is specially treated on the surface so that it does not adhere to concrete.

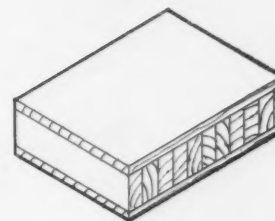
"Improved" wood is a further development of Plywood in which the veneers are subjected to very great pressure and are compressed and impregnated with synthetic resin. The resultant material is hard and dense and has the properties of wood and metal. It is made with grain in the layers at right angles, parallel or diagonal according to the purpose for which it is required. This is another material which has been evolved to meet aircraft requirements, and it is claimed to be "Dielectric, non-rusting, free from insect attack, completely stable and uniform."

Too often wood is painted, and it is a pity that, where colour is required, stains such as the Swedes use are not more frequently employed in this country. Of the ordinary finishes wax polish is probably the best. Scratches can be worked out and the grain is not filled with muddy pastes as is the case with French polish. Clear cellulose is all right temporarily but it darkens with age and the varnish is liable to get shabby. Experiments are being made with a new pressed cellulose polish in which the degree of polish is controllable and a stable and extremely fine surface is obtained.

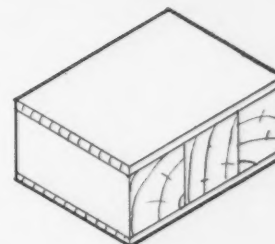
THREE PLY



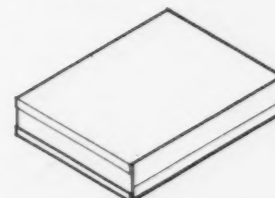
LAMINATED BOARD



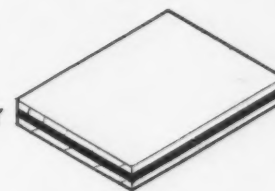
BLOCK BOARD



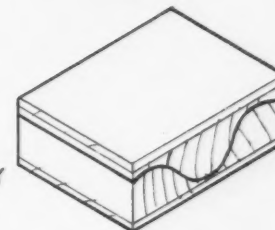
METAL-FACED PLY



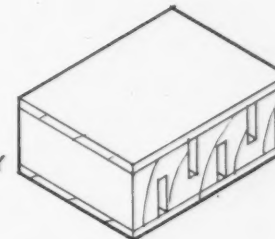
BAKELITE-CORED PLY



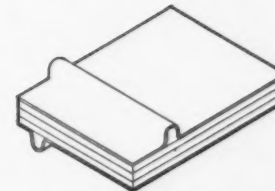
CORRUGATED STEEL PLY



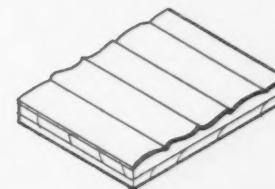
SLOTTED-CORED PLY



RIBBED PLY



MOULDED PLY



Plywood in Application

On the following pages some typical uses of Plywood are illustrated. One of the uses that has brought about the most striking change in design is for flush doors, but as they are of little pictorial interest they have not been especially included among the illustrations.



WALLS, CEILINGS AND FLOORS

In using Plywood for covering walls, especially in new buildings, the back should be painted with bituminous paint and small vent holes should be left top and bottom. Substantial battens or framing should be provided. If $\frac{1}{4}$ -in. panels are used bearers should be at 18 in. centres. Butt or V-jointing must be very carefully done with sharp tools, or if cover fillets are used the panels must be fully polished before the fillets are fixed. If very large panels are necessary special boards with chestnut cores are sometimes used to reduce movement to the absolute minimum. 1, an exterior use in the reveal to a recessed shop-front lined with ply, by Erno Goldfinger and G. W. Flower.

As already mentioned the rotary method of cutting gives much harder veneer than other ways, and although the veneers on ordinary plywood are thin, floors seem to have good wearing

properties. 2, a floor in Ash Plywood at a house in Clarence Gate Gardens, London, and 3, a specimen floor of metal-covered plywood intended for dance floors.

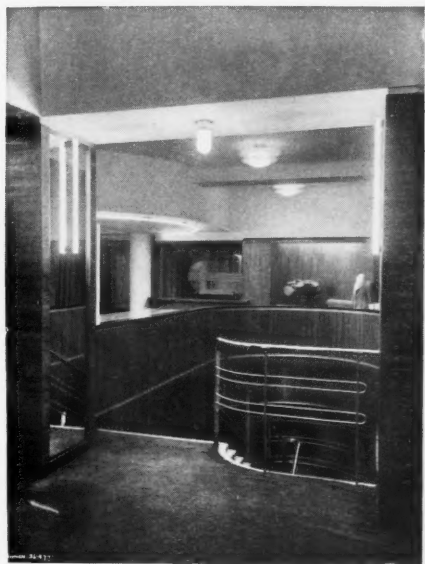
4, a plywood ceiling at Messrs. Bradley's, Chepstow Place, London, by J. A. Bowden, Son & Partners and J. D. M. Harvey. 5, simple panels of Birch used as a wall lining in the Secretary's Room in a London office. 6, flush door and bookcase in oak veneered boards at a house in Haverstock Hill. 7, wall covering in sycamore and birch veneers at Messrs. Bradley's, Chepstow Place, by J. A. Bowden, Son & Partners and J. D. M. Harvey. The finished work has a pleasing character of the wood. 8, an interior on the Dutch liner Nieuw Amsterdam, showing the fine effect obtainable from simple V-jointed panels of suitably faced plywood. 9, treatment of a



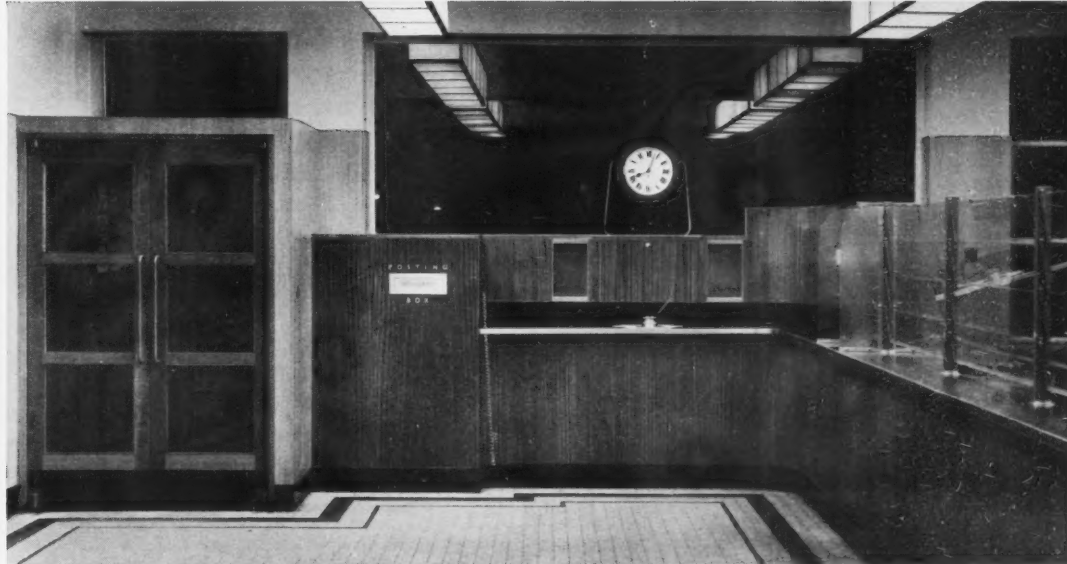
7



8



9



10



11



12

staircase with walnut veneer on laminated board, in a shop in Glasgow, by Sir John Burnet, Tait & Lorne. 10, a new Post Office at Bexley Heath with counters treated with Sapele Mahogany on plywood backing. 11, entrance vestibule at Arlington House, by Michael Rosenauer: another example of

Sapele Mahogany. The solid cover strips are Indian White Mahogany. 12, a shop in Brompton Road, by Wells Coates. Laminated wood and block boards are used to a very great extent in shopfitting work of all kinds. Veneers of various kinds make a fine background for display.



2



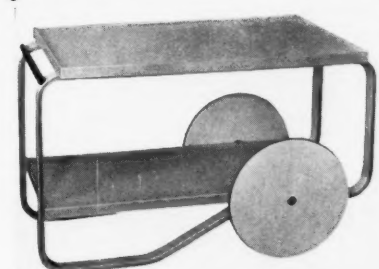
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4

Veneered Wall Covering

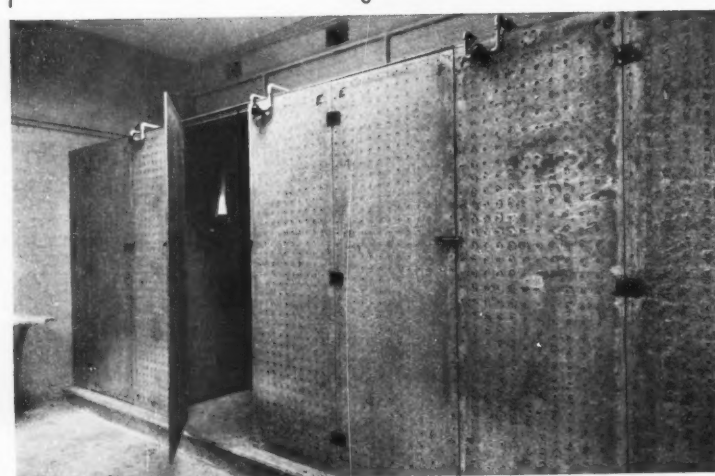
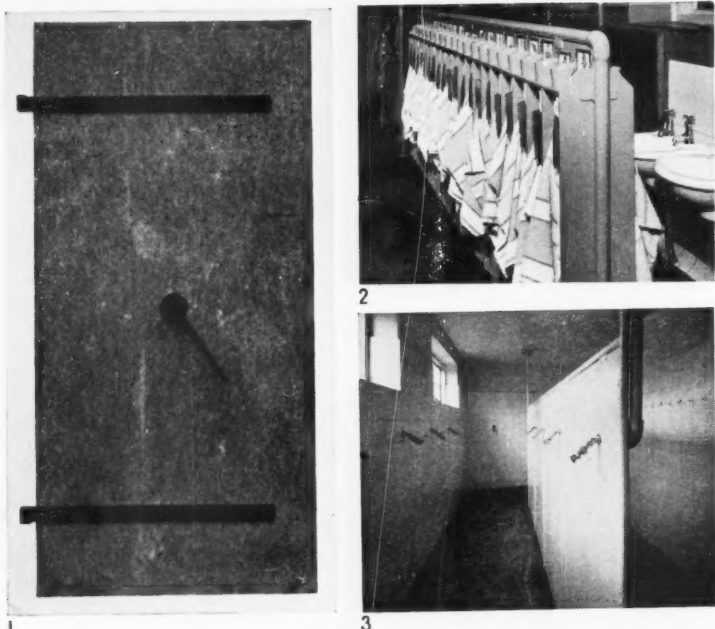
Rooms at the offices of plywood manufacturers, designed by Jellicoe, Page & Wilson, fine examples of veneered plywood panelling. The rich and dignified effect is obtained almost entirely by the simple way in which the carefully chosen veneers are used. 1, Australian Maple in the samples room and, 4, French Walnut in the board room. The applied decorative panel is tinfoil. 2, Indian White Mahogany panelling at a house in Chelsea. 3, a doctor's consulting room by Brian O'Rorke. The treatment of the walls and furniture in Australian Walnut veneers gives an efficient, yet comfortable character to the room.



Furniture

For many years the lids of grand pianos have been built up of plywood simply by gluing several layers of veneers together by hand, but it has not been until quite recently that plywood has begun to have a really revolutionary effect on the design of furniture. Naturally enough furniture makers, like ordinary joiners, have appreciated the simplification of construction which has been made possible by the advent of laminated boards. Lightly designed furniture, taking advantage of the raw material, is not far to seek, but this type of work is a development from previous framed construction. Bent wood furniture, which in standardized forms is now familiar, is one of the first fruits of a real revolution in design. The construction of this type of furniture depends on the flexibility, during manufacture, of members made up of laminae, as

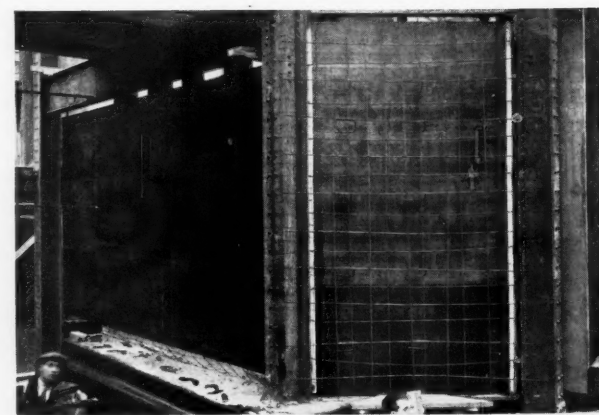
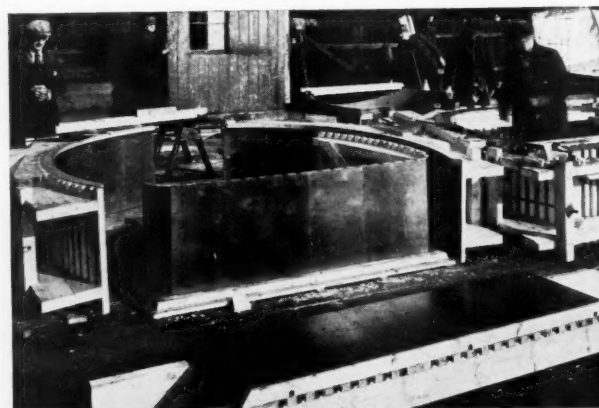
against steamed bends made of solid wood, and also the strength and springiness of the finished product. A step further is the plywood furniture pressed out complete, requiring practically no assembly. 1 and 2 are examples of this type of furniture. The desk, 3, by Denis Clarke-Hall, takes advantage of the large sizes made possible by the use of laminated board and could not have been constructed in solid wood without great difficulty. The bookcase, 4, by Wells Coates, is a straightforward application of plywood to contemporary design. In the tea-trolley, 5, the laminated principle is used for bends. 6 and 7, the component parts of a writing desk made of plywood, before and after assembly. The examples shown were designed by M. Anton Heythum of Prague.



Miscellaneous Uses

1, typical flush door for A.R.P. work faced with asbestos sheeting. 2, standardized towel and beaker fittings of metal-faced plywood. 3, shower partitions of the same material for schools. 4, special perforated galvanized metal-faced plywood is used for the doors of drying cabinets at Isleworth Fire Station. 5, standardized dressing cubicles at the Black Rock Bathing Pool, Brighton, are made complete in metal-faced plywood. The material is permanent and hygienic and is particularly suited for work of this kind. 6, special plywood in use as shuttering for casting concrete units for A.R.P. shelters. The surface of the wood is treated with a kind of polish so it does not adhere to the concrete. The adhesive used is of the synthetic resin waterproof type. 7, the same material in position ready for the pouring of concrete for walls.

We are indebted to the editor of "WOOD" for the loan of the following illustrations. Page 135 Nos. 1 and 2. Page 136 Nos. 1, 2, 3 and 4. Page 138 No. 1. Page 139 No. 8. Page 141 Nos. 6 and 7. Page 142 No. 1.



V i c e n z a

Vicenza is a city in the Marquisate of Treviso, yet appertaining to the Venetians, full of gentlemen and splendid palaces, to which the famous Palladio, born here, has exceedingly contributed, having been the architect. Most conspicuous is the Hall of Justice; it has a tower of excellent work; the lower pillars are of the first order; those in the three upper corridors are Doric; under them are shops in a spacious piazza. The hall was built in imitation of that at Padua, but of a nobler design, *à la moderne*. The next morning, we visited the theatre, as being of that kind the most perfect now standing, and built by Palladio, in exact imitation of the ancient Romans and capable of containing 5,000 spectators. The scene, which is all of stone, represents an imperial city, the order Corinthian, decorated with statues. Over the Scenario is inscribed, "Virtuti ac Genio Olympior: Academia Theatrum hoc à fundamentis erexit Paladio Architect: 1584." The scene declines eleven feet, the *soffitto* painted with clouds. To this there joins a spacious hall for solemn days to ballot in, and a second for the Academics. In the Piazza is also the *podesta*, or governor's house, the *facciata* being of the Corinthian order, very noble. The Piazza itself is so large as to be capable of jousts and tournaments, the nobility of this city being exceedingly addicted to this knight-errantry, and other martial diversions. In this place are two pillars in imitation of those at St. Mark's at Venice, bearing one of them a winged lion, the other the statue of St. John the Baptist.

In a word, this sweet town has more well-built palaces than any of its dimensions in all Italy, besides a number begun and not yet finished (but of stately design) by reason of the domestic dissensions betwixt them and those of Brescia, fomented by the sage Venetians, lest by combining, they might think of recovering their ancient liberty. For this reason also are permitted these disorders and insolences committed at Padua among the youth of these two territories. It is no dishonour in this country to be some generations in finishing their palaces, that without exhausting themselves by a vast expense at once, they may at last erect a sumptuous pile. Count Oleine's Palace is near perfected in this manner. Count Ulmarini is more famous for his gardens, being without the walls, especially his *cedrario*, or conserve of oranges, eleven score of my paces long, set in order and ranges, making a canopy all the way by their intermixing branches for more than 200 of my single paces, and which, being full of fruit and blossoms was a most delicious sight. In the middle of this garden, was a cupola made of wire, supported by slender pillars of brick, so closely covered with ivy, both without and within, that nothing was to be perceived but green; betwixt the arches there dangled festoons of the same. Here is likewise a most inextricable labyrinth.

I had in this town recommendation to a very civil and ingenious apothecary, called Angelico, who had a pretty collection of paintings. I would fain have visited a Palace, called the Rotunda, which was a mile out of town, belonging to Count Martio Capra; but one of our companions hastening to be gone, and little minding anything save drinking and folly, caused us to take coach sooner than we should have done.

JOHN EVELYN (Diary)

Just because we have successfully mucked up our own garden there is no need to toss the rubbish into our neighbours.



Litter

While the Scapa Society's activities in the sphere of litter prevention are by no means to be disparaged, a quotation, given below, from Beachcomber's column in the *Daily Express* does serve happily to restore a certain sense of proportion.

"I thought it was high time people started once more to write to the papers about litter. What astonishes me is that the sensitive people who swoon when they find a cigarette end or a bit of string at a beauty spot are apparently unaffected by the booths and road houses and hideous shacks all round them. Litter seems to mean something very small. When it is the size of a house it is unnoticed.

"The latest suggestion is that A.A. patrolmen should wander about and report every motorist who drops a match end or a bit of paper, so that he can be charged and have his licence endorsed. Since nine motorists out of ten break every rule of the road with complete impunity, I think it would be rather fun to nab them under a Litter Act. After all, driving to the public danger is one thing; hurting the aesthetic sense of a pantheist is quite another thing."

This sentiment has indeed a grain of sense in it. What an opportunity for some architectural-minded legislator with the ingenious spirit of an A. P. Herbert to sweep away under a Litter Act all the by-pass villas that Ribbon Development Acts and Town and Country Planning Acts have failed to disperse.



"It must be in keeping"

When any addition to an old building is contemplated no phrase is used more promptly or more frequently by those responsible than the above. Few remarks could seem, at first, to express so adequately what one is tempted to assume is inevitably the right attitude. But first, apart from architectural honesty, it is highly unlikely that if the new addition actually serves some useful purpose, for example a bathroom or a garage, anyone will take it for an original part of the old Jacobean or Georgian or whatever-it-is structure. And secondly, if both parts are equally good of their sort, the highest architectural ends are as frequently served by contrast as by rigid conformity.

An instructive example is the *Lycée Malherbe* at Caen. The Lycée is in fact the old monastery, *l'Abbaye aux Hommes*, founded by William the Conqueror, which, apart from the Church itself, was rebuilt in the mid-18th century. Those with a passion for architectural completeness might be tempted, before they have seen the present buildings, to bemoan

MARGINALIA

Scapa

The annual report of the Scapa Society, one of the oldest of the existing bodies warring against the spoilation of the countryside, contains as usual much food for thought, as well as much matter for congratulation. It is gratifying, for instance, to learn that "local authorities throughout Great Britain are asking for more effective powers to control outdoor advertising," though a cynic with some experience of local authorities might be tempted to wonder whether such admirable enthusiasm would survive any immediate prospect of really effective legislation.

At the same time, one is once more

staggered at the dilatoriness of our democratic functioning, when one learns that we must face the prospect of two more years of that dangerous, pestilential, and, one imagines largely ineffective curse of aerial advertising.

However, one must comfort oneself that in October, 1941, if the Committee's recommendations are carried out, this bore will finally disappear.

From this rather cold comfort it is pleasant to turn to that part of the report dealing with the Society's increasingly successful war on the brutes who plant their beastly hoardings on all the few remaining beauty spots

visible from a main road. In this connection it is perhaps not without interest to place on record a fine example of what Saki used to call "Tauchnitz morals." Several admirable, and one or two less admirable, English newspapers, which on the whole display a consistently enlightened attitude towards "amenities," and in this country seldom offend in this particular way by their advertisements, do not hesitate to scar the not wildly exciting but pleasant countryside along the Paris-Boulogne, Paris-Dieppe lines with gigantic supplications to read their columns on one's return.

such a sudden transformation from Romanesque to Louis Quinze, but none but the most bigoted ecclesiologist could sustain such an opinion when confronted by the view of that great Romanesque cliff of the Abbaye's nave, so dramatically and so properly terminated at the base by the severe arches of the 18th century Doric cloister. The contrast is sufficient but not overwhelming; the colour of the stone is exactly the same, and there is an underlying simplicity of purpose common to both that makes one glad that, as so frequently happened, the cloisters were not just a hundred or so years later in date and as a result in the Gothic, or worse still in that sickening Flamboyant style. As for the possibility that they might have been erected, as could so easily have happened, in a tasteful Viollet-le-Duc Romanesque revival provides yet another reason for thanking God for the 18th century.



Two Views of Gloucestershire

The two quotations that follow are taken from the latest of the series of Shell Guides to English counties, that on Gloucestershire, just published. They are from two short articles with which the guide concludes and illustrate two vividly contrasting view-points. The first, entitled *Dying Industries*, is by Thomas Hennell and the second, entitled *Living Industries*, is by Anthony West, the author of the Guide. This new Guide is an admirable addition to the series, well up to the standard of the best: Cornwall and Oxfordshire. It is of especial interest architecturally in that it contains a separate chapter on Cheltenham, fully documented and well illustrated, which it is hoped may do something to ensure that that town's architectural glories are treated with proper respect.

I

"The visitor to Gloucestershire whose interests extend beyond the obvious beauties of scenery, of old towns, villages and buildings, is likely to be impressed by that happy blend of frankness and courtesy which distinguishes the people of this county. It may well be that a further interest is thence evoked in some of the individual callings which this fortunate disposition has defended in a measure, against the obliterating tide of industrial revolution and social devaluation. Here, truly, as elsewhere, hereditary trades are rendered more and more difficult to carry on. . . ."

"A trade that was once important in country-towns and now is nearly destroyed, is the wool-stapler's; his work was to grade fleeces according to quality; to every sort a proper purpose was assigned. But these old standards are lost with modern manufacturing methods: a big combine of tailors will pool together, for their cloth, a great bulk of wool, good and bad, which thus comes out cheaply though not exactly standardized. Thus at one blow the farmer loses the due price of his good wool, and the country-town



Left, the late fifteenth century tower of Chipping Campden church, the centre of Cotswold prosperity when wool stapling was the major industry. Below, the west front at Dodington designed by James Wyatt in 1799. Both illustrations from the Shell Guide to Gloucestershire by Anthony West.



Clarence Square, Cheltenham, c. 1835. The greater attention paid to the glories of Bath has hitherto prevented an adequate appreciation of the considerable amount of 18th and early 19th century architecture of Cheltenham. From the Shell Guide to Gloucestershire by Anthony West.

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tailor loses all his custom, for his handiwork cannot be so cheaply produced as his rivals; nor can he unlearn the craft of immemorial generations.

"How many other country trades have declined from exactly such difficulties? The saddler, who is only now and then asked to make harness for fox-hunting, the carriage-builder who keeps on only as undertaker and decorator. Even the farm carts are replaced with lorries from Lancashire or America.

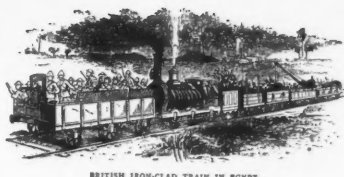
"Yet for individual craftsmanship of high standard there is a definite demand; where there are good museums and galleries, and enlightened education, such work is realized as a necessity and not a luxury. In our country there are living some of the best of these masters; and they deserve special mention because not only have they educated themselves to highest achievement in their chosen crafts, but, through experience of the best living art in many branches, and of the legacy of the past, they are qualified to set a pattern to every artist, not least to him who would be an artist in living."

II

"There is a great deal of writing about Gloucestershire which suggests that it is an agricultural county to which industry came late, bringing nothing but harm when it did. This is a misleading half truth for the county has a long industrial history. The Roman villa at Chedworth was in part a factory where raw wool was purified by treatment with fuller's earth, and the various surface iron workings in the Forest of Dean were productive at the same time. Cheap ready-made woollen cloaks were exported from Britain to the Roman Empire and we may suppose that the Chedworth fulling mill was connected with this trade. The iron mining was then unattached to any manufacture and its function was to produce iron ingots for blacksmiths who worked them up at the places where they were wanted.

"The last decade of the nineteenth century and the first decade of the twentieth were occupied in the dispiriting business of selling farm produce on a falling market. In an attempt to relieve the depressed state of the people, well-intentioned persons filled with the notions of William Morris started a movement to get them to make things by hand. An extraordinary legend came into being that the tradition of the county lay in handicrafts, and the grandchildren of the men who made the first Cunarders were told that they were honouring their forefathers when they made lamp brackets and fire-dogs in the clumsiest possible way.

"In 1910 when an aeroplane factory was started in Bristol it looked as if the tide of industry had set from the south irrevocably. But after the war the ravaged nerves of all England boomed the cigarette business into a major industry, and the prosperity of Bristol started drawing new industries into the district. The aeroplane factory in Bristol and the aeroplane works at Gloucester both expanded greatly during the war and maintained a fair level of prosperity after it, but since 1934 they have both boomed enormously. They employ hundreds of people, more hundreds are employed in providing for their needs in the way of parts and tools, still more hundreds are employed in bringing them food, selling them goods, and so on. The services created for the aircraft factories by the county authorities attract other forms of industry on their lunatic drift from the north, so an industrial revival is taking place. At first sight the sprawling red brick housing estates and the great factories look wholly disastrous to this stone countryside; but in those ugly factories men are doing work that their forefathers would have been proud to do and in those red brick houses they have families better fed, better clothed, and better housed than their forefathers ever were."



The Contemporary American Church

A vivid insight into the methods of design current in American church-building is afforded by the following quotation from the current issue of *Lutheran Church Art*, a small pamphlet published from Cleveland, Ohio, and (to quote the wording on its own title-page), "printed from Time to Time in the Interest of Church-Building of the Better Sort, Church Music, Liturgics, Paramentics, Campanology and Kindred Subjects." It is interesting (and its vigorous opinions are especially admirable) because it is obviously concerned with the ordinary rank and file, as it were, of churches—of which there appears from this article to be an extraordinary number being built—as distinct from those of conventional architectural importance which are normally the only ones to get into the news.

"It is hard to understand why the great majority of our congregations select the worst possible way of doing things. They do this with uncanny certainty. If there are ten good ways of doing a thing and one bad way, they are sure to select the bad way every time. They pick it up as unerringly as a child picks up bad grammar.

"We are not referring to doctrine, but to methods of building churches. The same principle could be extended safely to the equipment of churches. Lest the reader may think that our statement is much too sweeping, and that the general fifty-fifty law of averages might apply, permit us to cite a few matters of detail.

"Walls.—Of some twenty congregations that have built frame chapels lately, every one insisted upon basement walls much thinner than city and village ordinances specify. Many communities have passed an ordinance stating that the basement walls even of a small residence must be at least 12 inches thick in the case of a concrete wall, and 13 inches in case of brick. Of twenty congregations that have written us lately, eighteen were sure an 8-inch wall was enough, while two wanted 6-inch basement walls!

"How do the twenty congregations get that way? Simply because they listen to too many local experts. Most of these men are small-time contractors, accustomed to building small houses of the speculation sort. Few, if any of them have ever built a church. Eighty-penny nails are extremely useful in their place, but they are not used to fasten together the heavy timbers of a barn. The same principle applies to hollow tile and cement blocks.

"Exterior Trim.—If twenty-five letters reach our desk during the current month, from twenty-five congregations planning to build of brick, it is a sure prediction that 24 out of the 25 will insist upon artificial stone trim and tracery. It is a known fact that artificial stone does not hold up when exposed to the elements. Not in our climate, at least. We took a skeptical friend to inspect artificial stone trim in a dozen cities, taken in regular order. In every town we inspected a number of well-known churches. In every case, none excepted, the artificial stone had given trouble. At one place they had a church by a very prominent architect and they were in the very act of spending \$10,000 in replacing copings

HOUSES AND HOUSING



A survey of American housing forms the architectural section of the inaugural exhibition at the Museum of Modern Art, New York. The U.S. Housing authority co-operated with the Museum's architectural department in the planning of the exhibit. It is hoped that its value as propaganda for good housing will be considerable and it is proposed that the exhibition should tour the country during the next two years. The lay-out was designed by Mary Cooke and consists of photographs, drawings and diagrams with models on small tables attached to the wall as shown in the photograph above. The circulation in the exhibition is skilfully planned providing a one-way system of movement, achieved by means of screens, open partitions and a planned sequence of colour and texture. The new building of the Museum of Modern Art is illustrated on pages 121-124 of this issue.

and buttress caps that had gone bad. In another they were caulking the joints as one would caulk a ship. In another we found that two singularly beautiful French Gothic towers had become so decayed in 13 years that both had been removed, and much humbler and simpler towers of Indiana limestone substituted.

"Brick Veneer.—To mention the list of congregations that have demanded brick veneer during the past year would be almost to copy the list of some 100 or more that have written us. However, the same story may be told here. Not far away is a shocking example. A congregation spent \$19,000 for a church basement, and then roofed it over for the period of the depression. Today their brick veneer is full of cracks. One can literally shove his hand into some of them. In other places the veneer has pulled away from its backing, and the walls bulge crazily. Years ago brick veneer was a different

story. The usual brick veneer of today is to be avoided.

"Cardboard Walls.—In one large section of our country one might as well condemn religion itself as to try to condemn the long list of patented wall coverings that have come upon the market. Again permit us to say that each and every one of these products has its proper use, and is fine enough if confined to its proper place. The morning newspaper has its legitimate place, but would you write us indignant letters were we to say that it must not be used to paper the walls of our church buildings? So too have these synthetic products a proper place, and many uses, but as wall coverings for churches, they rank about zero. Some of them bulge and buckle, some pull loose, some take on a shockingly unpleasant colour after a time, others are acoustically so dead that speaking and singing becomes dull and lacking in

resonance. And yet acres of such products have been applied to the walls and ceilings of our churches during the past few years.

"This list of short-cuts and synthetic materials could be extended until the proverbial cows come home. We had made notes of many other examples of short-sighted economy. We had planned to mention the present mania for second-hand bricks and stone, wooden window tracery, organs with four or five sets of pipes camouflaged to look like twenty or more sets, carillons that contain no bells, and other such things. The list would contain such shams and short cuts as

the latest outrage that is sweeping some of our Midland States, namely the post-depression method of building a church with four load-bearing walls, and when it is almost finished, building sham arcades of columns and arches inside, these constructed of 2-inch by 4-inch scantling, lath and plaster, and marked off to look like stone. Literally scores of such disreputable things have sprung up like weeds lately. It is sad to think that men who would not be guilty of telling a lie in other relations to their fellow men, will write up a church dedication, and say of one of these impudent shams, 'the

new church is Late English Gothic, and is constructed of the best materials, solid and enduring throughout, and honest in every particular.' It is equally shocking that some denominational papers will print such bilge. Such churches are not English, they are not Gothic, they are not constructed of good materials, they are not solid, not enduring, not honest in any respect.

"We are well aware that some really fine men often build some really disreputable churches. We do not for a moment think that they do it merely to deceive the public. Rather is the evil an

outgrowth of a distorted method of thinking. Such men imagine that they have done the Lord a real service if they build a \$50,000 church for \$22,500. They imagine that the difference thus saved will immediately flow into the missionary treasures of one's denomination. Others, no doubt, haven't the slightest inkling of what constitutes construction that is 'solid and enduring throughout, and honest in every particular.'

"Our synodical noses are kept to the grindstone, year in and year out, because of the beastly high cost of poor construction. A total of millions of dollars flow into the yawning pit of costly upkeep. A church that is really honest in construction is low in the matter of upkeep. A shoddily built church is a constant source of irritating expense. Is it not high time that we outlaw the spirit of penury? A tight-fisted skin-flint is despised by all decent people. Why should a skin-flint, chiseling building committee continue to be applauded?

C A M O U F L A G E



The cooling towers of the central generating station of the Leicester City Electricity Service which have recently been camouflaged. The tone and colour values of the design match the trees and fields which surround the station. The towers are 120 ft. high and over two tons of special oil bound water paint was used on each. The scheme was prepared by Mr. Ernest Townsend of Derby.

The Engravings

The vignettes in this issue dealing with transport are from various sources. The first is from an early nineteenth century advertisement of a removal contractor. The second is from a present-day handbill advertising the paddle steamers familiar in many summer resorts, and the remainder are taken from "Our Iron Roads" by Frederick S. Williams, published in 1888.

CORRESPONDENCE

Architecture and Class

The Editor,

THE ARCHITECTURAL REVIEW.

SIR,

It seems to me that Mr. Barman traces back his theory of Class and Architecture too far. In this country there is surely very little evidence of a connection between these two things, earlier than the nineteenth century.

The various phases of eighteenth century classicism were not brought about by an aristocracy frantically trying to escape confusion with the middle classes, nor, I think, can the Gothic Revival be attributed even indirectly to the influence of "huntin', fishin' and shootin'." As for the Tudor barons, their houses were certainly larger and contained more chimneys than those of their predecessors, but this is surely no reason for supposing that they were an expression of class. Incidentally, the Doric example from Lacock belongs to this period, and was, I suggest, far more likely to have been regarded as an ingenious use for a new feature than as an apology for a chimney. If it was necessary to apologize for a chimney later, it was not through any association with factories or the middle class, but only because chimneys would interfere with strictly classical composition.

In spite of Mr. Barman's remarks about the present day, I should have thought that class distinctions could now be traced in almost every activity, including building, and that their prominence in our own surroundings may lead us to over-rate their influence in other times when society was so clearly divided that artificial distinctions were unnecessary.

Yours etc.,

OSWALD BRAKSPEAR.

Corsham, Wilts.

