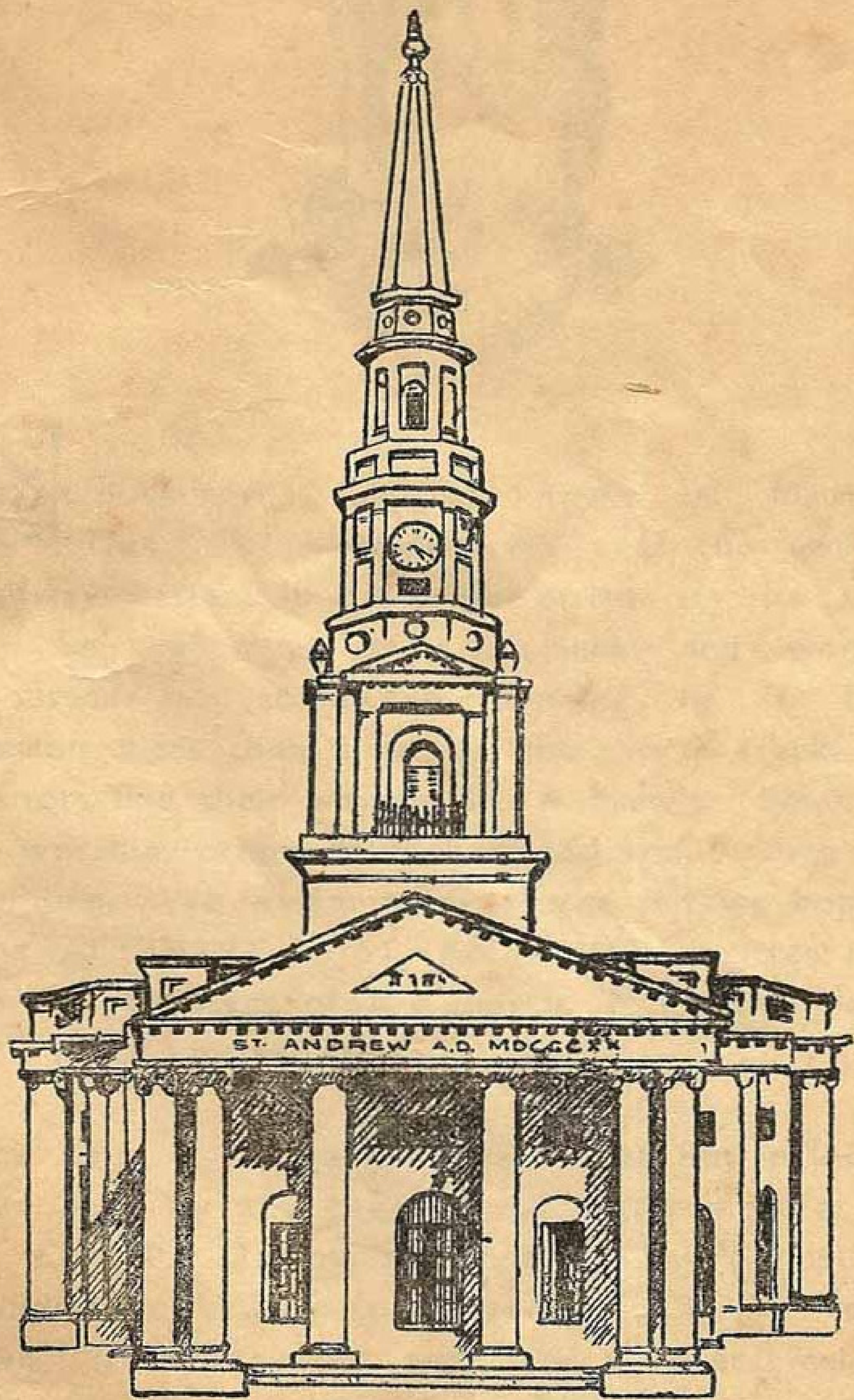


AN
ACCOUNT
OF
St. ANDREW'S CHURCH
EGMORE
MADRAS







St. Andrew's Church known in Madras as 'The Kirk' — stands very near the two main Railway Stations in the centre of the city. Its tall spire can be seen from great distances and every day thousands of commuters coming in to Egmore Station check their time by the church clock. Many visitors find their way to St. Andrew's. Some come to worship, others to look at the architecture of the building. We welcome any visitor and we hope that this 'ACCOUNT OF ST. ANDREW'S' written in 1821 by the architect of the church, Major De Havilland will be of interest to you.

The Kirk is a legacy of the British Raj in India. It was built by the then British Government at a cost of £20,000. (Twenty thousand U. K. Pounds). As a building it belongs to an age very different from our own. It reflects that age: and it reflects certain of the attitudes of that age. This book by Major De Havilland also reflects many aspects of British India at the beginning of the 19th century. His language and his style of writing belong to that period. The

days of British imperial glory in India are long past and will never return. Yet it remains true that St. Andrew's is one of finest examples of Georgian Church architecture in Asia, if not in the world. It is in an excellent state of preservation and continues to be well maintained.

In the years since 1821 our world has changed in countless ways. Today's problems are complex and for millions of our people the main struggle in life is not about preserving a beautiful church building but about daily food and daily water. As a congregation of the Church of South India, St. Andrew's is deeply committed to the hopes and struggles of the poor. Through our evangelistic work; through our community development projects; through our programmes with the handicapped; through our ministry of healing; through our work in the slums and in the hospitals and with leprosy families. In all these areas we are trying to share something of the love and hope of the Christian Gospel. So we are not just a historic church building, but a people of faith and of witness. As a congregation we continue to be renewed by Christ's power and joy.

Yet we also cherish our roots, and this old building is part of that inheritance. The Kirk has stood in Egmore for many years—and we hope it will stand for many more. And we pray that it will stand not just as a reminder of a period in our Indian History long past but —and this is much more important— as a symbol in our city of the Lord who lives and reigns—Christ, our Master.

Peter W. Millar

Minister of St. Andrew's Church

October 1982

AN
ACCOUNT
OF
SAINT ANDREW'S CHURCH
MADRAS

Soon after the publication of the last Charter for the Honourable the East-India Company, in 1813, the members of the Scottish Church in India adopted measures to have *kirks* built at the different Presidencies, and accordingly, about the year 1816, the first was erected at Calcutta, which, generally speaking, is a handsome edifice.

Some difficulty arose, however, on the score of steeples, proposed to be added to these *kirks*, and it was understood that Doctor Middleton, the Bishop of Calcutta, had opposed it, as an unusual and unconstitutional measure, inadmissible out of Scotland; but Dr. Bryce, the head of the Scottish Church in India, persisting in support of his own establishment, carried the point, and the *kirk* steeple rose in proud majesty among those of the English Church.

Madras was the next presidency at which one was to be erected and the Government there having lately built St. George's Church on Choultry Plain at the Company's expense, for the Church of England service, could not, with consistency, do less for that of the sister kingdom. The necessary orders were consequently given for purchasing a piece of ground which should afford a fit site for it and for preparing plans and estimates for a suitable edifice.

The situation selected was in some respects the most unfavourable that could have been chosen, especially as regarded the nature of the soil on which the structure was to be founded; it was also in an unpleasant neighbourhood, on the banks of the Chintadripettah river, which, for many months in the year, had little water in it, and that often

stagnant and unwholesome: it was, moreover, near the noisy village of the same name, and its pagodas. But it had advantages which weighed in the opposite scale; it was not far from the boundaries of the Esplanades, and therefore convenient for any part of the garrison of Fort St. George. Over every other consideration, however, the apparent cheapness of the bargain (the prime cost of which was only 4,000 pagodas) prevailed.

The plot purchased contained six or seven acres of land, and on it stood the Old Freemasons' Lodge, built about thirty years before by Mr. Lucas of the medical establishment, who, though he might have been a very good *mason*, was certainly a wretched architect; but he was a busy man in his life in speculations; among other fancies, his mind was long bent on the discovery of a perpetual motion.

The ground, low and marshy, was frequently overflowed during the monsoons; but that vicinity was undergoing improvements by the erection of a bridge, since named St. Andrew's and by the deepening and contracting of the bed of the river.

The old building on the ground served for the *kirk* and the minister's *manse* till the new one was completed, and was afterwards removed.

When the plans were called for, Lieutenant Grant, of Engineers acting temporarily as Presidency Superintending Engineer, submitted one. The Elders of the kirk had determined on a *circular form* and as great anxiety was manifested to have the work begun immediately, much feeling having been excited on the question of steeples, and the Engineer himself wishing to begin the work before he should be superseded, recourse was had to the ready expedient of borrowing from another, and Gibb's plan for a circular church, proposed for St. Martin's Lane in London, about, seventy years ago, (but set aside for the present building on account of the great estimated expense) was resorted to. With a few alterations, a copy of this plan was submitted, on a somewhat reduced scale.

It was in like manner hastily approved. The Right Honourable Mr. Elliot, the then governor, being favourable

to the object in view, found no fault with it. But another question then arose between the Bishop and the Scottish Ministers, as to the competency of the latter to marry and baptize in their *kirks*. This question seemed to be of such vital importance, that the building of Saint Andrew's at Madras was postponed, until an answer should be received to the reference made by Dr. Bryce to the Mother-church on that subject.

The ensuing year, 1817, a favourable reply having been received to this reference, and more time and attention bestowed on the plan, it was found objectionable in many particulars, more especially in the nature of the proposed roof, which would have been difficult of execution, much more expensive than anticipated, and not sufficiently strong or durable for an edifice of that description.

The chief engineer, Colonel Caldwell, reported officially upon it: he was of opinion that the roof intended would never answer, and recommended that the dome should be covered with lead or copper; but such a covering, at Madras, would have rendered the church scarcely sufferable from heat: besides, that it would have been very difficult, if possible to have secured the wood-work from the white ants, as has been evinced in St. George's Church on Choultry Plain, whose organ has narrowly escaped being completely reduced to dust by that persevering and destructive insect.

The plan was further objectionable as to the doors and windows, which were too small, and not suitably disposed for the local temperature; while the manner in which the vestry and other rooms were to be attached to the body of the church was both inconvenient and unsightly.

A want of taste was also thought to pervade the architectural proportions and combinations; but above all, the foundations not having been planned with a knowledge of the site which the building was to occupy, were very insufficient for the security of any edifice in that soil.

The estimate, which had been prepared with equal haste, amounted to 34,000 pagodas; exclusively of the lead or copper

with which the dome must have been covered, and of many other *items* omitted.

Meanwhile, the author of these remarks had been called to the Presidency to take charge of the Superintending Engineer's department, and after communicating with the Minister and elders, he reformed the plan, and submitted it with all its details for their approbation, which was obtained in the most flattering and unqualified terms, and subsequently confirmed by the Government.

The circular form was retained and the dimensions originally proposed generally adhered to; but in other respects the plan was entirely new in design and construction. The main object was, strength and permanency combined with lightness and neatness. Above all the total abstraction of timber-work in the roof was desirable; first, because, in the vicissitudes of that climate, even the best-seasoned wood soon perishes; and secondly, that it never can be completely secured against the deprivations of the white ants. On these grounds it was resolved to dome and arch the building with masonry, if it could be safely contrived without making it heavy, or taking away from the elegance of the design. Such an undertaking was of no small difficulty without incurring very great expense and was even by many considered impracticable.

The edifice may be thus described. The body of the church is a circle eighty-one feet and a half diameter in the clear, with a rectangular compartment east and west of it, and a portico extending beyond the latter to the westward. Over the circular parts is a dome, covering as it were the *nave* of the church, with an *annular* arch round it over what may be termed the *aisles*.

This dome is fifty-one feet and a half in diameter, interior measurement, borne on sixteen columns, disposed at unequal distances; thus, the whole circumference of the *soffit* of the entablature is divided into sixty-four parts, *five* of which are given to the two inter-columniations through which the main passage leads, from the principal entrance westward to the pulpit and sacramental room; *two* parts to the next inter-columniations on each side; and *three* parts to each of

the ten others; which, with the sixteen diameters of the columns themselves, each equal to *one part*, make up the sixty-four parts of the circumference taken in the centre of the entablature.

The architrave and frieze, which stand on the sixteen columns, are of stone, laid in the manner of a *straight arch* perfectly horizontal; but the cornice above is of brick; and on it rests the dome, the *equilibrium* of which is preserved by the *lateral* pressure of the annular arch round it resting on the outer walls of the building.

Of the sixteen columns above-mentioned, the four bearing the principal inter-columniations are of granite; the remainder are of the same kind of stone as the architrave and frieze, and of what is at Madras termed the *iron-stone*: an indifferent sort of material, apparently composed of clay and *scoria of iron*, more or less honey-combed, but which by experiment has been found to be of a consistency sufficient to resist a pressure, *three times* as great as bricks would bear, without being crushed; and it is calculated that if these stones were well selected and laid, the columns might support seven times as much weight as is actually laid on them.

The capitals of these columns are all of granite to secure the volutes, which are ponderous, from breaking off by their own weight or by accident; and on each capital stands another block of granite, against which the *straight arch* of the entablature presses and is supported. The *voussoirs* are about three feet high, the whole breadth of the entablature, and one foot thick.

The dome is so constructed as to relieve the entablature by means of arcades, wrought into it and resting on the columns; while at the same time it is, as it were, but a frame-work of brick, running upwards from the columns also towards the crown, where these *ribs* are terminated and united together by a circular arch of the same description. This frame-work is then filled in with masonry formed of *cones* of pottery, such as are used in *Syrian roofs*.

The purpose of this mode of construction was; first, to relieve the entablature between the columns; and secondly, as already remarked to obtain as light a structure as possible (which

was of moment in so unfavourable a soil), consistently with strength and durability.

With a view to render the equilibrium of the whole still more perfect, the arcade, built into the dome as above described, is carried outwardly, above the terrace of the annular arch, to the exterior limit of the upper diameter of the columns, where it rises perpendicularly to the height of the balustrade which surrounds the building and where it terminates, into a *cordon*, from which two steps retreating unite it to the exterior curve of the dome; these steps themselves standing on a small *scheme annular* arch, which tends also to lighten the edifice. This combination at once resists the lateral pressure of the dome, and stabilitates the columns on which it rests.

The interior form of the dome is a segment of a sphere fifty-one feet and a half in diameter and twenty-four feet high, including the entablature, making the whole height under the key from the pavement about fifty-four feet. In the interior of the dome, above the entablature of the order, stands in relief a balustrade, through which is seen, as it were, the azure sky, the canopy of heaven; represented by the stucco of the dome coloured with *lapis lazuli*. This appearance gives to the whole an awful grandeur, which could not have been expected in so small an edifice.

The balustrade, however, rising against the curve of the dome, and not being quite perpendicular, appears, as seen in the drawing of the interior of St. Andrew's, in discordance with the strict rules of architecture: but when viewed from beneath the dome, it does not offend the eye as might be supposed and its height having been diminished to assist the perspective, the defect is rendered less obvious. Similar anomalies however, may be traced in the work of some of the best masters of the art: in St. Paul's Cathedral, London, for instance, that *chef-d'oeuvre* of the great Wren and of British architecture, the pilasters in the interior of the cone supporting the dome, if examined in the drawings will be found to have a similar defect, arising from their convergence; but the defect does not offend the observer below, while it in fact adds to the grandeur of the scene, by giving the appearance of greater loftiness to the cone.

This may be a fit place to remark, that when the entablature above described was placed on the capitals of the columns, a rod of iron, one inch in diameter, was carried round in a groove under the soffit, which passing between the blocks of stone and the capitals, formed a complete ring; it was then supported by iron Y's, in the foot of which was an eye to receive it, the two tops of the Y's running into the arcades of the dome above-mentioned. These Y's descending through the entablature grasped the ring in the middle of each intercolumniation and kept it in its position. No great resistance was expected from this ring, and the object of it was chiefly to observe if any movement should take place in any part of the circle from an imperfect equilibration in the dome and annular arch, and to keep the whole together in its place whilst the scaffolding was removing. But no movement whatsoever was perceived, the ring suffered no more strain than when applied, and might easily have been removed: but as no inconvenience from it was anticipated it was allowed to remain, and the groove was stuccoed over.

Subsequently, and after the church had been completely finished, the columns were carefully examined, but no *horizontal* fissure or crack was perceived in their whole height; a proof that the equilibrium was well established, and that no movement had actually taken place in the entablature supporting the dome and annular arch.

The annular arch, it may be here stated, was also chiefly composed of *pottery cones* like the dome, the springs of it only being of brick.

The order within is the Composite, the whole height thirty-five feet, of which three feet six inches are taken up by low circular pedestals the height of the pew rails; the entablature is five feet four inches, and the column, including base and capital, twenty-six feet two inches. The pedestal is made circular for convenience, as it is not seen; and the base, standing immediately above the pews, leaves the whole column exposed to view. The diameter of the columns is two feet seven inches and seven-eighths, and diminishes to the top only one-eighth; but the shaft is *fluted* and *rudented plain* one-third of the height, to give it gracefulness and lightness.

Corresponding with the columns, and in a line with them drawn from the centre, are single pilasters against the wall of the edifice, *projecting* one-fourth of a diameter, *fluted* and *rudented* one-third, but straight without diminishing at top, such diminishing being of bad taste, even when the pilasters stand near the columns. Between the pilasters arcades are shewn of the same depth as the pilasters, in each of which is a circular-head door and an oblong attic window above it. The arcade is terminated by an *archivolt* resting on an *impost*, and keyed with a *console* bearing the architrave from which the annular arch springs.

The frieze of the entablature which supports the dome is formed of projecting *fascies* wreathed; and the *soffit* of the *straight arch* or entablature is pannelled, and enriched with foliage between the columns: other parts of the entablature are also lightly ornamented.

In the *annular arch-way* or *aisle* the architrave of the order is alone preserved, from which the arch springs; a lighter and better effect is thus obtained for a small span, while by the lateral pressure of the arch placed in this manner a better counterpoise to that of the dome is obtained: above the architrave is a neat Etruscan border.

The thickness of the dome at the crown is only nine inches, whence it gradually increases to nearly twice that dimension at the cornice. Over the *Syrian cones* already mentioned, three courses of flat tiles are carefully laid, and on them the stucco is applied.

Without arrogating to himself any particular merit in the edifice, the engineer may, he believes, safely say that it is the only building extant, or at least generally known, in the world, wherein a dome of masonry of those dimensions is supported on a colonnade of that height, the entablature of which is a *straight arch*, without beam or lintel. Many larger domes exist, doubtless, but they are supported on solid walls or strong arcades; and if any there be resting on colonnades, it is where the intercolumniations are small, and by means of strong beams or massive stone lintels cramped together and not acting as *voussoirs* against each other. In the present case, the span

of the largest intercolumniation or *straight arch* is sixteen feet from the centre of the columns supporting them. But the unfavourableness of the soil rendered the undertaking by much the more difficult, since any deficiency of equilibrium in the several parts could not be indifferently made up by excess of solidity, without running the risk of partial and unequal settlements, which would have rent the building in every direction.

On the same principle, the walls of this edifice were made as slender as consistent with security; and it will be found that few buildings of a solid construction like St. Andrew's Church, stand on so small a surface of supporting points as it does, compared with the whole area of the edifice. The adoption of arcades and pilasters within, and of pilasters without, led powerfully to this desired object.

The doors generally are fifteen feet high by six in breadth and the attics oblong, corresponding in breadth with the doors, and four feet in height; but the eastern window is twentyfour feet by nine feet two inches. None of the doors and windows are glazed: they are *venetianed* to admit light and air; and the attics are panelled and turn on horizontal pivots.

The eastern rectangular compartment contains a long room, into which the body of the church opens through a lofty arch (as seen in the drawing of the interior) immediately behind the pulpit, which exhibits a grand appearance, scarcely to have been looked for in so limited a construction. This room is forty-eight feet by twenty, and is intended for the administration of the Lord's Supper when it may not be convenient to use the *nave* for that purpose, as is most commonly the practice in the Scottish Church. It is flat-domed, with *Syrian cones* in three compartments, supported on eight columns of the Composite order, with pilasters behind them, surmounted by an entablature, in which, to render the stile less heavy, the *frieze* has been omitted. Above this entablature angular *pendentives* spring to support the oval and circular domes. The whole height of this order is twenty-one feet and a half, but without pedestals; and the entire height, from the ceiling to the pavement, is twenty-nine feet and a half.

Above the middle part of this apartment is erected a small room, behind the eastern pediment (domed also), for

the elders to keep their records, plate &c. and to hold their meetings. The whole construction of this compartment is not incurious, inasmuch as no timber is employed in it, and even very little iron.

On each side of the arch leading to the room below from the body of the church, and in the thickness of the wall, is a spiral staircase of masonry, leading up to the record-room and to the terrace above the annular arch, which forms a pleasant walk; the light is introduced into these staircases by small apertures between the pairs of exterior pilasters, which are scarcely perceptible to the observer.

The rectangular compartment to the westward corresponds in exterior form and dimensions to the other; it contains the base of the tower and steeple twenty-four feet square (in which is the vestibule, fourteen feet in diameter), with a room on each side twenty-two feet and a half by twelve. These side rooms, through which there are other entrances into the church, are intended to hold staircases to the galleries, whenever it may be deemed necessary to erect them for additional accommodation. One of these staircases is already constructed, and leads to the tower and steeple; nor would it be attended with much difficulty to establish galleries, and an organ-loft opposite the pulpit, although, when **St. Andrew's** was built, they were both expressly forbidden. Such galleries should be supported on iron standards free from the columns.

The effect of a good instrument in the church would be admirable, and few apartments could be better suited to the solemn and lengthened notes of an oratorio or other sacred music.

When this temple was first opened for divine service a considerable echo affected the voice of the minister, so as to render it rather indistinct to the distant parts of the congregation; but much of this inconvenience was attributable to the advancing age of its minister, that venerable and most amiable *single-hearted* man, the Reverend **Dr. Allan, D.D. and M.D.** Alas! he did not live long to perform the divine offices of his calling in that edifice: he had himself laid the *corner* stone of it, and daily watched its growth to completion, as an

anxious father would have done that of a favourite child, to maturity. This echo, however, which was the result of the circular form adopted in the building, was more remarkable from the newness of the stucco, which for a considerable time continued to retain some degree of moisture, a condition which, it is well known, from the pores being filled, favours the reverberative tendency of the surface; but would gradually lose that tendency as the masonry and stucco exsiccated. Any echo proceeding from the concavity of the dome could not interfere, from the centre of reflection being far above the congregation, and therefore the inconvenience must proceed from the circular shape of the walls chiefly, and as they are much broken into arcades, doors, and windows, it will not long be sensible.

The steeple stands on the tower which is raised over the vestibule to a level with the crown of the dome, and rises above it $111\frac{3}{4}$ feet, divided into three stories, a spire, ball, and weather-cock; giving to the whole an elevation of $131\frac{1}{2}$ feet above the entablatures, and of $166\frac{1}{2}$ feet above the pavement of the church. The first story is square, with Venetian doors in recess, covered by pediments on projecting columns of the modern Ionic order. The second is octagonal, with columns at the angles of the Composite order, disengaged about two-thirds of a diameter; and the third is circular, with eight Corinthian columns projecting two-thirds of a diameter, as in the second story; and the spire, on an octagonal base, is fluted: the whole gradually tapering into a pyramid, whose height to its base, is as 14 to 3 nearly, offering a pleasing object to the eye of the observer. The weathercock, which is of copper, is made to turn on a *red-wood* spindle, to neutralize as much as possible the fatal effects of thunderstorms.

The steeple, as above described, is taller by eleven feet and a half than that of St. Martin's Church in London, which has lately been brought into view by the prolongation of Pall-Mall and the street in front of the King's Mews, estimating that steeple to rise about one hundred and twenty feet above the entablatures of the building.

On the 8th May, 1820, the steeple was completed, and on the 11th, only three days after, was exposed to imminent

danger in a most violent storm while the whole of the scaffolding was still about it, opposing a surface to the raging elements three or four times the area of the steeple itself. The wind blew with the greatest violence for thirty hours, chiefly from the north-east, during which period, sixteen inches of rain fell at Madras; and the scaffolding, which was framed of heavy spars and purlings, was blown against it: but the steeple resisted the whole storm unhurt; and fortunately for Dr. Allan, who was in the *manse* below, and could not have ventured without doors, none of the timbers detached themselves. No measures could be taken for his relief till the storm subsided, although much anxiety was entertained for his safety, the wind blowing exactly in the direction of the *manse* in a most tremendous manner. This memorable storm continued for the whole time with the same unabated violence across the Peninsula, and was felt at a considerable distance at sea.

To the westward of the compartment containing the steeple, stands the portico, of the modern Ionic order, on a colonnade *doubled* in its depth, surmounted by a pediment along the whole front, in the *tympanum* of which the sacred name JEHOVAH appears in Hebrew characters of gold in a triangle, emanating rays of glory; while in the frieze below stands the name of the edifice and the date of its erection. There are three doors under the portico. The middle one, supported by pilasters and an entablature, leads through the vestibule directly to the body of the church; the others, through the side rooms, to the circular passage on either side. The reason for doubling this colonnade was the better to support the roof of the portico, which is entirely of masonry on the same principles as the dome, with *straight-arch* entablatures in lieu of beams or lintels. This double colonnade suited with the rest of the exterior architecture, consisting of columns and pilasters in *pairs* of the same order, also gives a sufficient depth for the stone steps leading up to the portico to be under cover, so that the carriages may draw up to them conveniently: a most desirable arrangement in low latitudes. The whole length of the portico is fifty-seven feet; the breadth, out and out, eighteen feet and a half, and eleven feet within the columns.

A few iron bonds and Y's were used to prevent any movement in the work while the centerings of the portico

were removing: but when done, there appeared no stress on them whatsoever. Blocks of granite on the capitals unite the pairs, and serve as abutments for the straight arches.

The use of pediments in terraced buildings, where the pitch roof is not continued from them with the same slope, is in itself an anomaly, since pediments in their origin were in fact the gable-ends of such roofs. They are, however, in very common use without any reference to the roof, especially in India, where terraces are preferred; and with more or less good effect, as the buildings bearing them are more or less lofty. But an obvious defect in these *vain* structures consists in their extending only to the edge of the upper diameter of the column *interiorly*: while exteriorly, the cornice projecting a diameter or more beyond the column, seems to make the pediments totter, and to be in danger of falling forward at the slightest blast; that, at least, is the impression which prevails when they are seen in profile. To avoid this awkwardness in the present case, the pediment is made to extend over the double colonnade, and besides that to project as much *inwardly* as the cornice does *outwardly*.

The advantages of this arrangement is not confined to the mere appearance, but is turned to essential use; for the pediment being arched and bearing on the columns only, tends to stabilitate the colonnade without dwelling heavily on the intermediate entablatures, having but a very thin wall in front for the *tympanum*. The sections of this pediment will render these details obvious; and it will be seen that the doubling of the colonnade of the portico has no bad effect in the view taken of it in any direction.

The basement of the building is four feet high, and serves as a plinth to the order (which has no pedestal) all around the edifice, running *flush* throughout, as well as the entablature, without breaks. This gives the appearance of neatness and of additional strength to the edifice.

The eastern elevation, wherein the large window into the sacramental-room is conspicuous, has pilasters to correspond with the columns of the portico, which are thus disposed of: the middle inter-columniation occupies *four* diameters in the

clear; those on each side *three*; and these are bounded by pairs of columns or pilasters separated by half a diameter. In the pediment to the eastward are wrought the Company's arms in relief with Parker's cement, with the motto in gold letters in the frieze beneath. The elliptic shield of the arms serves for a window to the record-room above.

The exterior order, like the interior, is thirty-five feet high; the diameters are three feet two inches and an eighth, being *one-eleventh* of the whole height, or *one-ninth* of the column itself; the entablature two diameters. The pilasters run up without decreasing, but the columns diminish one-eighth; they are both *fluted*, and *rudented one-third* up.

The north and south elevations of this church will not be found wanting in neatness and chasteness. The columns and pilasters are disposed in pairs, and give the appearance of solidity which becomes such a temple. The circular part of the outline of the plan on each side is cut off to form a *fronton* corresponding with the ends of the octangular compartments: and as this cutting off takes away from the strength of the walls where the lateral pressure of the dome and annular arch is considerable, two pairs of columns are advanced in front of the pilasters, forming a small porch over the side entrances into the church, at which the steps are also constructed under cover. These columns are well connected with the pilasters and walls by blocks of stone and masonry, which, with the *finishing* or *amortissement*, and a *sarcophagus* above, form a compact resisting body.

In these elevations of the church is shewn how the circular part of the building is connected with the rectangular compartments on each side by means of a *bent* pilaster. This expedient seemed to be the best for the occasion, although *bent* and *inserted* pilasters and columns should, as much as possible, be avoided, as defective in taste and elegance: but they are to be met with in many buildings, and occur frequently in the Cathedral of St. Paul's already referred to.

The balustrade round the building is of the same height as the entablature, and serves to screen the arcades of the dome above, and to make the dome itself as little conspicuous

as possible, so as not to take away from the loftiness of the steeple, which is the principal object. The entablature, without being loaded with decorations, is not altogether plain: its frieze is filled with an Etruscan border, and some of its members are foliated. The capitals of all the columns in and out are of stone so that the volutes are in no danger of giving way, as occurred at the Madras banqueting-room, when it became necessary to remove them all, and to change the style of the order altogether.

The ratio which the whole area of the church bears to that of its walls and columns, is as 6.658 to 1: and that of the interior area of the body of the church to the section of the sixteen columns supporting the whole roof, as 5.973 to 1. The former ratio is nearly the same as Rondelet finds in the Church of Saint Sulpice at Paris, but greater than that of St. Paul's in London, which is as 6 to 1: and the latter is within a small fraction as great as that of St. Joseph at Palermo, the lightest building mentioned in Mr. Rondelet's Tables. The area of the ground which St. Andrew's Church covers is 10,193 feet.

The stucco with which the walls are incrustrated inside and out is put on with the greatest care: the columns especially, which actually resemble beautiful parian marble in whiteness and in polish. The Madras stucco or *chunam* is renowned for its superiority over every other, and this edifice offers a fine specimen of its elegance and beauty.

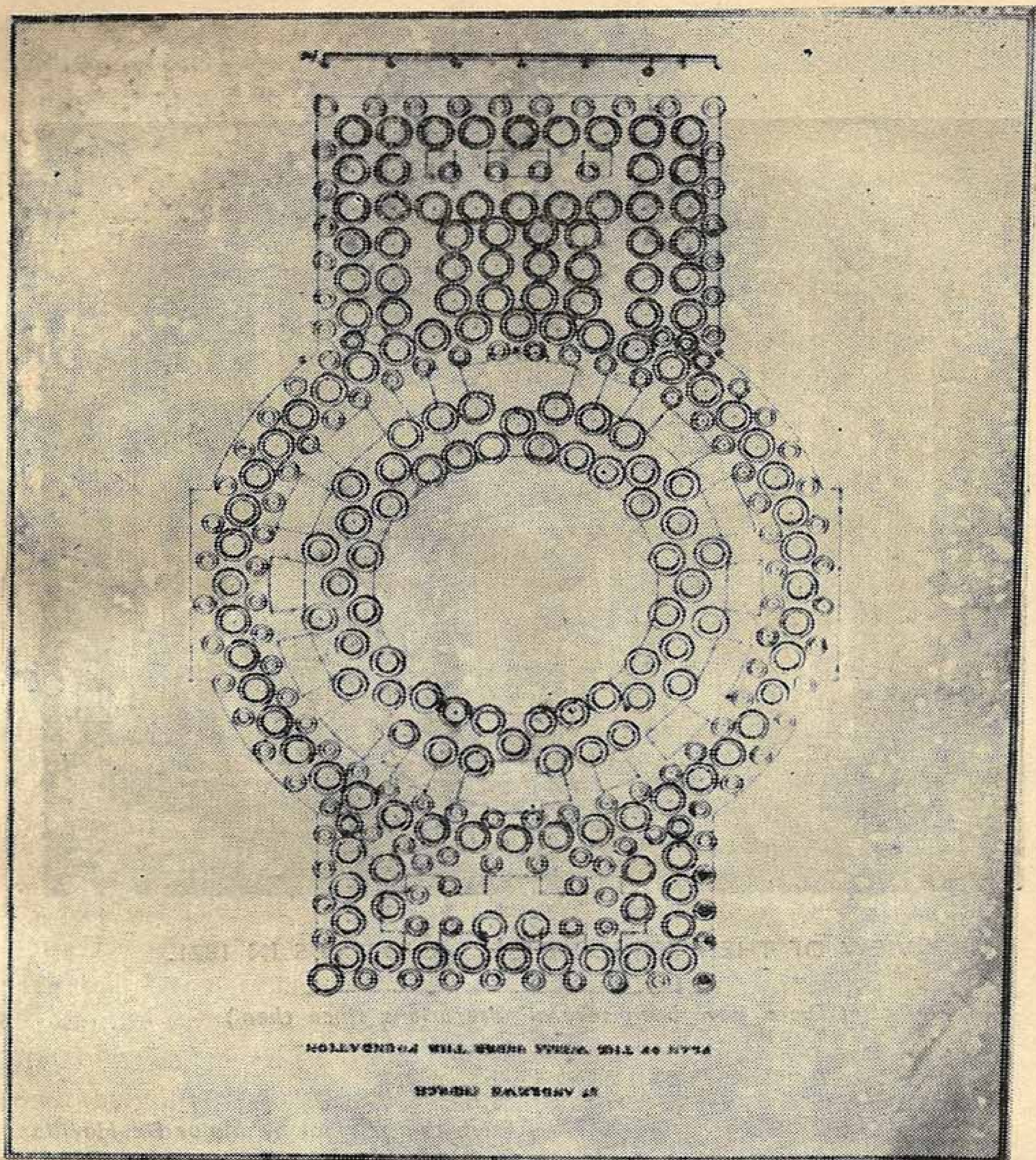
The pews and pulpit are of mahogany: the former erected on curves, concentric to the latter: light, airy and convenient, with a *shaped* back and arms to each sitting. The pulpit is a neat specimen of the gothic order. There is only one reading-desk for the precentor, the minister performing the whole service in the pulpit. Even baptism is there administered, and for this purpose a silver basin or font is attached to the pulpit on the minister's right hand, the parties coming to the baptism standing below it on the platform.

The floor of the interior is laid with marble tessellated, slightly veined, and the portico and all the steps with granite.

There remains still to be described the *foundations*. It has already been remarked, that the soil was most unfavourable, as indeed it is throughout the vicinity of Madras. The practice which has obtained from time immemorial in this part of India to secure edifices in such cases is a simple and a most efficacious one, worthy the notice of architects in general: it is that of substituting *wells* for the pile-work used in Europe.

In the present instance, the whole area of the edifice, excepting a circle in the middle of about thirty feet diameter, was sunk as deep as it could with convenience, and until the water and the mud became difficult to control. This was at about the depth of fourteen feet below the surface of the soil; it was then levelled and the wells formed and founded on that surface. These wells were of two kinds, of *brick* and of *pottery*, the former about four feet in diameter in the clear, the latter three feet.

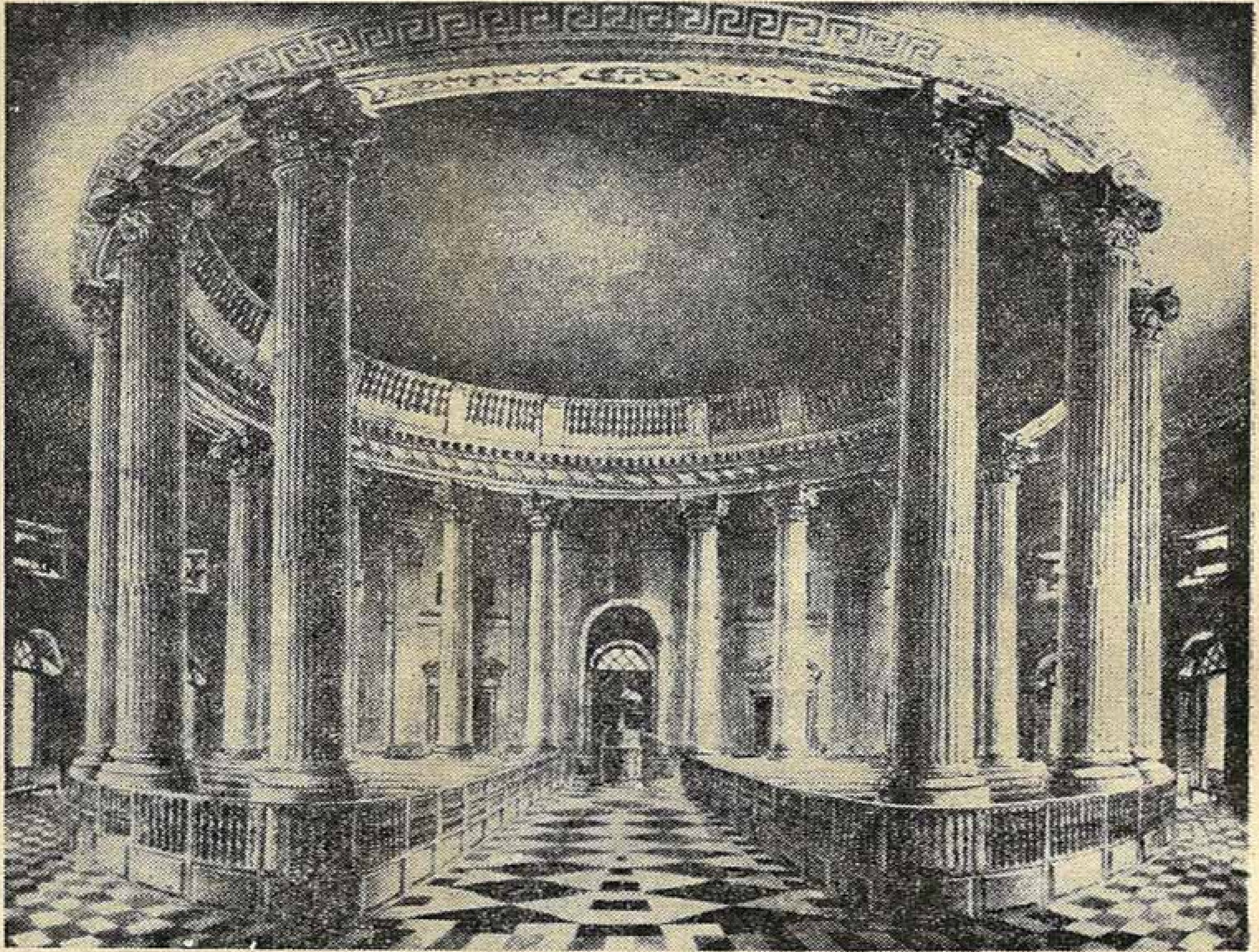
The process of sinking these wells is as follows. If of brick, the bricks are made purposely for them, and of a shape to fit each other in their breadth in circular layers, like the *voussoirs* of an arch, of the usual thickness, and about seven inches long: a little longer as the diameter of the well increases. Before these bricks are laid, a ring of wicker-work, of the diameter of the intended wall and as broad as the bricks are long, is placed on the surface, and on it the bricks are carefully laid in horizontal layers, with a little clay mortar, very liquid, between them. A cylindrical wall is thus raised to a convenient height; or if known, as high above the surface as it may be required to sink the wells below it. The cylinder thus formed is then firmly bound together outwardly with hay or straw ropes or twists, wound round it from the bottom to the top: this done, the well-sinker gets into the cylinder with a basket, and with his hands chiefly when the mud is soft, sometimes with a *mammotty*,* large short-handled hoe, and other fit tools, he excavates the soil from the bottom, and fills the basket, which is then haled up by other workmen on scaffolding above, and handed out of the way. In this operation great care must be taken to excavate *evenly* all round under the wicker ring, that the cylinder may preserve its perpendicularity. The process is thus continued until the cylinder



PLAN OF THE 150 BRICK AND POTTERY WELLS ON WHICH
ST. ANDREW'S CHURCH

PLAN OF THE 150 BRICK AND POTTERY WELLS ON WHICH
ST. ANDREW'S IS BUILT

— From the original by Major De Havilland



VIEW OF THE INTERIOR OF ST. ANDREW'S IN 1821.

(There have been several alterations since then)

— From the original by Major De Havilland

disappears beneath the soil, or until the bottom is found to be of sufficient consistency for the object in view. If the cylinder be not long enough to reach to such a soil, it is raised again and bound round as before, and the well-sinker continues his work till the object, a good soil or rock, is attained. The well is then filled with brick-bats, sand, shingle, small stones, or any other substances which will neither *dissolve* nor alter their volume in water and will admit of being rammed down to a solid consistency.

The wells having been placed as near to each other as practicable, the interstices between them are very limited; but these interstices are also to be filled up and rammed down with the same kind of materials as the wells themselves. The whole space is then levelled to an uniform surface, perfectly firm and impenetrable, on which the masonry of the foundations is established.

The pottery wells are fitted up and sunk like the others, but the cylinders are formed of *baked* rings, formed in frames two to three inches thick and five or six in height, *in lieu* of bricks. These, however, are seldom used for wells much more than three feet; while, on the contrary, wells even from twelve to fifteen feet in diameter, are often sunk with brick in the way described above, and to a very great depth.

The *well-sinkers* are a distinct set of people, of the agricultural or labouring class in Lower India. They intermarry among themselves only, not even, it is said, with the *tank-diggers*, whose avocations and labours are of so similar a nature. They travel about the country in small companies or families, with tents or sheds in search of employment, but in the vicinity of Madras, where their labours are constantly in request, they have had, for the last forty years a settled place of habitation, and reside there in huts and small houses. They are very hard-working people, but not provident though well paid while employed. They are given to drinking, perhaps more than other classes of labourers, from their practice of taking spirits while sinking the wells, in order to sustain them in their great exertions, and to preserve them against the effects of cold and wet.

While sinking the wells they are almost always immersed in water, having no more clothing on than decency requires:

and though the water gains on them they continue their work by diving beneath it, remaining below a considerable time at each immersion. The practice of allowing the water to rise over the men is to save the expense of baling, which would be considerable and also to obviate a greater evil which would accrue if *baling* were attempted; for the water, forcing itself through the interstices of the bricks, would wash away the mortar and derange the cylinder, which would then fall in. In pottery wells, however, it may be and it is often done: there being less space in these, the sinker is more embarrassed, and would find it difficult to come to the surface for breath if the water were deep. As the exertion of working under water is very great, they relieve each other very frequently, the one employed in drawing up the basket taking the place of his fellow below. The women and children do not assist in this part of the work, but they receive and remove the soil from the man who raises it out of the well.

All wells for water are sunk in the same manner wherever the nature of the soil admits of it. The clay mortar, in these cases especially, is laid very thin. The dimensions of water-wells are suited to the purpose for which they are required, and to their depth. Sometimes the wells are made to diminish in stages as they are sunk, and in this manner many wells have been carried to the depth of fifty feet. When required for foundations, the diameters are regulated by the nature of the walls or revatments they are intended to support.

In the plans annexed, it will be observed that the larger wells of brick are disposed of under the more essential parts of the building, and that they are supported by the smaller of pottery. On the same plan is shewn in dotted lines the outline of the foundations as laid on the top of the wells, which foundations diminish regularly upwards to the dimensions at the basement shewn in the other plan. In order to stabilitate the edifice and to bind every part firmly together, all the foundations are connected by vaults, from a half to a whole brick thick, upon a rise of three or three and a quarter feet; that is to say, the vaults spring at the ground level, and rise to receive the pavement at the top of the basement, the spandrils being filled up with broken brickbats and lime mortar, called in India *jully*.

Thus the whole area of the church comprises a series of vaults, which, besides strengthening the edifice, might at any time, if expedient or necessary, be converted into catacombs. Under the tower and steeple the large brick wells alone are used; and as it was expected that the greatly exceeding weight of that part of the building over the rest would cause its masonry to settle more than the rest, the further precaution was taken of having inverted arches under the rooms on each side of the tower, so that the weight of their outer walls should in some degree become a counterpoise to the tower.

The wells are sunk about nine feet, the foundations being raised about thirteen and a quarter feet above that, and the basement four feet more, make the whole depth below the pavement about twenty-six and a quarter feet. But even at that depth the soil attained was still of the nature of a *quicksand*, and to appearance not very solid: but it was a *sand*, a substance that would not dissolve or alter its volume.

The ground, when opened for foundations, proved to be as follows: First, a crust of vegetable and made soil, scarcely eighteen inches deep, below which was a foot or two of alluvious earth and sand; immediately under this and at about the level of the sea at high water, commenced a stratum of black soapy salt mud, evidently a marine alluvion deposited there for ages in which were many oyster-shells, some found single, other still joined together, but all perfectly flattened, and so far decomposed as to be easily crumbled to dust. This stratum continued for eight or nine feet, when the mud became gradually mixed with quartz sand. Hitherto this mud had been found very soft and wet, but much water had not gathered in the trough; and although the workmen stood half-leg deep in it while working, there was not much difficulty in effecting the excavation: but as the sand increased so did the water and it soon became necessary to establish and sink the wells as before described. As the sinking advanced the soil was examined; and after proceeding six or seven feet deeper, it was found to contain so large a proportion of sand, that the mud with it barely filled up its interstices, so that, even when washed clear of it, its bulk remained undiminished. The wells were, however, sunk two

or three feet more; and as this kind of medium continued, it was determined to stop there, although, as before remarked it was even then little better than a *quicksand*: but the whole area being *uniformly* the same, no apprehension was entertained of the result, as each part would be sustained *in equilibrio* with the other.

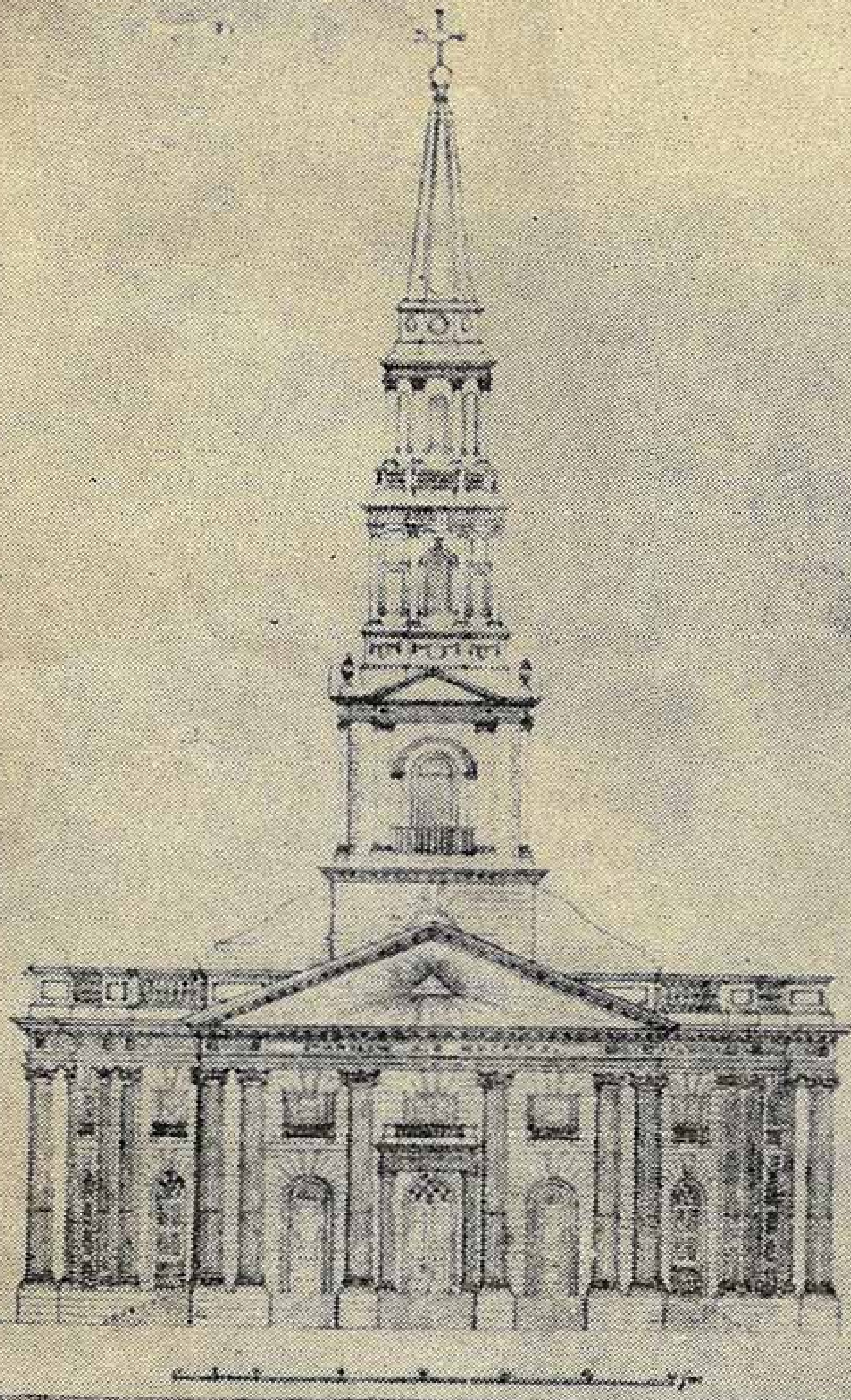
All edifices of importance along the Coromandel Coast where the soil of the nature described prevails, are founded in this manner; and generally, wherever it can conveniently be effected, and where *welling* is neglected, the buildings very soon crack into fissures in every direction; for besides the *impression* which it necessarily makes in the mud, the rain during the wet season getting beneath the upper-stratum of clay and vegetable mould, through the fissures into which the hot weather has rent it, dissolves the salt, and offers a less resisting *medium* to the walls, an effect which becomes more visible every year. Almost the whole of Fort St. George is seated on wells in this manner; but those which are used under the sea face are built with lime mortar: a precaution very necessary, wherever the action of moving waters is to be apprehended, as under bridges, quays, piers &c.

These foundations have been found, when judiciously secured, to answer perfectly well, and St. Andrew's Church stands firmly on its bed of wells. It may however be observed that the great excess of weight in the tower and steeple over the remainder of the building has occasioned a slight fissure on both sides; but not a more considerable one than may be discovered in all edifices where the inequality of pressure is so remarkable.

It has before been stated, that in May 1820, when the steeple was just finished, a most violent and lasting storm occurred, which caused some anxiety for the safety of the edifice: but before that it had been exposed to a former one, which happened on the 24th October 1818. At this time the walls were raised up to the entablature, but the sacramental-room only was yet covered in: the dome of this apartment was just finished, and the centerings were not yet removed. The storm lasted no more than a few hours, but with the most raging violence: wind and rain, with vivid

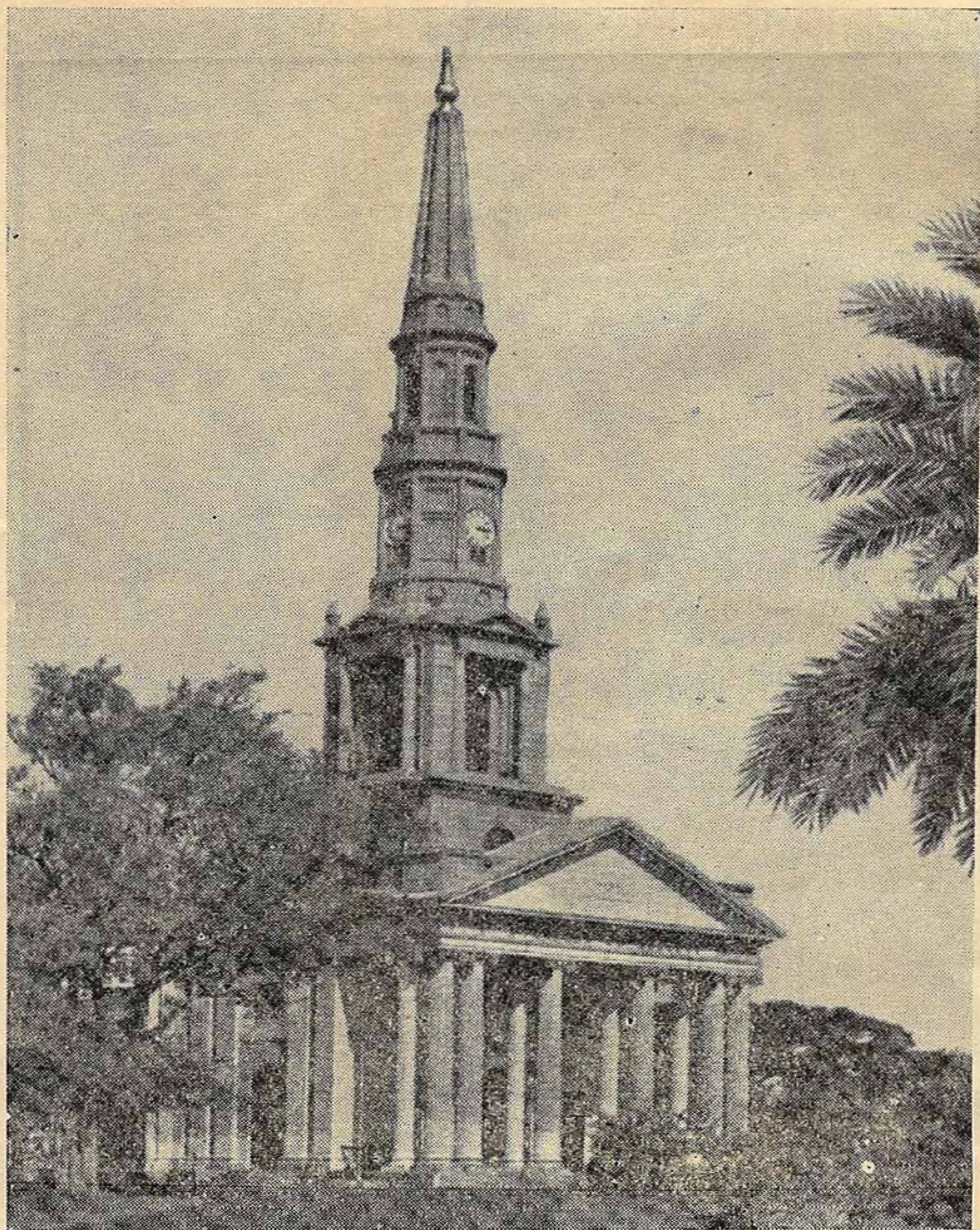
SAINTE ANDREWS CHURCH.

West Elevation



ST. ANDREW'S CHURCH—WEST ELEVATION

YACOT, NORUM—From the original by Major De Havilland



ST. ANDREW'S CHURCH, TODAY

lightning and thunder. The velocity of the former was computed to have been at least ninety-four miles per hour during its height; and the rain, although it was of comparatively short duration, amounted to a depth of five inches, and inundated the vicinity of Madras.

After it was over St. Andrew's Church was examined. No damage or mischief at first appeared to have been sustained but, on a closer inspection, a crack was observed across the building between the sacramental-room and the porticos on the north and south faces, obliquely from near the room on the south side to the portico on the north. During the storm the centerings of the sacramental-room had still remained and though they were heavy, and supported on temporary brick pillars, their weight could not *alone* have been the cause of the accident, since the fissure observed was at a considerable distance from them, and that the whole weight, with the centerings, must have been as nothing almost compared with that of the steeple; and hence there was every reason to believe that the edifice had been struck during the storm by a thunderbolt. It was, however, determined to prosecute the work and the crack, which, though scarcely perceptible, could be traced from the top of the wall to the bottom on both sides, and through the foundations for the columns within, has not since suffered any change. Such cracks, however, in another construction might have proved fatal; they would have served as a gallery for the white ants up to the roof, which, if it had been of timber, they might soon have destroyed.

It is surprising that the expedient of *welling* for foundations has not been generally adopted in England, where especially along the banks of the Thames and other oozy rivers, their use would be so expeditious, economical and effectual. Cast iron zones might with good effect be employed with *rebales* to fit on each other. In the new London Bridge, now erecting, they would have answered uncommonly well; and being of iron, it would not be necessary to keep the water in them while sinking, so that as many might be kept going as a steam-engine would keep clear of water and the men in them work nearly dry. Their own weight and the sharpness of their edge would take them down easily, as fast

as the soil could be removed from them with windlasses or cranes, &c., worked by the same engine. When sunk they might be filled with materials, rammed down with sufficient lime to consolidate in the course of time; so that if ever the iron zones should become corroded, the materials would remain a solid mass of masonry. Assuming even the supposition that the iron would corrode sooner than the wooden piles would rot, which may be a question, this mode of founding seems preferable to that of piling generally used in England.

The long room of the Custom-House might, in like manner, have been secured against the fatal accident which has levelled it to the ground and which will cost the nation so many pounds to repair; for this *welling* would have been peculiarly well adapted to those foundations, wherein it has been stated that *old walls* were found which interrupted the piling and prevented the piles being sufficiently driven. These, or any other obstacles, would have been easily removed and the wells sunk as necessary.

In the Tunnel now constructing under the Thames they might be most advantageously employed, in the event of the soil becoming unfavourable, or if there should be the least danger of the masonry sinking or settling. In short, in every situation they would be useful and particularly so in a confined space where the driving of piles would be very inconvenient.

The *first stone* of St. Andrews was laid under the north-west angle of the steeple on the 6th April 1818, by the Reverend Doctor John Allen, D. D. and M. D., who then named the edifice and blessed and consecrated it for divine worship according to the rites of the Church of Scotland. The ceremony was simple, without procession or pageantry. Every thing having been prepared and a platform laid, the Minister supported by the four Elders, came to the spot, accompanied by a numerous and respectable assemblage of the congregation. Under the stone was deposited specimens of the several coins of the British and Madras currency and a brass plate, containing the following inscription on one side and the same rendered into Latin on the other.

By the Grace of Almighty God,
in the Reign of GEORGE III, Father of his Country,
and during the Regency of GEORGE his Son,
the First Stone of this Edifice
appertaining to the Church of Scotland,
was laid,
in the presence of
Robert Fullerton, David Hill, Kirkby Dalrymple,
and William M'Taggart, Esquires,
the Elders of the Church of Scotland at this Presidency,
by John Allan, D. D. and M. D.,
their Minister and Moderator,
on the 6th April 1818 :

The Right Honourable Hugh Elliot being Governor :
Major Thomas Fiott de Havilland, Architect.

This inscription was also written on parchment, with other translations of it in the Tamil and Gentoo languages; the parchment likewise contained the relative value of the coins at the currency of the day, and with the coins themselves, was inclosed in a bottle hermetically sealed, for which a cavity had been prepared in a block of granite underneath, to be covered by the plate, and then by the foundation stone, after the intervening surface had been endued with mortar by the Minister. A silver trowel had been prepared for the occasion, and the foundation stone suspended to a small tackle over the site, by means of which the minister unassisted performed the whole operation of laying the stone.

The prayer offered up to the Almighty on the occasion by that worthy and truly amiable man the minister, was highly appropriate and was delivered so impressively as to reach the hearts and feelings of all those who were present. It is inserted here, a tribute to his memory, whose great characteristics were meekness and singleness of heart. His one desire and constant prayer, poor man, was to see this edifice completed, and to perform the service of his God in it ere he died. The Almighty vouchsafed his prayer; but, alas! he did not grace the pulpit long; he was soon called away to better climes! It was a remarkable circumstance, that the great bell which was put up in the tower was tolled for the first time at the funeral of this good man.

THE PRAYER

“ Almighty and ever gracious God! we, thy humble and
“ dependant beings, desire to approach the footstool of thy
“ throne to celebrate thy unsearchable perfections, to
“ acknowledge thy righteous administration, and to express our
“ thankfulness to Thee, for our privileges as members of
“ society and as Christians. We adore Thee, the one only living
“ God, the lord of hosts, with whom is everlasting strength :
“ the creator and ruler of the universe, the heavens declare
“ thy glory, the hosts of the firmament proclaim thy praises!

“ Amidst such astonishing displays of infinite power,
“ wisdom, and goodness, who would not stand in awe of thy
“ majesty, ascribe unto Thee, the kingdom, the power, and the
“ glory, in whom all possible perfections supremely reside. We
“ adore that infinite understanding which devised the extensive
“ plan of the universe; we revere that Almighty power which
“ raised the stupendous fabric; we venerate that unerring
“ wisdom, which establishes the laws by which the order of its
“ numberless systems is invariably maintained; we contemplate
“ with delight, that uncircumscribed benevolence, which peopled
“ the heavens, the earth, and the elements with animated
“ beings, and made provision for their support and enjoyment.
“ The eyes of all wait upon thee, and thou givest them their
“ food in due season.

“ While the works of creation celebrate thy goodness,
“ and are subservient to thy will, forbid that we, the subjects
“ of thy moral government, should remain silent, ungrateful,
“ and disobedient. Let us never forget the distinguished rank
“ which thou hast assigned us among thy works, and that to
“ whom so much is given, of them much also will be required.
“ We thank Thee for our national privileges and blessings ;
“ *truly the lines have fallen to us in pleasant places*, and we
“ are a highly favoured people. Under thy divine protection
“ we enjoy every security for the exercise of our religion,
“ the safety of our lives, the possession of our property
“ and the establishment of our freedom and independence.

“ While we thank Thee for our privileges, civil and
“ religious, we pray for thy blessing on the establishments

" where our lot is now cast. Inspire the Governors of them
 " with wisdom to rule in thy fear and to pursue such
 " measures as may tend to thy glory, and the happiness of
 " all under their authority. Surround, we beseech thee, with
 " thy special favour, the Governor of this Presidency, and
 " prosper his administration. Be gracious to all who sit in
 " council with him. Bless all their endeavours to know and to
 " promote the interests of this establishment. Enable all who
 " have any public duty to discharge under government, to be
 " faithful to Thee, and to the trust that is reposed in them.

" Now, O God, we implore thy countenance and favour,
 " in behalf of this distant corner of thy vineyard. *Consecrate*
 " *a people in this place for Thyself*: bless the occasion of our
 " present meeting; condescend to assist and encourage thy
 " servant who has the superintendence of the edifice about to
 " be erected; establish Thou the work of his hands; prosper
 " his undertaking; *protect the builders*, and in thine own good
 " time perfect the structure. *Except Thou, O God, dost build*
 " *the house, the builders will labour in vain: except Thou takest*
 " *charge of the flock of thy pasture, the watchman's care of them*
 " *will prove fruitless*. Our authorities may plant, and we, thy
 " servants, may water; but to thee, O God, we look for the
 " blessing, and to give the increase.

" We pray for the whole Christian world; for the spread
 " of gospel light among all nations; for the Churches of Christ,
 " distinguished by whatever name; for our national Churches;
 " for these distant branches of them; for the servants in the
 " ministry, and for the whole body of Christians in communion
 " with them.

" May the name of the Lord be hallowed in every Christian
 " land, and power of godliness prevail. Build up, we beseech
 " Thee, Christians in their most holy faith, upon the founda-
 " tion of the Apostles and Prophets, Jesus Christ being the chief
 " corner stone, on whom the whole moral building fitly framed
 " together groweth into an holy temple, for an habitation of
 " God through the Spirit.

" Now unto Him who is able to do for us far above what
 " we can either ask or think; unto God only wise, be ascribed

“all honour, power, and glory, through Jesus Christ, world
“without end. Amen.”

The congregation departed with hearts warmed by the piety of their excellent pastor, fervently praying for the undertaking.

It may be here remarked, that the bells for the Church were also ordered at Madras; but there was no foundry established there for large works, except that at the powder-mills. When the casting of the bells was suggested, no doubt was entertained of the head *founder* of that establishment being allowed to give his assistance in the undertaking. When, however, application was made to the Military Board, under whose orders the Powder-manufactory is placed, it was not found convenient to *spare him*. The Church is a *civil* work, the powder belongs to the military department, and the Military Board, perhaps, considered it an improper interference with their authority, although the application went to them through the Government.

The project was nevertheless persevered in, the Government not counter-ordering them; and after some trials in a temporary foundry erected for the purpose, and an experienced founder having returned from Bengal, *a handsome bell was cast, four feet in diameter (the largest ever cast at Madras), and two smaller ones*: but from the foundry being only a temporary one, and the founder not having all the requisite means conveniently at hand, the *tips* of some of the ears of the great bell remained defective, and although they were yet abundantly strong to bear the weight of the bell, and much more, it was thought more prudent to perforate the crown and to fix in it a *wrought-iron* preventer staple, which was accordingly done, without in the least affecting its tone, which in the presence of the Governor, was, on being completed, tried and found to be a most excellent one. *It was then put up, and generally approved; the first time it was tolled was, as already stated, at the funeral of the worthy pastor.*

Not a word was said against this ill-fated bell till the engineer had left Madras, when, through some unworthy intrigue which need not here be detailed, the bell was cried down,

and the Military Board was induced to order an inquiry. For this inquiry it appears, from the reports of the day, that the founder of the powder-mill establishment, *without* whose services it had been cast, was selected, and it is not surprising that *he* should report upon it unfavourably, when a great jealousy existed between him and the founder employed. The bell was then ordered to be sold for the account of Government. But it was not sold *in statu quo* to the best bidder, the most customary mode of proceeding, it was first brought to the Arsenal, and there *broken up*, involving, of course, additional expense. *Dead men tell no tales!* Had it not been thus broken up, it might yet be proved that this bell was perfectly good and unobjectionable, notwithstanding the inserted staple; an assertion the author of these remarks feels called upon to make in justification of his character, which, although only impeached in so trifling a matter as this bell, and under circumstances which he could not control, he will not allow to pass unnoticed. He will further observe, that the insertion of staples in the crown of bells is by no means an uncommon expedient, when it is apprehended that the cast ears may not be sufficiently strong. One of the largest of the beautiful bells of St. Mary's Church, at Taunton, may be mentioned as an instance where it has been resorted to: this bell is entirely supported by such means, the cast having been broken entirely off. And it is fair to notice the *haste* with which St. Andrew's bell was taken down, since it might certainly have been allowed to remain, and to be used until another was prepared to replace it, if there had not existed some indirect motive to the contrary. One of the small bells cast at the same time is still in that Church, and the other has since, it is understood, been sent to Masulipatam for the Church at that station.

The cost of St. Andrew's Church amounted to about £20,000, all contingencies included; a sum which must be deemed exceedingly moderate for a building of this description, and finished with the care and in the style that it is; and with the cheapness of which few, if any, at Madras can be compared; even such as are of a much plainer, and of a far less durable construction: but *no pains were spared to insure permanency and economy.*

It was executed by the Engineer, *on oath*, as to his disbursement: a practice that has successfully prevailed, and

almost uninterruptedly, at Madras for the last thirty years, and has been found to answer in every respect better than the contract system, which has three times in that period been attempted to be established there, as it is generally at the Bengal Presidency. And here it is that the advantage of having commissioned-officers to superintend public works is obvious; since, besides all the inducements they may have, like other men, to serve their employers honourably and faithfully, to maintain a fair character and a reputation for probity and honesty, and that they are bound under penalties to perform the work duly and properly, they have their military commission at stake, which must inevitably be forfeited if convicted of fraudulent practices. To this consideration of the subject may be added, that of the means it gives the Government of usefully employing their military establishments in time of peace; in which employment scientific men cannot fail of improving themselves, both in theory and practice, and of thus combining the several branches of the profession, a knowledge of which can alone form the perfect Engineer.



ALL PROFITS FROM THIS BOOK WILL GO
TOWARDS THE WORK OF
ST. ANDREW'S CHURCH