

THE AMERICAN ARCHITECT

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ROTHENBURG-ON-THE-TAUBER

By W. GEDNEY BEATTY

FORTY-ONE miles west of the Bavarian City of Nuremberg, is the town of Rothenburg. It stands on the edge of a plateau, two hundred feet above the Tauber; which, winding about in the valley, passes under the picturesque ancient bridge that connects Rothenburg with the country to the west.

A surprise awaits the sight-seeing traveler, when the town first comes into view. Here is a German city, completely walled and almost untouched for three hundred years; and which is not equaled by any other town of the Empire for its quaint mediæval streets and architecture.

The spirit of the sixteenth and seventeenth centuries pervades the place. Except for their modern dresses, even the inhabitants, of which there are 8,000, seem to belong to the past.

As one wanders through the little streets with their gabled houses of half-timber work and of stone, the town life of mediæval Europe is

readily understood, at the time when the surrounding walls were a defensive necessity. These are about two and a quarter miles in length and contain a number of gates, through which roads lead into the country in various directions. At the time of "The Thirty Years' War," the town was again and again besieged and taken.

Almost all the repairs to the buildings have been made in the spirit and with the purpose of preserving the original town as far as was practical. Here is the Rathhaus with its Council Chamber that is in use to-day, and where at each Whitsuntide, a play commemorating the capture of the town by Tilly, in 1631, is performed. The building is a Renaissance structure of 1578, although some parts are later. Certain portions date back to times before the sixteenth century. The climb to the top of the tower, which is 230 feet high, well repays one for the effort. Here is found a watchman on the lookout for fires



LOOKING ALONG TOWN WALL

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THE KABALZELLER GATE

and ready to alarm the town. The view from the tower is very fine. Below one sees the narrow streets winding between the red roofed houses; and enclosing all is the line of walls which are quite irregular, with here and there a tower built into them.

On the top of some of the walls is a walk along which one can go a considerable distance and have a good view of the old yards, where still are kept cows and chickens, as has been the custom for hundreds of years.

At some of the points where the streets cross and in the Market Place are little fountains with their quaint carved stone curbs, and some charming iron work. Around these children are playing, who shy-

ly look at strangers with the same curiosity as their ancestors had in the sixteenth century.

For the tourist who visits Munich or Nuremberg, this little Bavarian town should not be passed by, as there are not many European mediæval towns in existence that have suffered so few changes; and the trip of a day, I am quite sure, will never be regretted.

Some of the accompanying views are from prints sold in the town and others from photographs I have taken myself.

To the student of architecture there is much of interest in the examination of the methods used in the construction of the walls and buildings, and in much of the architectural detail; for in this quaint town there are unusual opportunities to investigate and study.

They convey a good idea of the architectural features and quaintness of Rothenburg, and it is hoped will induce architects to visit the place.



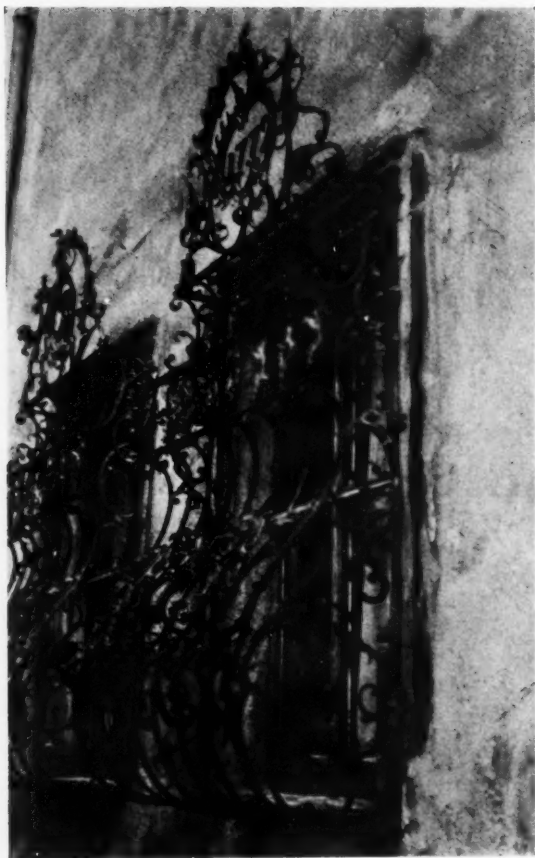
DOUBLE BRIDGE, WITH TOWN IN DISTANCE



LOOKING TOWARDS THE KLINGEN GATE, ROTHENBURG-ON-THE-TAUBER



CITY HALL, ROTHENBURG-ON-THE-TAUBER



IRON WINDOW GUARDS DATED 1772, ROTHENBURG-ON-THE-TAUBER

SMOKE PERPLEXITIES OF THE ARCHITECT

By RAYMOND C. BENNER, PH.D.

IS this perhaps a new train of thought to you, that smoke can have any bearing whatsoever on the problems of the architect? Have you ever stopped to consider that in this connection it might be a hindrance? For such it is. It limits not alone the expression of the finer ideals of the artist but is detrimental from a practical standpoint, making unavailable for use certain materials which could otherwise be utilized to the best advantage and necessitating changes in design.

The architect is one of the greatest sufferers from this unmitigated nuisance and at the same time he is not entirely blameless as to its existence as such. If in designing

the building he would give due consideration to the proper kind of furnace and provide room for the installation of the boiler and furnace equipment, there would be much less smoke. Cheap equipment has no more place here than elsewhere.

No one will deny that soot and the associated substances are injurious to building materials. To anyone walking down one of our main thoroughfares it is a self-evident fact. When, however, we wish to know the how and why of its many injurious effects it is essential that we understand its composition and properties. Soot, in as far as it materially concerns us, is the product of the incomplete combustion of the one great smoke-producing fuel, soft coal, all others being negligible.

It is not a difficult task to burn soft coal without the emission of black smoke. The furnace has only to be so constructed:

(1) That sufficient air will be admitted to combine with the combustible matter in the coal.

(2) That the air will be thoroughly mixed with the combustible gases.

(3) That a sufficiently high temperature be maintained until the gases are completely burned.

In domestic installations, where the coal



A WINDOW DETAIL, ROTHENBURG-ON-THE-TAUBER

is burned at a comparatively low temperature Sir Roberts Austin finds as an average of some forty experiments that of the coal burned in grates something more than six per cent. is given off with the flue gases in the form of soot. After a very careful and elaborate research Scheurer-Kestner



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found that when the temperature of the furnace is high, as in the boiler furnace, the carbon lost as fuel never exceeded one per cent. and that the average is between five-tenths and seventy-five hundredths per cent.

All conditions in the furnace greatly affect the amount of carbon lost as soot but the fact stands out that where equal amounts of coal are consumed domestic installations are worse offenders than boiler furnaces. Loss of efficiency through the escape of soot itself is small. This is, however, an indication of a far greater loss in the shape of unburned, invisible gases, which loss may reach as high as ten per cent.

Soot consists of:

(1) Carbon in a finely divided state. This, as is well-known, is lamp black, the basis of most black paints and has a great covering power. It has the power of absorbing the corrosive acids which are produced by the combustion of coal containing sulphur.

(2) Tar. Common coal tar which makes the soot cling tenaciously to everything with which it comes in contact. Tar contains carbolic acid and other bodies of an injurious nature.

(3) Acids. Sulphurous acid (H_2SO_3), Sulphuric acid (Oil of Vitriol) (H_2SO_4), Sulphuretted Hydrogen (H_2S), Hydrochloric acid (HCl).

The acids corrode and tarnish all of the common metals. They attack many of the stones and building materials, especially limestone. Draperies, paper, paints and other decorative materials suffer to no less extent. In burning the sulphur in the coal the relatively inactive sulphurous acid is produced, but this soon becomes oxidized in the air to the far more active and corrosive sulphuric acid. These acids are also poisonous and detrimental to health.

(4) Ash. This is the least injurious of all the constituents of coal and may be, for all practical purposes, considered as common dirt.

(5) Ammonia (NH_3) while found in soot, is only in very small quantities and is of less importance than the corroding agents.

(6) Arsenic. This poisonous substance has been found in small quantities (generally less than one-tenth per cent. of the soot).

The amounts of these constituents of black smoke vary between the widest possible limits, depending upon the composition of the coal, methods of firing, amount of air, temperature of the furnace, etc.

Dr. Russell found that rainwater did not contain acid unless it also contained soot. The amount of free acid in nine samples calculated as sulphuric acid was



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found to be: 1.4, 0.5, 7.2, 0.0, 0.0, 4.9, 0.8, 1.2, 2.3 per cent.

From analyses it is found that the amount of tar and carbon in the soot from domestic fires is much higher than from boiler furnaces, while in the case of ash the reverse is true. Domestic soot is thus by far the more objectionable and is produced in greater quantities from the same amount of coal. The amount of acid depends

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more upon the amount of sulphur in the coal than upon any one factor and is given off with the products of combustion whether smoke is produced or not. When, however, soot is produced a large percentage of the acid is occluded in the soot where it is more injurious than if allowed to escape alone into the air. The soot coming in contact with metal, stone, decorations, etc., is made to adhere firmly by means of its tar content, in reality covering the surface with a coat of black paint. The acid is not readily washed away by the rain but continues to act until it is all used up. This acid absorbed from the air by the rain-water would be more injurious if it did not drain off from most surfaces before its action was completed.

One cannot fail to notice the rapid tarnishing and disfigurement of all polished surfaces, even though the more serious corrosion may escape observation.

The damage to metallic surfaces may then be considered from two standpoints.

(1) Soiling the surface.

(a) Deposition of carbon.

(b) Deposition of tar which holds dust and soot.

(2) Chemical action.

(a) Tarnishing by H_2S , Ammonia, etc.

(b) Corrosion by the sulphuric acids, etc.

(3) The combined action of all. The soot is made to adhere to the metallic surface by means of its tar content, when the occluded acid, which is nearly always present, can carry on its destructive action to the greatest advantage.

The soiling of the metallic surface by the presence of soot containing no injurious constituents is a simple matter and is easily remedied by simply wiping off. This phase is, unfortunately, of rare occurrence, as most soot contains both tar and acids.

When the surface is covered by soot containing tar the matter is more serious, for more heroic measures have to be taken in order to clean it, chemicals being frequently necessary. The corrosion caused by the acids and other gaseous impurities



HEGERETTER HOUSE AND HOSPITAL COURT, ROTHENBURG-ON-THE-TAUBER



MARKUS TOWER, ROEDER STREET, ROTHENBURG-ON-THE-TAUBER

in the air brings about a permanent injury to the metal, destroying the beauty and strength. This can only be guarded against by some means of protection.

Sulphuretted hydrogen is the only common gas which attacks silver, tarnishing that substance and forming silver sulphide which must be removed by some polishing agent, causing a loss of silver,

Copper and brass are readily tarnished by this and require constant polishing to keep them bright. Black copper sulphide is the coating formed.

Ammonia also attacks copper and brass readily and this combined with the acids in the air forms a green coating called "verdigris."

Gold itself is very little affected by the corroding constituents of the atmosphere. When, however, it is alloyed with copper, as is usually the case (pure gold being soft), tarnishing and corrosion take place to some extent.

The corrosion of pure iron in pure air is not extremely rapid, but when iron con-

tains impurities such as sulphide, phosphide, carbide and free carbon, corrosion is accelerated. When saline substances and strong acids are introduced into the rain water rusting is increased many fold.

Dr. B. Rideal found 4.25 per cent. sulphuric acid, equivalent to 8.95 per cent. Fe, dissolved in the rust from iron roof girders from the Charing Cross Station—which collapsed because of this self-same rusting. In other places where there was not an appreciable amount of smoke one-third to one-quarter as much sulphate was found. This was due to improper protection by paint.

The acid which is absorbed by the soot containing tar is by far the most destructive to metallic surfaces. The carbon containing acid is made to adhere firmly to the metal by means of its tar content. In this position the acid has the best possible opportunity to attack the metal, the action being in all probability of an electrolytic nature. The pitting of iron is in part due to this cause.

Our investigation in the Pittsburgh district brings to light some interesting facts in regard to the length of time that different materials will last. Ingot iron, copper and lead have the greatest endurance. The lives of all metals are of much longer duration, frequently two or three times as long in an uncontaminated atmosphere, as, for instance, they would be around the steel mills in Pittsburgh. At least double the amount of repainting of metal surfaces is necessary on account of the smoke and even with this additional protection the metal itself must be renewed about twice as often—adding much to increase in expenses.

EFFECT OF SOOT ON STONE

The effect of soot and the occluded acids on stone, terra cotta, brick, etc., is somewhat similar to that which it has on metals, *i.e.*, it both soils and corrodes. The destruction of the beautiful is, however, the more important, as most stones are but little affected by the acids while all are practically destroyed so far as any decorative value is concerned. Mortar and stone containing carbonate of lime are those which suffer most from the chemical action of the acid and subsequent erosion by the weather. In many cases this is a very important factor as limestones and sandstone with a calcareous cementing material make up a large portion of the stone available for building purposes.

Most stones used for the construction of the main portion of buildings are finished in the rough. It is very difficult, if not impossible, to remove the soot settling in the crevices and if removed a portion of the stone has to be taken off at the same time. Sand blast, brushes with metallic bristles, together with chemicals (hydrochloric acid) are used in cleaning. These processes are objectionable and cannot be endorsed and withal are only temporary expedients as the surface is soon as dirty as before. To quote from Stone, "Nearly every stone, except those that are almost completely non-absorbent indurates on exposure. The natural quarry water, more or less impregnated with silicious materials, comes to the surface by capillarity and by evaporation leaves a thin skin of its mineral content. This is Nature's protection. The sand blast rudely brushes this skin away, leaving

the particles beneath robbed of their natural silicious protection and subject to the direct attack of all atmospheric acids."

The logical step would be to protect the exposed surface of the stone by means of some harmless waterproof coating which is permanent, does not discolor the stone and gives a surface easily cleaned. Numerous methods, all more or less effective, have been suggested.

The action of sulphuric acid on stone is the same as that upon carbonates of calcium (CaCO_3) magnesium (MgCO_3). (The chemical compounds of which form a large part of limestone, mortar after it has been exposed to the air for some time, as well as the cementing substance for the grains of sand in many kinds of sandstone.) The acid unites with the carbonate calcium forming calcium sulphate (gypsum) and liberating carbonic acid gas. This causes the stone to swell and become more friable and porous and renders it more soluble in water. For these reasons disintegration takes place much more rapidly, exposing new surfaces to the action of the acid fumes in the air. Dr. Angus Smith has found mortar to contain 48.16 per cent. calcium sulphate due to the action of the acid in the air. Prof. H. Jackson has found limestone to contain from 4.79 per cent. to 15.8 per cent. calcium sulphate on the outside while on the inside there was only from 0.23 per cent. to 2.8 per cent.

The problem of adapting building materials to use in a smoky atmosphere is most difficult. Limestone, marble and sandstones with a calcareous binder are readily disintegrated by the acid and because of their light color become quickly soiled by the soot. They cannot be readily cleaned and when cleaning is possible the stone is worn away in the process and they become dirty, in many cities, in less than a year. Thus the stones which are plentiful and easily worked can be used only at a great disadvantage. Granite is darker in color and is not corroded but is of course more expensive. Dark colored brick do not show the discoloration to any extent, but the mortar is corroded. Glazed brick and terra cotta are the most practical substances available as they can be cleaned without injury and the building look as good as new.

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Soot and its accompanying evils makes of no avail the use of light colors in the painting of the houses of a smoky city unless, perchance, one wishes to paint again within a short time. Architects from experience are generally inclined to adopt the more somber shades. Yet this is due to discoloration rather than to destruction of the paint. In some cases the soot and tar form a light adhering film which seems to be actually a protective coating and can be cleaned, leaving the paint fresh as ever.

Interior decorations are even more of a problem. Under the conditions that obtain in many localities wall paper must be cleaned every six months and renewed at least every two years. Curtains and draperies are soiled three to four times as quickly as in smoke free communities. The frequent cleaning together with the destruction by acid shortens their life. The destructive action is probably greatest on fresco paintings which are not only soiled but attacked by the acids as well.



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THE AMERICAN ARCHITECT

EXTRACT FROM AN ADDRESS TO ARCHITECTURAL STUDENTS

DELIVERED BY MR. REGINALD BLOMFIELD, PRESIDENT
ROYAL INSTITUTE OF BRITISH
ARCHITECTS

DRAWING as an instrument of thought and analysis is all-important. Some students draw too little, and others perhaps too much. The important thing is to be clear why you draw at all. (I am talking, of course, of the training of students in architecture, and not at this moment of drawing in general.) Now, the object with which an architect, in his actual practice, makes sketches and notes of a building is to carry away an accurate record of the facts of that building. He will put down all that is relevant, partly in sketches and measurements, partly, maybe in writing; but he will not waste his time on anything that has no bearing on the subject. Your attitude when you are making drawings of buildings for the purposes of your training should be the same. You should make it your business to master the meaning, the purpose, the construction of the building, or detail of a building that you are studying. Sketches, however rough provided that they are accurate, are of more value to you than the most slashing black-and-white or the most elegant water-colour. I have noted sometimes, in students' drawings, an evident anxiety to make the drawing itself attractive, and a fondness for details because they are picturesque and sketchable; but the architectural student should recollect that he is not out for the purposes of the painter. He may take his holiday and indulge himself in a landscape or the like, but the object of his labour should be the critical analysis of the building he is studying. Incidentally he will acquire in this way a quickness and accuracy in seizing and presenting architectural forms which will be invaluable to him in practice; and in all drawing, whether it be of these technical studies or the drawing that is common ground both to painter and architect, the object should be to grasp the essential characteristics of form and present them clearly and faithfully.

The caution that I would offer you is not to be in a violent hurry to be original. Architecture is much too old and great an art to lend itself readily to originality. It is fenced in by conditions and limitations which you are bound to observe; and the originality you should seek for is not that of the inventor of new and unheard-of shapes and forms such as are exhibited by the Cubists and the acrobats of Art Nouveau, nor is it to be sought in brilliant caricatures of well-known features, which arrest the eye, it is true, but pay the penalty by going out of fashion in due course. The originality you should aim at is that of the great masters of the past, who used the forms and phrases that they found to hand, but applied them with a richness of invention and resource that doubled their possibilities. You should ground yourself solidly on the best traditions of the past, whatever bold flights of invention you may risk in later years. In your student days your object must be to master thoroughly your technique, in order that the ventures of after-life may not fail for want of the knowledge of the facts and resources of architecture. I would urge you also not to study the fashion of the day too closely. Your object should not be immediate success and the quickest road to it. It may be that you will be driven to bow the knee in the House of Rimmon, but the least you can do is to nurse the faith that is in you, and endeavour to acquire a standard of judgment of your own. Your aims and ideals of architecture should be far beyond the narrow area of fashion, and there is only one road to that commanding position, and that is the patient and persistent study of the masterpieces of the art, and the firm conviction that architecture is an art to be taken seriously—not merely a business of which the sole object and criterion is immediate success.

I come back, then, to where I started—that the pursuit of architecture is not to be lightly undertaken. But I now add that those who take up the art in the right spirit will have their reward, I hope, in plentiful opportunities for the exercise of their skill, anyhow, in the enjoyment of one of the finest of the arts, and the art most intimately allied with the history of the human race.

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FIRE WASTE, AND THE ARCHITECT'S RELATION TO IT

REDUCTION of the enormous fire waste of this country, said to amount to nearly \$225,000,000 a year, most of which may be classed as "preventable," in one way or another, is now regarded by the majority of intelligent citizens as an important part of the campaign inaugurated a few years ago for the purpose of conserving the national resources. Of course, it is well enough to exclaim that reduction of loss, both in property and life, by the prevention of fires lies in the hands of the American public, but it is obvious that the responsibility falls heavier upon certain portions of this public than upon others. For example, an architect is in a position to exert an influence which many times determines both the character of a building and the materials entering into its construction. He is also in a position to influence or determine to a large extent the plan and equipment of most buildings which includes means of escape for its occupants as well as fire-preventing and fire-fighting apparatus. While the average citizen can do much to prevent fire-waste by exercising care about his own and other people's premises, the architect can exert an infinitely greater power for the conservation, if not of our resources, at least of our accumulated wealth. Under these

circumstances, the architect's moral responsibility becomes astonishingly heavy.

In fact the time will doubtless come, perhaps sooner than anyone now expects when, if an architect neglects to advise an owner of the possible consequences involved in the employment of combustible materials of construction where others proven to be non-combustible, even if not always absolutely fireproof, equally suitable are available, and to use his best efforts to include in the equipment of buildings proper and adequate means for the prevention and extinguishment of fires, whether required to do so by law or not, or fails to incorporate in his plans ample means of exit for occupants, he will be considered derelict in his duty and be called to account before a properly constituted tribunal. In the meantime, the course which can with safety be pursued will upon a little reflection be apparent to anyone.

EMBASSY BUILDINGS NEEDED

THE anomalous character of the diplomatic arrangements of this country whereby a comparatively poor man, who despite general impression to the contrary, occasionally does succeed a very rich one in a diplomatic post, and almost invariably finds that owing to the scanty salary paid by the Government he is unable to maintain the dignity of his office, would surely seem to require a remedy. With each succeeding presidential administration this same question of satisfactorily filling diplomatic posts abroad arises, but its periodic recurrence apparently has not heretofore impressed Congress with the necessity for some positive action in the matter.

President Roosevelt and President Taft were each one able to appoint to the ambassadorships of the larger powers men whose private fortunes enabled them to maintain adequate establishments, irrespective of the relatively insignificant salaries attached to the posts. President Wilson, however, appears to be experiencing much difficulty in prevailing upon the men he has selected for these positions to accept them. Tentative appointees, it is stated, have hesitated in their acceptance owing to the fact that they have not felt prepared off-hand to meet the very large personal

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expenditures involved in the position of ambassador under present conditions.

The "Jeffersonian simplicity" that is so much vaunted in this country and is often declared to be one of our national characteristics, is no doubt understood and appreciated here, but in the courts of Europe where formality and lavish display are frequently regarded as the measures of dignity and influence, the poverty of our diplomatic service is undoubtedly detrimental to our interests, even though our greatness as a large and powerful nation may be in some respects conceded.

Inasmuch as this Government expects its ambassadors and ministers to maintain an adequate measure of dignity, it seems but just that it should contribute the necessary money and, moreover, it should provide our embassies with buildings in keeping with the importance of this nation among the nations of the world. The unwise policy ordinarily pursued in our Government appropriations, is undoubtedly in a large degree responsible for these condi-

tions. Enormous sums appropriated annually for purposes that are generally considered to be largely political and that serve no very good purpose, might with great advantage be at least in part diverted to the proper housing of our diplomatic representatives abroad, so that we would cease to be the object of pitying contempt on the part of representatives of even comparatively insignificant principalities whose pretentious embassy buildings are in striking contrast with the rented quarters frequently occupied by our ambassadors.

The confidence expressed in some quarters that the present Congress will enact legislation designed to result in a law which will provide inducements for men of ability without large private means to accept positions as ambassadors and ministers, affords some measure of encouragement just at this time, and it is hoped that provision will be made for the design and erection of suitable embassy buildings before the subject is again dismissed for four years.

RECENT LEGAL DECISIONS

NECESSITY FOR ARCHITECT'S APPROVAL

Extra work was done under a building contract, and also certain work was not done in accordance with the plans and specifications. All this was done by the subcontractor under the direction and by the order of the owner, the general contractor and a superintendent who had been appointed by them and the architect to superintend the work during the architect's absence from the state. The contract provided that alterations in the work should be made on the order of the architect, which order should state the amount to be paid therefor, and that, in case of disagreement the amount should be submitted to arbitration. It was held that the subcontractor was entitled to recover for the work, notwithstanding this provision, especially as it did not appear that there had been any failure to agree, but merely that the owner and general contractor refused to pay.

As to the balance due for the work under the contract, which required the architect's

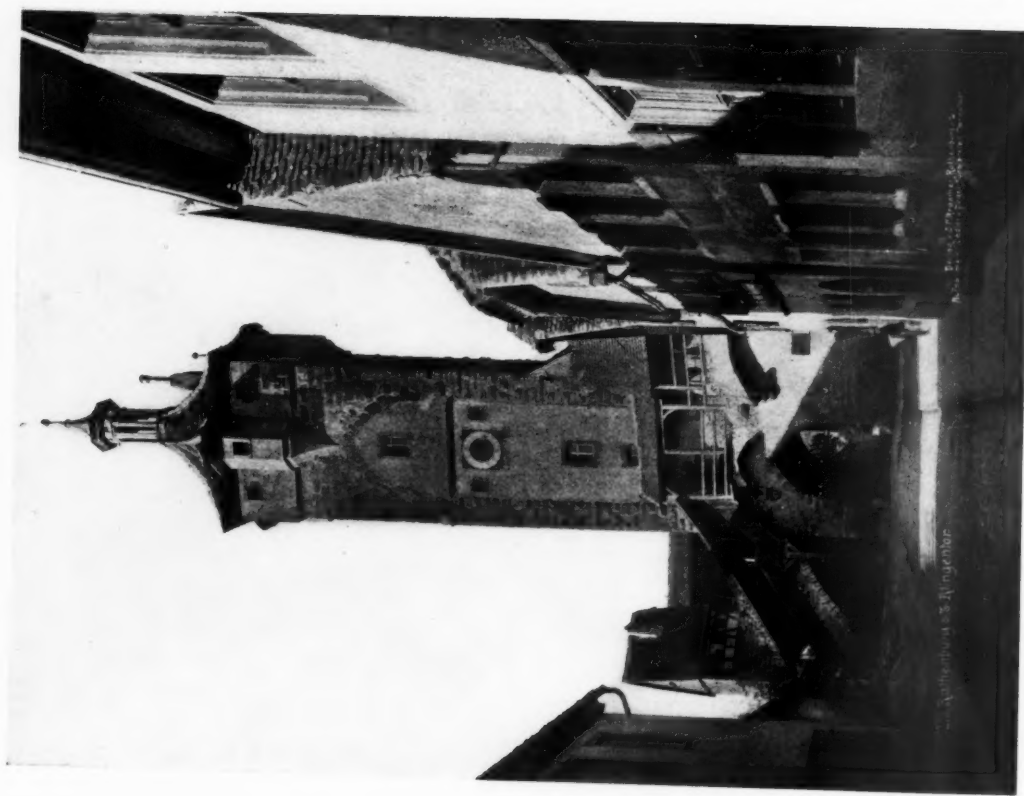
certificate before payment, that was essential although the superintendent had been appointed without the subcontractor's consent, the latter having recognized and accepted him as the architect's representative.

Llano Granite & Marble Co. v. Hollinger, Texas Civil Appeals, 148 S. W. 336.

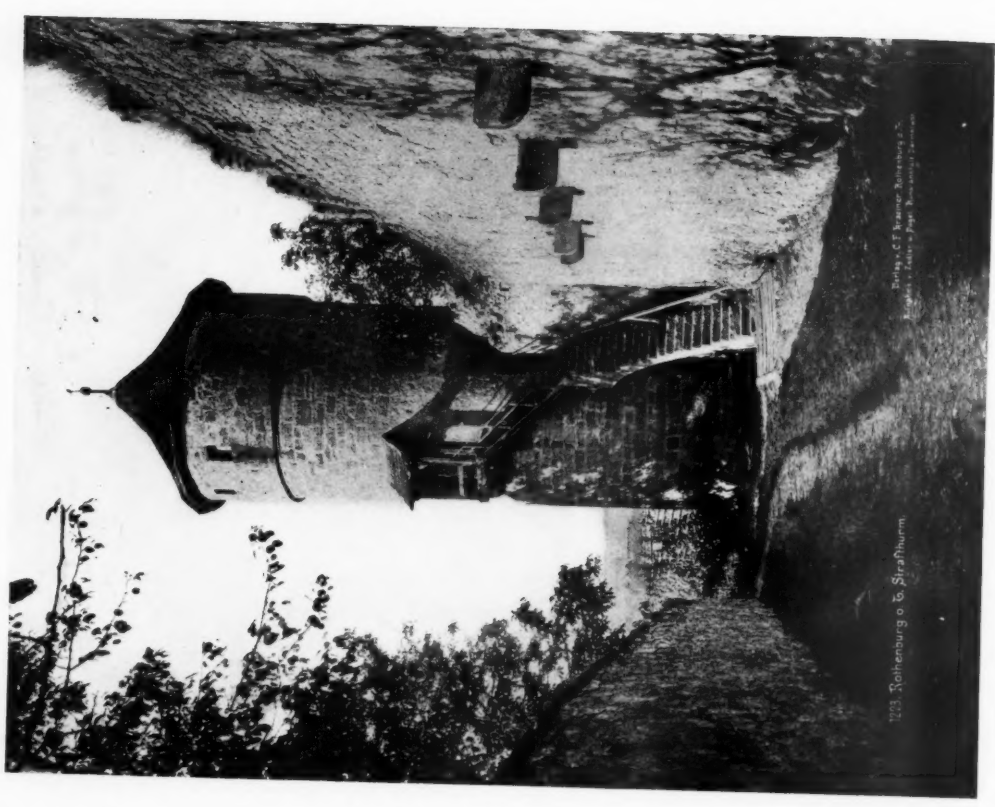
EXTRA WORK—WRITTEN ORDERS

A building contract provided that no alterations should be made, except on the architect's written order, which should state the price to be paid. In giving a written order for certain extra work, the architects did not state the price, but directed the contractor to keep an account of the cost. They subsequently approved the contractor's bill, including these extras, and gave him a final certificate, on which the owner paid large sums without objection. In an action for the balance of the contract price it was held that the contract provision requiring orders for extra work to specify the price had been waived.

Raff v. Isman, Pennsylvania Supreme Court, 84 Atl. 352.



THE KLINGEN GATE



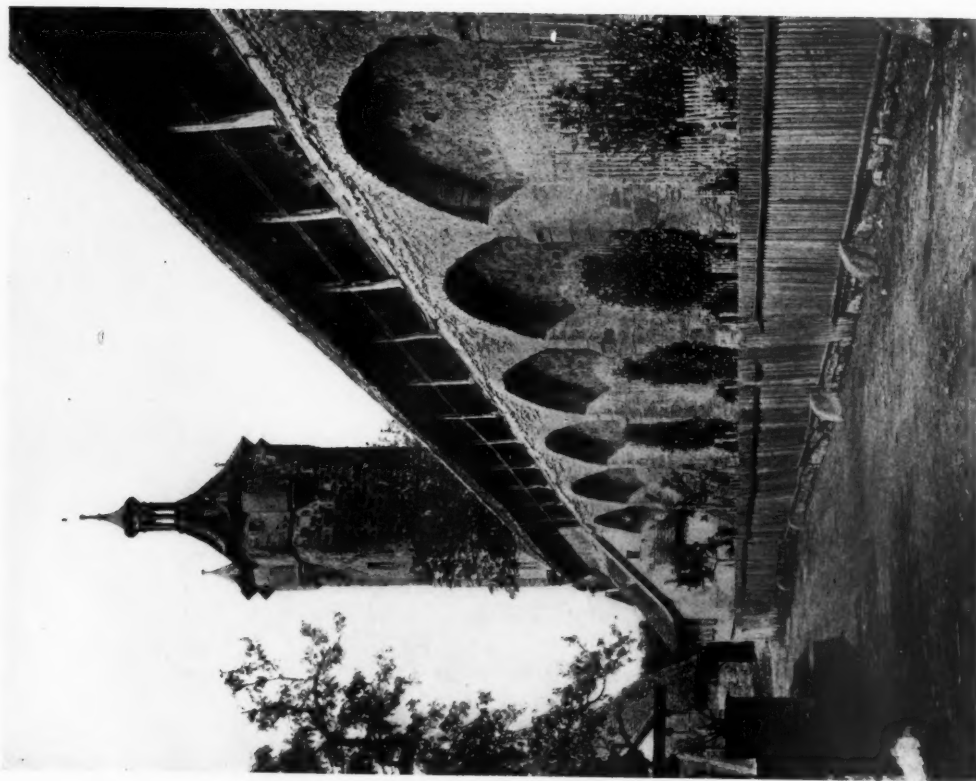
"PUNISHMENT" TOWER

ROTHENBURG ON THE TAUBER

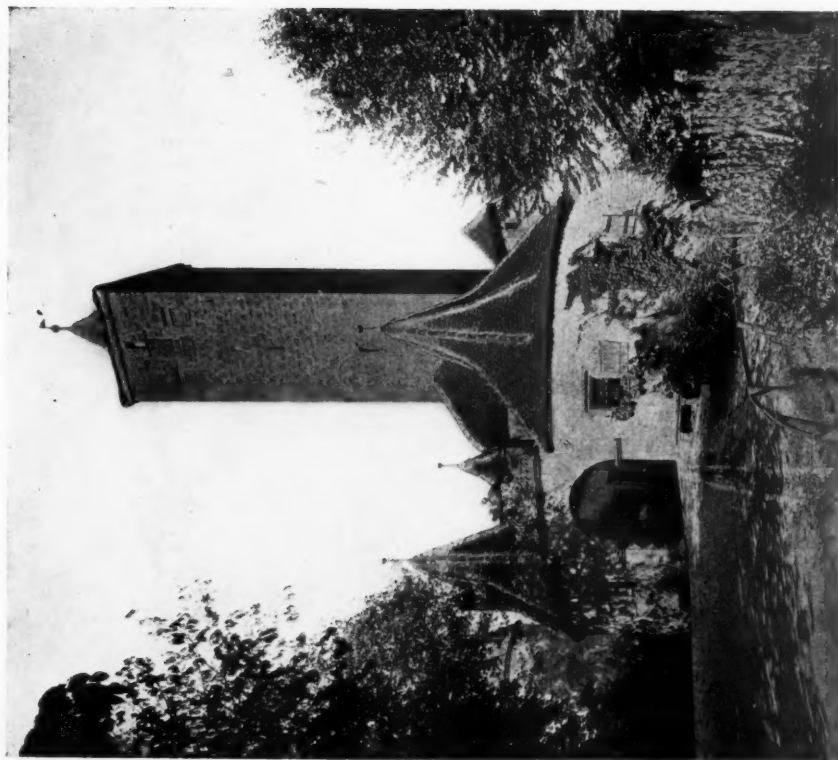
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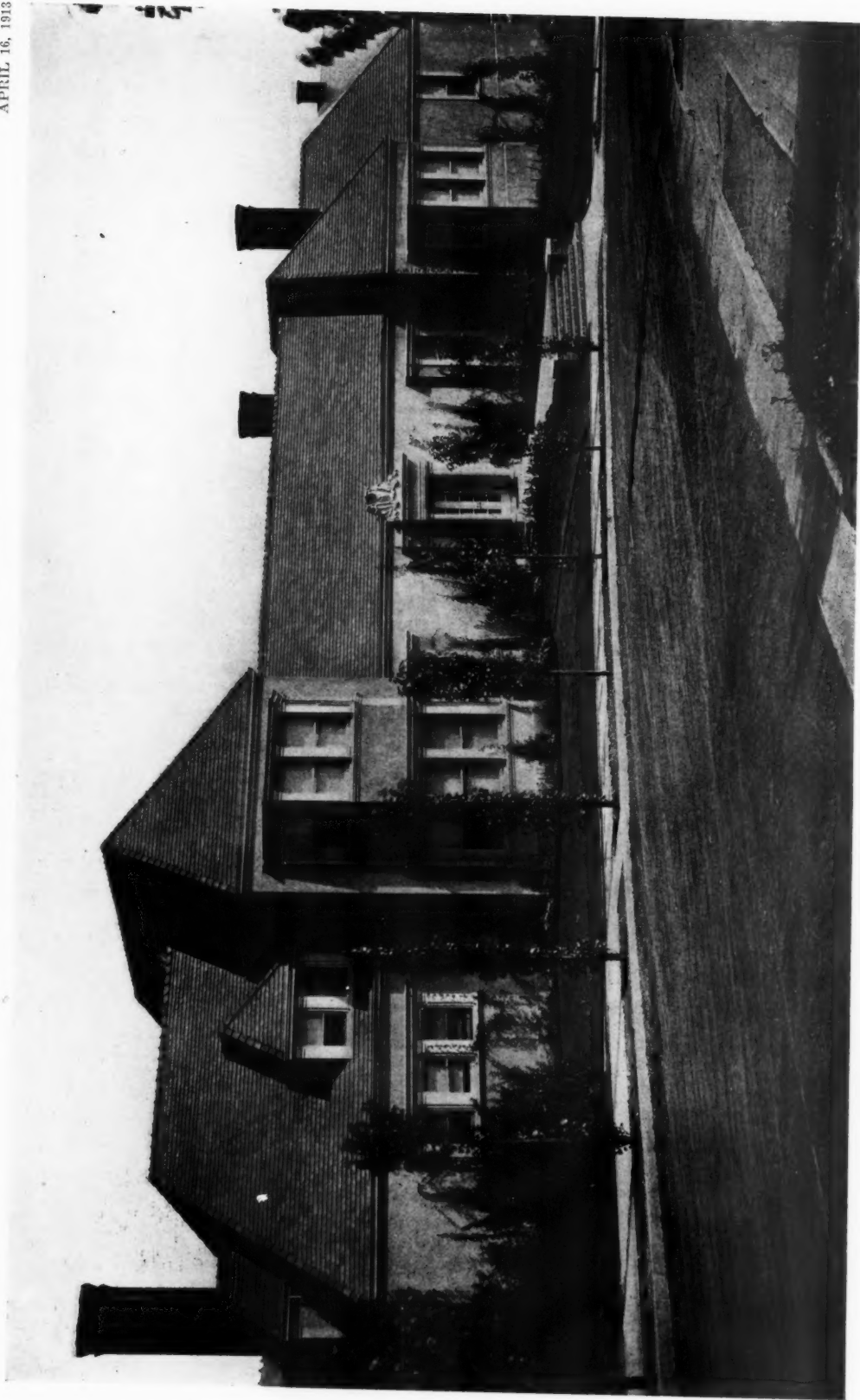
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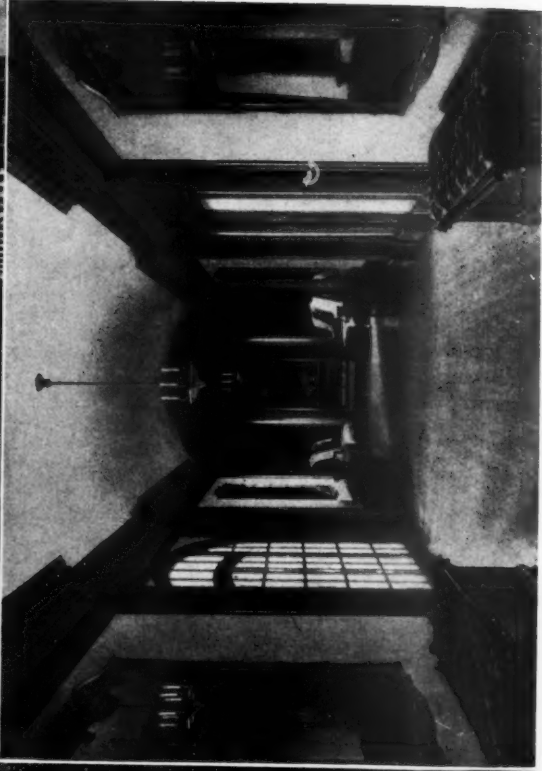
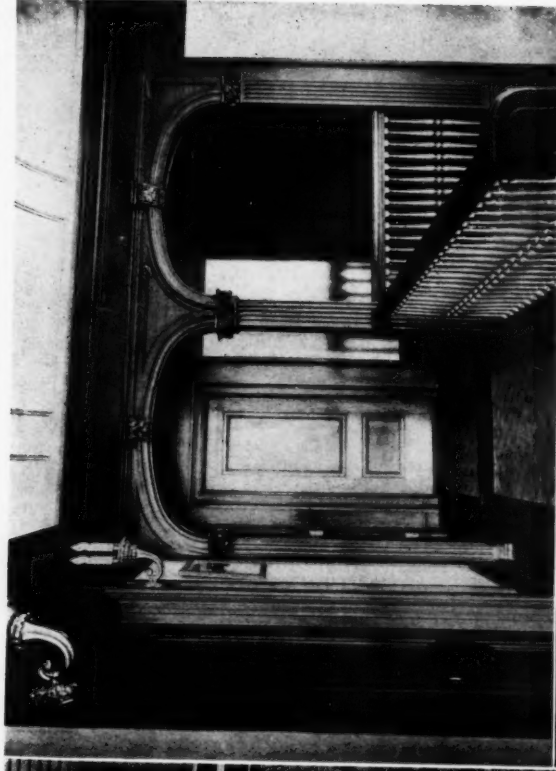
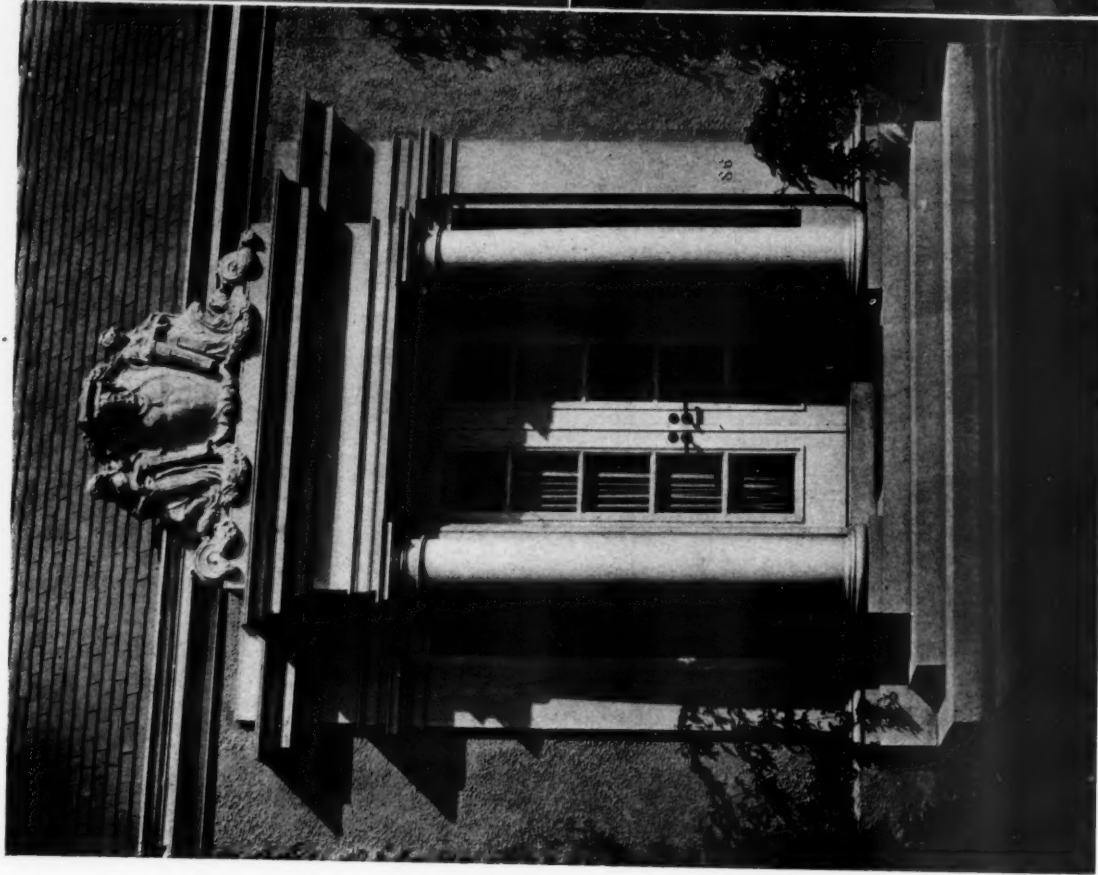
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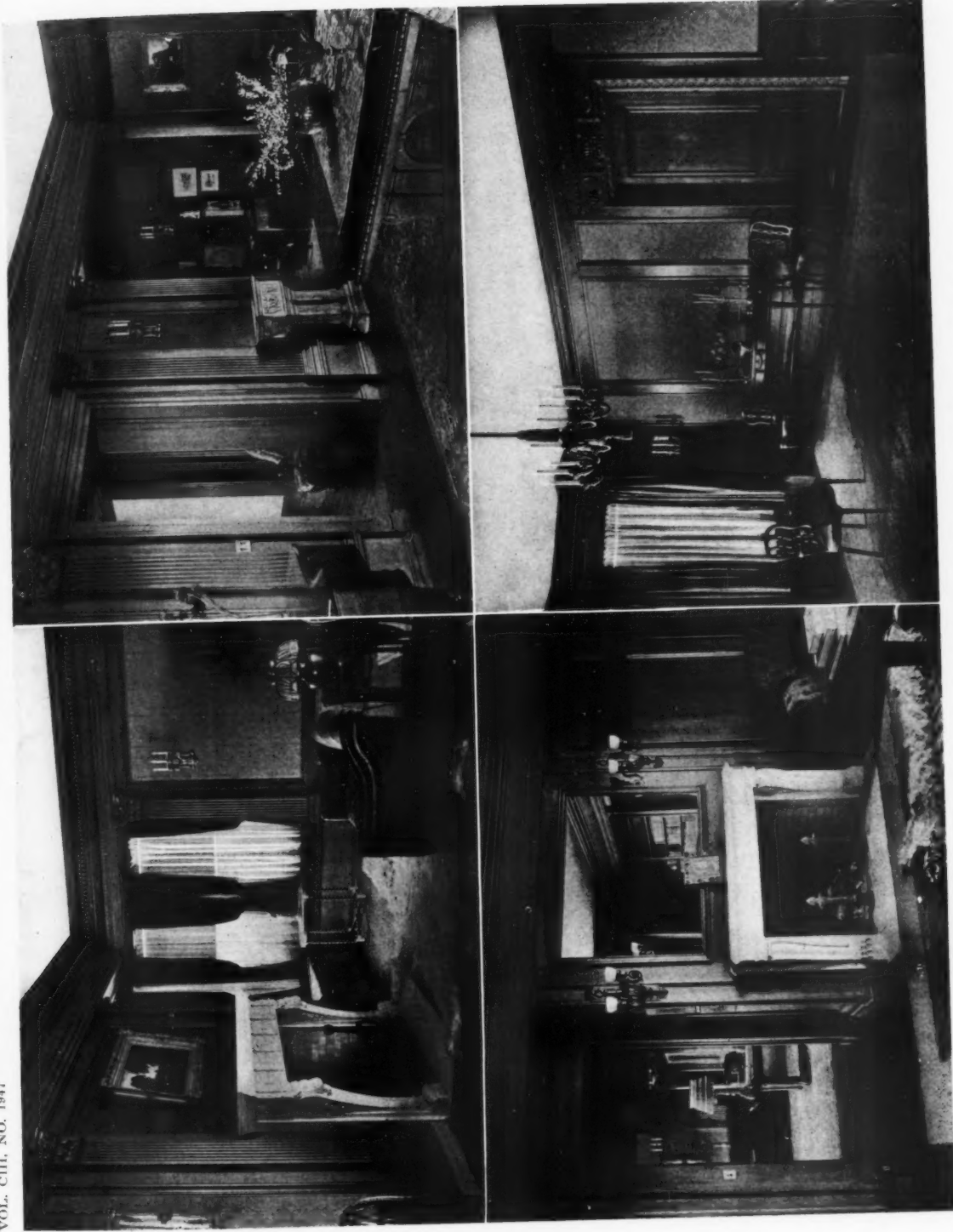
AT LEFT: VIEW ALONG THE OLD TOWN WALL
ABOVE: THE CITY GATE



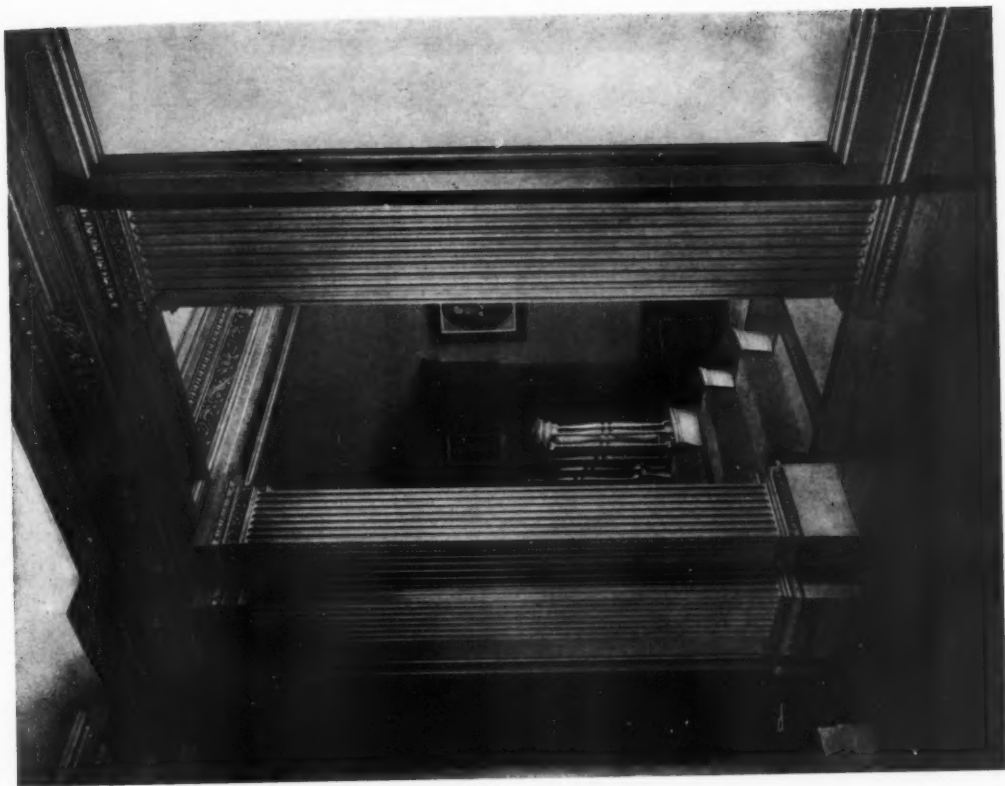
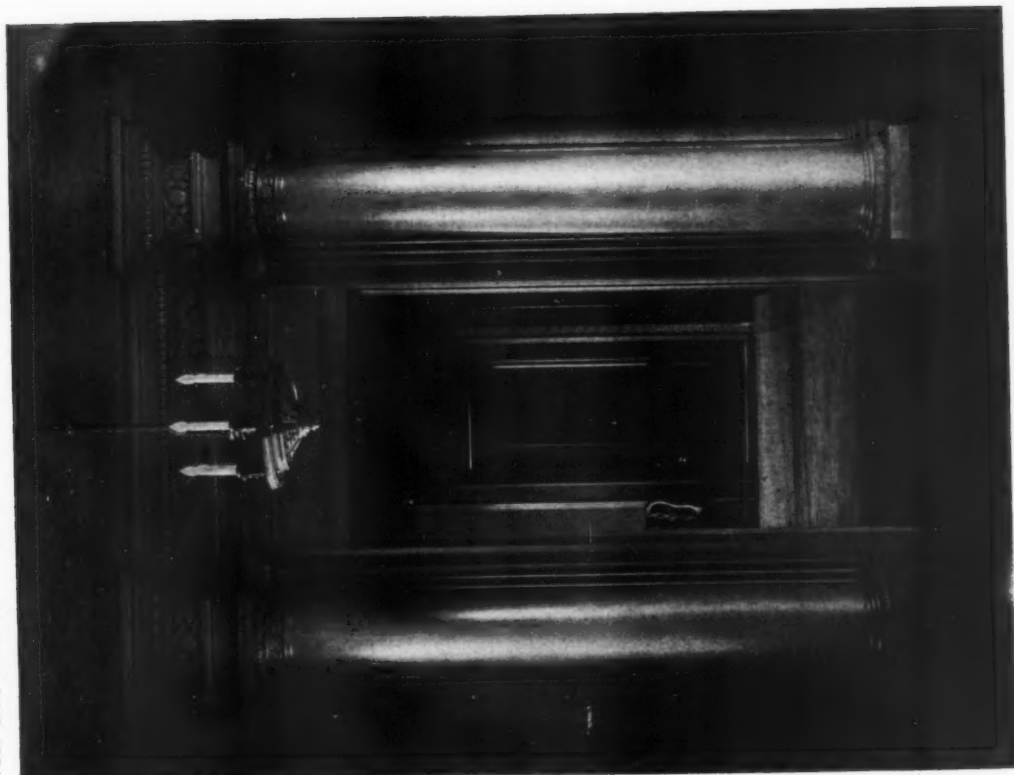
HOUSE OF JAMES K. MOFFITT, ESQ., PIEDMONT, CAL.
MESSRS. WILLIS POLK & CO., ARCHITECTS



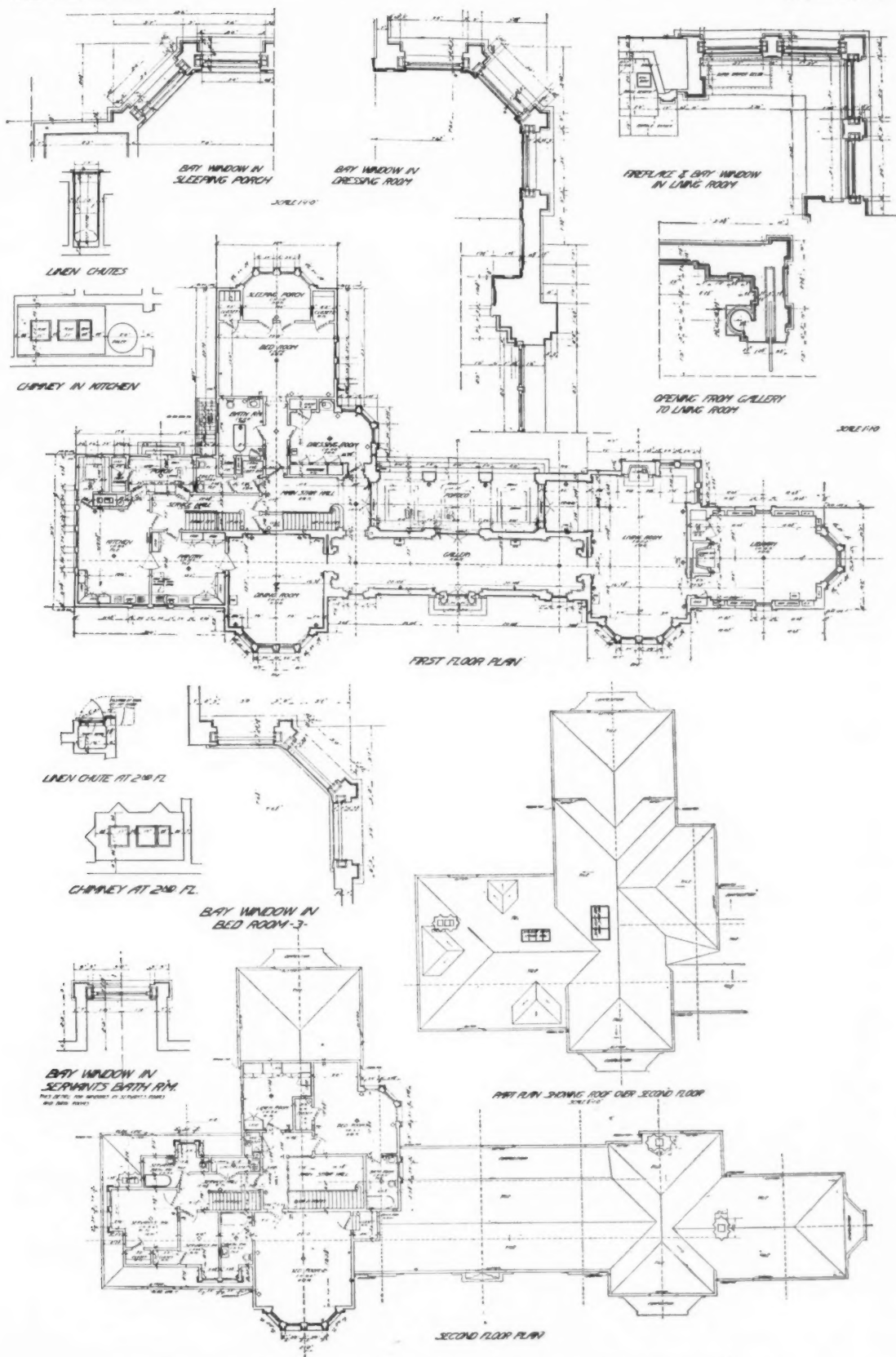
HOUSE OF JAMES K. MOFFITT, ESQ., PIEDMONT, CAL.
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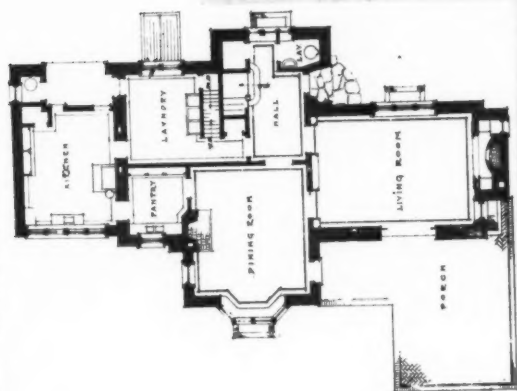
HOUSE OF JAMES K. MOFFITT, ESQ., PIEDMONT, CAL.

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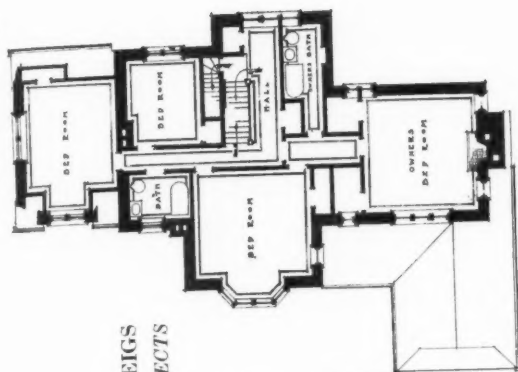
THE AMERICAN ARCHITECT

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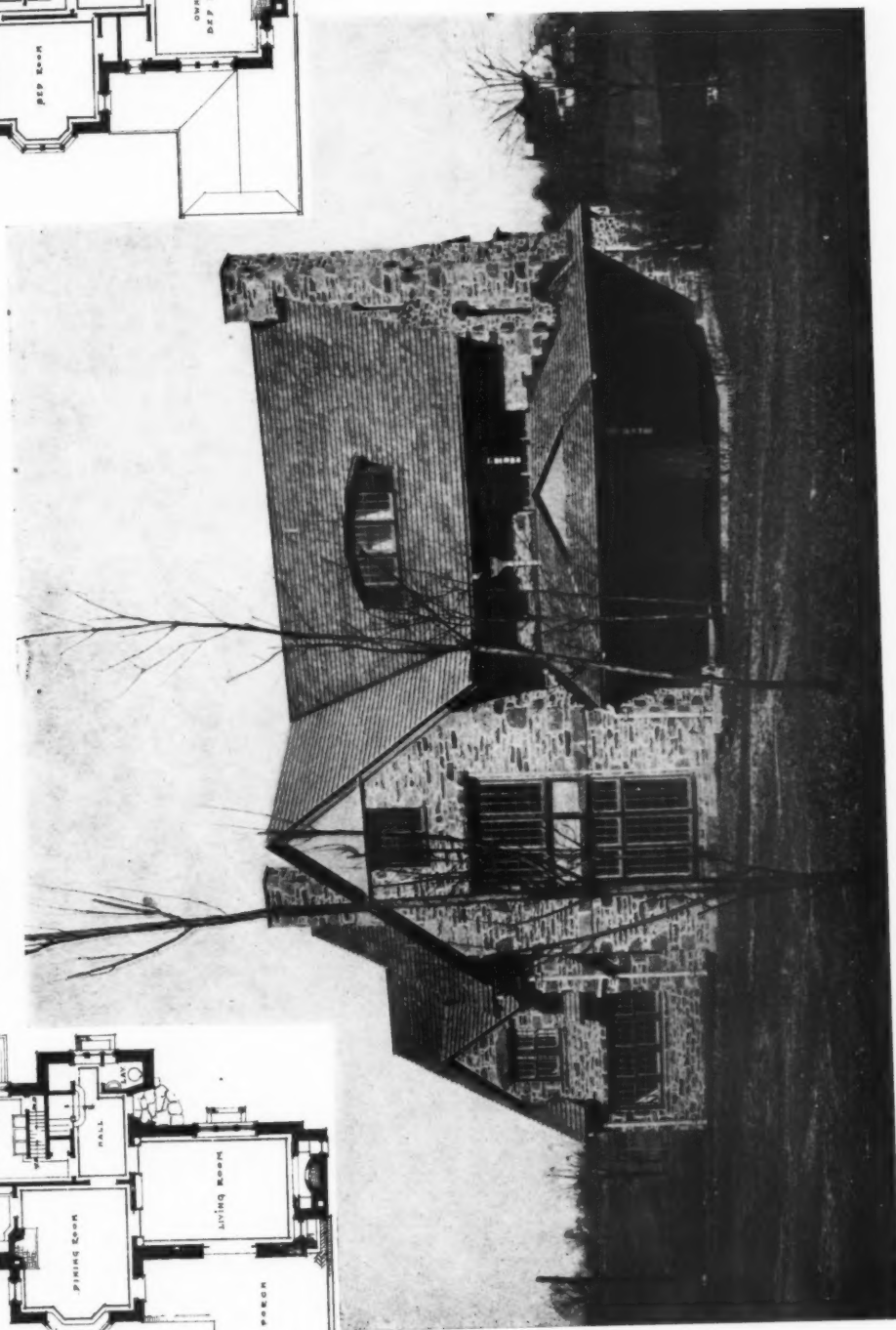
APRIL 16, 1913



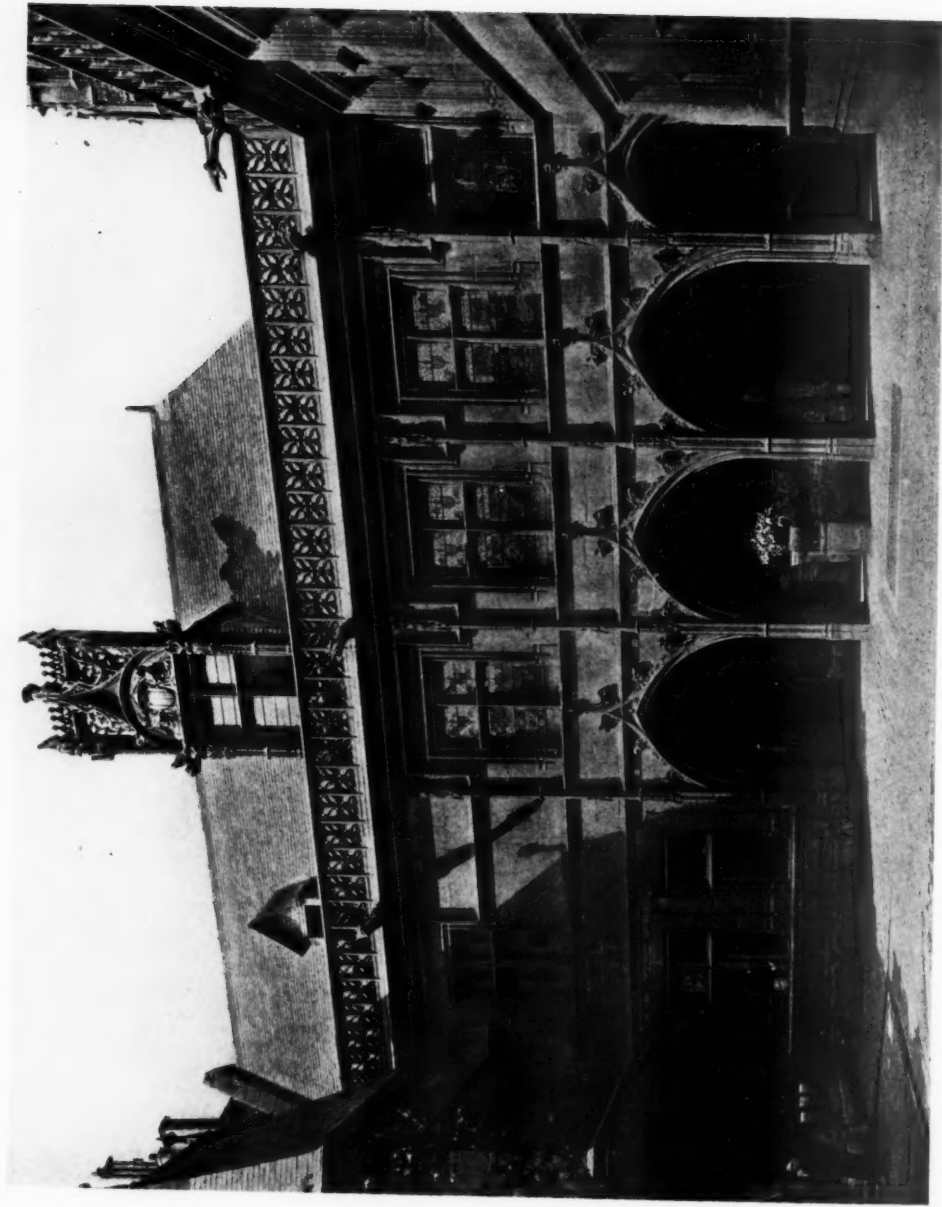
A HOUSE
AT CYNWYD, PA.



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