If basement rooms are to be used for other than cellar purposes, it becomes necessary to make the walls double. When stone is used, this is to be done by "furring," with small wooden strips secured to the masonry and covered by lathing and plastering. Brick walls may either be furred in the same way, or laid as two separate walls, two or more inches apart, occasionally bound together by cross bricks, or, better, by small, flat iron bars; and then, if desired, the inner wall may be plastered directly on its surface. If openings are left into the air space, it greatly hastens the drying of the wall, but they should all be tightly closed when the work is done.

Such spaces are sometimes used as ventilating flues, with a total ignorance or disregard of their real value. Any ventilating or hot-air pipes which may be needed may very well be inserted in such spaces, but should be entirely shut off from the air cells. Another common mistake in building hollow walls, is making occasional vacancies, while the main part of the wall is solid, as though there were some virtue in the air, which would be diffused over the whole mass. The solid portions must be just as small as may be consistent with strength, for even a single bond-brick will often betray its position by a damp spot on the plastering.

Wherever hollow walls are used, whether above or below ground, the builder must remember that their purpose is not to save materials or cost, but to increase efficiency. He must not, as some do, make the entire thickness the same as if it were solid, filching the material from the middle, but must, for safety, add all the thickness of the air space, and spare no cost in the bonding, for safety is of prime importance. If properly built, a hollow wall is stronger than the same material laid solidly. There, nevertheless, are some things in the way of its universal adoption, and, except for the greater danger in case of fire, the preferable mode of securing the required air space is that by furring.

While we are below ground, let us examine the cellar bottom. If the ground is wet and springy, it will be necessary to cover it with a coat of concrete, made of coarse gravel and hydraulic cement an inch or two thick. Where the soil is dry, hard gravel, or even sand, will do, if the occupants are careful people; otherwise, it would be better concreted, so that it may be the more readily cleansed.

Foundations, other than cellar walls, ought always to be laid on hard ground, and below the deepest frost, according to soil and climate.

The choice of material for the walls of the superstructure is to be governed mainly by location. Good sense and good taste, never inconsistent, both say it should be the most substantial which can be procured with economy. Stone is undoubtedly the most suitable for any permanent building, when it, and the requisite lime, can be obtained of proper quality and wrought without too great labor and cost in comparison with other substances. Next to this is brick. One great obstacle to the use of stone has been the supposition that it must appear smooth, or it would look badly; and another, the difficulty of forming the heads and jambs of doors and windows. Both of these objections are obviated by using bricks in combination with the stone, where much accuracy of finish is required, or where openings are to be

covered. A simple surface of broken stone, such as can be gathered from the vicinity, suggests an unassuming control of the resources of the neighborhood, which no far-fetched material can show.

Stone walls ought always to be furred, and brick walls either furred or built hollow. It is best never to build any wooden blocks into the masonry, but, for nailing to, a thin strip may be occasionally laid in the mortar-joint, not more than two inches wide and less than half an inch thick. This will hold nails and will not weaken the walls. The ends of floor timbers are commonly built into the masonry, just as so many stones would be, but it is better, for the durability of the timber and the solidity of the wall, that, except on the bottom where they rest, they should touch nothing, a little space being left above them, and around their sides and ends.

Bricks, if used in the country, ought to be hard-burned, so that they may be left in their natural state, as much of the advantage of either brick or stone is lost if an external covering, demanding frequent renewal, is required for protection. It is useless to give any attention to outside cements, mastics, and plasterings of any name, since, while they are most objectionable for other than structural reasons, they form neither a permanent nor a cheap surface for exposed walls.

Next to brick in value, as a house material, is wood. Its great fault is the liability of burning. Its durability, when properly used and cared for, is perhaps as great as stone, in ordinary houses. There are many old buildings composed of both materials together, in which the wood is comparatively sound, while the stone is falling apart. It has many advantages, among which are warmth of walls, thinness, and lightness, and the rapidity with which it may be wrought.

There are many ways both of framing and covering wooden houses, each having its peculiar merits and defects. The earliest method was to construct the frame of square hewn timber, as large as could be handled conveniently, the joints being secured entirely with tenons and wooden pins. The braces were tenoned into the beams and posts, and were short, the strength of the frame depending mostly on the stiffness of the timber. The corner of a house framed in this style is represented in fig. 4. The weakness of such frames results from their apparent strength, the very weight of the timbers employed breaking them down. In such frames there is little regard paid to the direction of the strain which each piece is required to resist. Floor timbers are often used wider than their vertical thickness. Such floors sag of their own weight and vibrate with every step. Houses thus made are also sometimes blown out of the perpendicular, and lean in a seemingly threatening manner, the weight tending to increase their inclination. With such timbers, however, there may be considerable distortion without danger of actual breaking. The advantage of the method

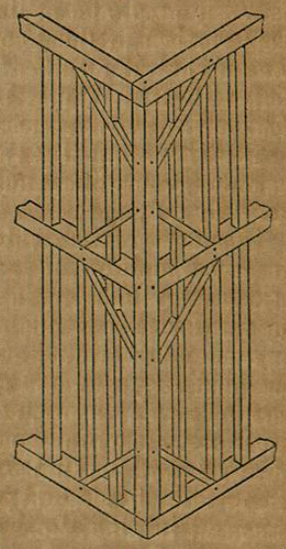

Fig. 4.

is chiefly its rudeness, few and simple tools only being used, and nothing but wood required for fastenings. It is cheap, where timber is plenty, but wasteful where it bears a market value.

The other extreme is the balloon frame, where no timber is used in the walls but vertical studs, of the smallest size that will answer to nail the covering to. Reliance is placed, chiefly, on the outside boarding, to keep the frame in its proper shape. Its advantages are its small cost, the ease of handling small timbers, the rapidity of its formation, and the fact that it does not need a mechanic to put it up. Its most prominent fault is the dependence put on nails—the most unreliable material of all that are used, even when new—and its liability to get out of place, and constantly grow weaker, by the corrosion of the nails and the wearing of the nail-holes. For small houses, and other buildings of light uses, it is a very suitable and valuable mode of construction.

In the best frames, there is no timber used beyond what is required, and each stick is so placed that its most effective strength is made available, the special use of every piece being considered, and its size and form adapted to it. Cross strains upon the wood are avoided wherever practicable, each piece resisting either compression or extension in the direction of its length. Where stiffness must be relied upon, the greatest advantage is taken of the edgewise strength of the timber, so that where, by the first-described plan, there would be floor timbers seven inches deep and perhaps ten inches broad, once in two feet, in this the timber would be ten inches deep, only two or three inches wide, and not more than sixteen inches apart. The weight is thus far less, and the strength and stiffness far greater. To keep such thin timbers from twisting out of place, there are bridging pieces, or braces, spiked between them, answering a much better purpose than an additional thickness of timber.

In this method, the timbers may all be much smaller than those formerly used, and still be stronger than the heavy frames. Being kept vertical by the braces, the studs may carry most of the weight. As the timbers on different sides generally meet the corner-posts at different levels, they may be as small as four inches by eight inches, or four inches by six inches, in many houses.

It is important that timber should be so arranged as to tie the frame as often as possible, and always to have a lateral pressure counteracted by a tie.

The most common thickness of wall timbers is four inches. This, in large buildings, is hardly enough to give all the strength of joints which is desirable, or the greater thickness for sash rendered necessary by the increase in the size of modern windows. Near large lumber markets, it is always cheaper to adopt such sizes as are in ordinary use and may be found ready prepared; but where timber is sawn expressly for any house, at least five inches thickness is preferable. In such cases, it will frequently save waste if all the framing plans are drawn before the timber is cut. Care should be taken, in seasoning it, to keep it straight; and the drying may be greatly hastened by frequent turning, &c.

One of the most durable coverings for a wooden house is boarding

vertically, the joints being protected by a narrow strip of batten. If the narrow boards are used, and the joints are tongued and grooved together, this is also one of the tightest and warmest coverings, but is not the cheapest, and has the disadvantage that, for nailing the boards, there must be horizontal timbering, additional to the vertical studs required for the interior lathing, and for support of the beams above. A modification of this kind of covering, very different in its appearance, is made by using quite narrow planks, an inch and a quarter thick, and omitting the battens. The same material may be used horizontally, but is better, if so used, with rebated joints, the outer lip being the thicker of the two, and the edges sloped a little downward.

Less costly than either of these is the common horizontal clapboarding, of which there are two forms, one of long pieces, uniform in thickness, except a shallow rebate at the lower edge, nailed directly on the frame; the other, of thinner boards, wedge-shaped in their section, laid upon a lining of rough boards. In cost the latter somewhat exceeds the other, but adds greatly to the stiffness of the frame, and produces a much tighter barrier to the weather, especially if between the lining and the clapboards, there is placed a sheathing of paper, which is now manufactured for that purpose, and is quite as efficient to exclude either wind or heat as another thickness of boards would be.

There is no more durable or warmer form of wooden covering than shingling of the best quality, laid on boards. If proper precaution is taken in selecting and preparing the materials, this kind of walling does not deserve the neglect and prejudice which seems to have befallen it, in late years.

Where it is customary to lay either clapboards or shingles on lining boards, walls are seldom filled in with bricks, an excellent practice, very prevalent in many localities. By "filling in," is not meant, however, "filling up," as some seem to suppose, who, in their inconsiderate desire to build thoroughly, use hard bricks, and lay them solidly, from the outer covering of the timber to the inner one, thus destroying the non-conducting air-space, which it is the very object to secure, and making the walls less valuable than if left with the simple boarding.

For this use, the best bricks are the softest from the kiln, only partially burned, and unfit for any other use. They should be laid on edge, in the center of the framing, so as to leave a space on each side, and must be secured in their place by an occasional board nailed in between the studs.

On the inside, the laths ought to be nailed once in sixteen inches—twelve is better—and at the corners those from both directions secured to the same support, so that there may be none of the angle cracks, which difigure so many good houses, in consequence of the shrinking of timber. The double air space made by the internal course of brickwork is useful to remedy imperfections in the outer or inner coating of the wall. The same purpose is sometimes accomplished by plastering roughly on laths fixed between the studs. A better way, because less likely to be rendered defective by shrinking, while affording an increased thickness of wall, very desirable at the windows, is to lath and

plaster roughly on the studs, in the usual manner, and then nail narrow strips of inch boards upon that surface, against each stud, and lath and plaster again.

Where neither bricks nor sound stones can be obtained, if timber is costly and lime cheap, a wall, answering a very good temporary purpose, may be built of concrete, which is a composition of lime and stones, so small that they are mixed into the mortar, and used without reference to their shape or position, the whole being formed in molds. Such walls need furring, as much as those made of bricks or stone, to render them warm, and must have, besides, a plastered surface exposed to the weather. They are inferior in every respect to a rough stone wall, and are said to be no cheaper, unless there may be a saving in the cartage of materials.

But exposed plaster surfaces must always be a vexation, until some cement is invented better than anything which all the centuries past have produced. Such devices have long been common, promising great things, deluding many, greatly corrupting public taste, substituting the fictitious and the flimsy for the true and the durable, and each, in turn, leaving a waste of dilapidation behind it, as it has gone out in disgrace, to be followed by another deceitful pretender of the same character.

It is greatly to be regretted that so much of the inventive genius of this age, both here and abroad, has been directed to the cheapening rather than the improvement of building. One half the thought and time and experiment which has been devoted to the production of imitations of stones, whose only merit, if successful, would have been that of appearing to be something better than they really were, or than those who used them were willing to pay for, would long ago have given the world a method of making the floors of ordinary dwellings fire-proof, and so little more expensive than wooden ones as to be within the means of every builder.

Let the workers in iron and cements, instead of counterfeiting with their materials more valuable substances and pushing them into uses for which they are nowise suitable, devise some way by which the supports of floors may be made as light and as strong of iron as of timber, and covered with a composition as elastic, as strong, as warm, and as durable as wood, and at the same time incombustible, and both shall be pronounced benefactors of mankind, and receive the commendations of all lovers of good architecture, instead of their execrations. Until something of this nature is devised, in common houses wood must be relied upon for the supports and surfaces of floors. They are greatly improved, but seldom, by a layer of clay or elastic mortar upon boards placed between the floor beams. This makes them less combustible. Similar measures may advantageously be used in the ceilings of upper rooms, which are close to flat roofs, to protect them from heat in summer.

What shall the roof be? If the object is solely to inclose the most cubic space with the smallest amount of material, the flatter the roof, and the more like a tea-chest the house is made, the better the object will be accomplished. Happily, however, there are some mechanical and financial obstacles to the execution of such an object. The cheapest

and most available roof-covering for isolated houses is shingling, or, in some favored localities, slating, and these both require a conspicuous elevation. The degree of slope is frequently determined by the carpenter for the ease of reckoning the length of rafters. It ought to be a well-considered matter, for, more than any other external feature, it defines the character of the house.

Upon parts of roofs it is, however, often desirable to have a much lower pitch than is suited for shingles, if good tinning work can be obtained. For such work, and for the gutters and valleys of roofs, the thinnest tin of the sort called "terne" or "leaded" plate, is considered more serviceable than the more costly kinds.

Of all the many cements introduced to notice within the last few years for the purpose of covering roofs, none have yet had a sufficiently long or severe trial to be pronounced perfectly reliable, and some have most certainly been proved worthless. Probably no one of them will accomplish what is claimed for it in all climates, but some of them may be found valuable for particular sections of the country when sufficiently tested. If so, they will, in many particulars, simplify the formation of roofs, and especially of their water-courses. Most if not all of them give an unpleasant character to rain-water, rendering them objectionable, if cisterns are to be relied upon.

The stability of partitions is promoted by resting those in the upper story directly upon the lower ones.

The warming of the house is a most important matter, and one which generally requires as much consideration in a southern house as in a northern one. The occasions for artificial heat being irregular and infrequent, are none the less imperative. In northern houses it is important that the chimneys should be in the interior of the building, that none of their heat may be lost. Flues are to be brought together, as much as practicable, in order that the heat of each may increase the draft in the others. Sometimes, too, the habits of the family and arrangement of the rooms are such that a part of the summer rooms are unoccupied in the winter season, at least for purposes requiring them to be warmed. But it is different where a sudden, chilly change of the weather, at any season of the year, affects people in every part of the house alike, and fires are demanded in each room. Their use being but temporary, the chimneys may be placed wherever they are most convenient, and open fires, on such occasions, at least, *seem* to be more effectual than any plan of close fire. In northern regions it is always easiest to warm an upper room from below, though, for special reasons, it may not always be expedient to do so.

Great outcry has been made against stoves, and they are undoubtedly liable to more abuse than open fires, and are certainly less cheerful; but there is no reason why we should not have the advantage of their very great economy, and still have wholesome and pure air to breathe.

And this suggests the vexed question of ventilation, which by some seems to be considered the cure for all life's ills. We all suffer too much from its neglect. Perhaps we should suffer less if it were less misunderstood. In the first place, we must remember that, except in the single matter of temperature, no system of ventilation, however perfect, can give us any better air than that which surrounds our house. If it

is damp or smoky, or in any way unpleasant or unwholesome, that within the walls must be the same. The most we can do is to warm it, if too cold, and to change it so frequently as to maintain a purity equal to that out of doors. These changes may be made by blowers and other mechanical means, out of the question in a country house, by the force of the wind, or by the ascending power of heated air.

The old way, so much favored by the lovers of open fires, was a combination of the last two plans. The air of the room, as fast as it as heated, ascended the great-throated chimney, and its place was supplied by cold winds through every crack. Nearly all the chimney caps and ventilators in use depend upon the wind for their efficiency. Blowing against inclined surfaces, the air is diverted upward, and thus produces an ascending current in the pipe to which the cap is attached. In breezy weather some of these devices operate excellently, but in a calm, of course, they are valueless. Their fault is similar to that

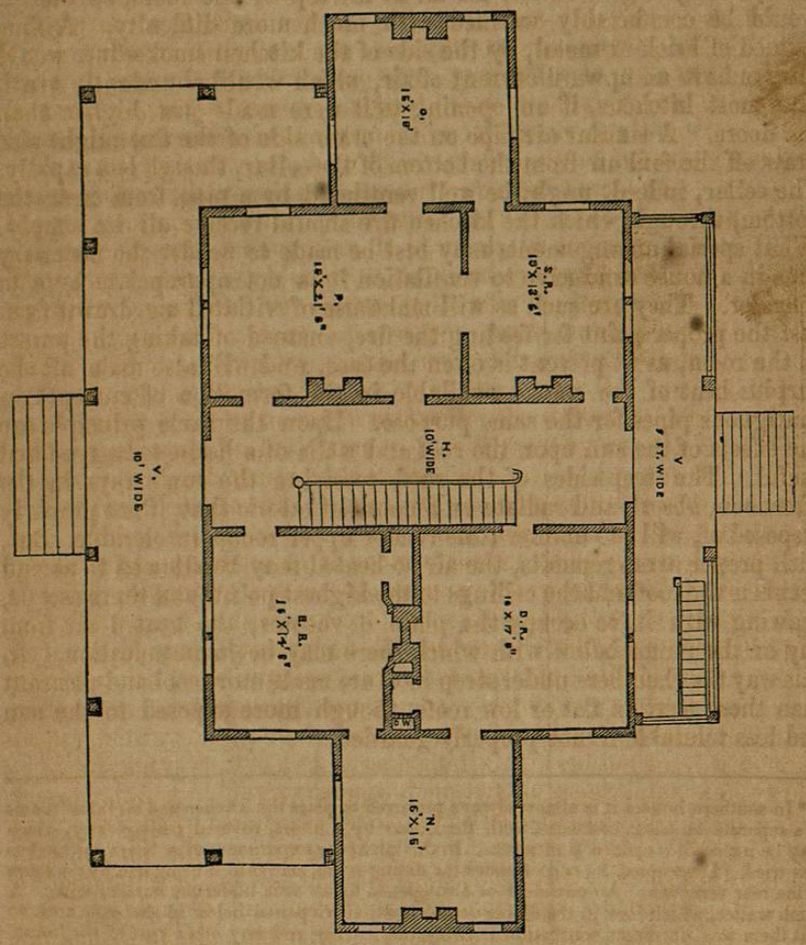

Fig. 5.

FIRST STORY PLAN

which the negro found with the moon, that it only shone in light nights, when it was not needed.

Doors and windows for summer or southern localities, will, in suitable weather, always be made use of as the most simple and thorough means of ventilation. Sometimes houses have been made, in the Southern States, with openings opposite to each other on all sides, through the entire building, so that in every direction there might be through drafts when there was a breeze. Nothing could be more delightful in pleasant weather. Figure 5 represents the principal floor plan of a house of this kind, built in Mississippi.*

But there are days when the outer air is too cool for comfort. Then our fires should, if possible, be so arranged that the external air shall be properly warmed as it comes in, and the vitiated air consumed or carried off in a regular flow, without unpleasant currents. Its ascending power must be made use to draw it off. It is not necessary, nor always best, to give outlets for air at the top of the room, as then it would be comfortably warmed with much more difficulty. A flue, formed of brick or metal, by the side of the kitchen smoke-flue, would always have an upward current of air, which would abundantly ventilate most kitchens, if an opening to it were made just higher than the doors. A similar air pipe on the other side of the flue might also draw off the foul air from the bottom of the cellar, though less rapidly. The cellar, indeed, might be well ventilated by a pipe from near the bottom, through which the kitchen fire should receive all its supply. What special arrangements may best be made to render the necessary fires in a house conducive to ventilation it is not appropriate here to consider. They are such as will make use of vitiated air drawn from just the proper point for feeding the fire, instead of taking the purest in the room, as at present is often the case, and will also make all the surplus heat of the smoke available in the formation of currents in contiguous pipes for the same purpose. Upon the same principle are the effects of the sun upon the roof and walls of a house to be rendered useful. The steep sides of the roof, receiving the sun's rays in the afternoon, absorb and radiate an amount of caloric that, if not properly disposed of, will in summer time render upper rooms intolerable. But, with proper arrangements, the air so heated may be allowed to ascend between the roof and the ceilings to the highest point, and there escape, drawing with it, to occupy the place it vacates, the heated air from any of the rooms below with which there may be communication. In this way the chambers under steep roofs are made more cool and pleasant than those next to flat or low roofs, though more exposed to the sun and less tolerable if not properly guarded.

---

* In southern houses it is almost always preferred to place the kitchen and servants' rooms in a separate building, connected with the house by a short, covered passage-way, which may be inclosed or opened at pleasure. In this plan, the experiment of a basement kitchen was tried. It occupied the corner under the dining-room, access to it being had by the stairs in the rear verandah. An outside door also opened to an area under the nursery wing. A dumb waiter, which rose in the dining-room closet, also opened below to the same area, so that there was no direct connection between the kitchen and any other part of the house. For additional ventilation, there was a large opening in the kitchen ceiling, from which a wooden conductor led up between the chimney and dining closet, and entered a flue in the chimney near the roof.

But all of these means of construction are unavailable without one other, and with that any of them may be used as desirable. In building, as much as in almost any other enterprise, there is profit in the possession of ready money and plenty of it. Little, miserly savings, which do not, altogether, make a perceptible reduction in the first cost, are the very things that take away most from the real value of a house. Afterwards, you will wish you had obtained this true value, even at many times the original expense.

One of the greatest and most frequent mistakes in building is, attempting to accomplish too much with the funds provided. It will not do to fix on the size and quality of your house, and also to limit your expenditures, with ordinary judgment of the cost of building. Nor, if a friend capable of advising you in the matter, tells you the money is too little for the house, or the house too large for the money, must you think he is trying to persuade you into extravagance. Probably the truth is just the reverse. If you cannot understand why a house no larger than the one you want should cost so much, do not, for that reason, disbelieve the fact, if those who assure you of it have better opportunities of knowing than yourself. It is better to be informed before the money is spent, than to find it out afterwards. Probably the reason is that you desire additions or alterations, which seem to be insignificant, but which materially change the plan from that which you have adopted as a standard of cost. If your purse is limited, you must restrain your ambition. It is not wise to attempt to get more for your money than it is worth, in ordinary circumstances. If you try to drive hard bargains, ten to one you will be the one cheated, and the occupants of your house will suffer for it as long as it stands, even if in the end it does not cost you more money than it would if fairly built at a fair price. Build well, doing what is done so that it will last, curtailing the dimensions of the house, if necessary, to fit it to the money to be spent, trusting to the future for enlargement, rather than spread a little money over a great extent—none of which will ever be worth the trouble it has cost.

Much additional value may be given to any structure in the country, by a prudent foresight in the selection, preparation, and preservation of materials, previous to the commencement of the actual work. In clearing ground of stones, there may be encountered many better suited for peculiar uses in foundations, if saved, than any which could be found if specially sought. There are few who appreciate another means which their own lands afford of enriching and beautifying their edifices, without expenditure of money, in a way which money alone cannot imitate. There is hardly a wood that grows that cannot be used advantageously and ornamentally in its own native color in house building. The variety of these is very great. On many single farms there may be found from twenty-five to thirty-five different kinds of wood, all suitable for parts of the interior finish. The balusters of stair-railings, for instance, might be not only more striking and more appropriate, but more beautiful than any imported wood, if they were made of different native woods in their own natural grain, and arranged with reference to the contrast of colors. A log saved from a

fruit or shade tree, when one is sacrificed for any reason, will occasion but little trouble to lay up, but could hardly be procured on demand.

As soon as the plan of the house is so far decided on as to warrant their purchase, the lumber and timber for its construction should be seasoning. Too much haste in erecting the house will inevitably show its effects in cracks and twists and gaping joints when too late to provide an entire remedy.

In arranging and combining the means at command, so as to meet as fully as possible the wants of the family, without waste of material in the first instance, or causing an unnecessary expenditure of time and labor in the future, there is much occasion for both study and experience. As each man commonly builds but one house, and has no opportunity to correct his errors, he is liable to encounter difficulties, or fall into mistakes, that have troubled hundreds before him, who have, too late, learned how to avoid them. The number and uses of the apartments being determined, they are to be combined and arranged with reference to convenience of communication between them, their exposure and prospects, and the exterior shape of the edifice, involving the form of the roof, spacing of windows, &c. It will be seen that there are many diverse and sometimes conflicting purposes, all to be kept in view, and difficulties to be reconciled, that may well perplex one unaccustomed to the work. It is impossible to lay down rules for designing a house, but some points to be regarded, in judging of plans, may be designated.

The rooms should be compared with others, of nearly the same size, devoted to similar purposes, and furnished in nearly the same manner. Every one understands that unfurnished rooms seem to be of very different dimensions from the same apartments when occupied; and the room which, as a bed-room, may seem large, will look very small as a parlor.

The size and shape of many rooms must be regulated by the furniture that they are to contain. The bed-room *must* have space for the bedstead to be placed without interfering with doors, or it is valueless. The eating-room must, at least, have width enough for the table, with its chairs, and passage-way on either side. If a piano is to be accommodated in the parlor, the requisite space must be provided for it, without crowding it upon the hearth, or closing up an important door, or a window.

The height of stories has an important influence in determining the apparent size of the apartments. The old houses were uncomfortably low. Following the fashion set in cities, there is a tendency to the other extreme, and rooms are often rendered cheerless by an unreasonable height. Besides the useless cost involved, and the unfavorable effect on the appearance of the house, it causes great inconvenience at stairways. The stairs are tedious to ascend, and occupy so much room in each story as to interfere with doors and passages. For any house in which the largest rooms are not more than sixteen feet wide, a greater height of story than eleven feet is seldom, if ever, advisable, while smaller houses, and upper stories, may range from eight or nine feet upward, the former being as low as sleeping rooms ought to be made.

When men sit down to sketch an arrangement of rooms, &c., the staircase is almost always treated as a subordinate feature, which may be crowded into any corner, otherwise unoccupied; and too often the same feeling controls its actual construction. In a good staircase, the steps will be broad and not too high, and there will be room enough for the tallest person to pass without even a seeming danger of hitting.

The ease of stairs depends, not entirely upon the height of the step, but on the proportion which the rise bears to the breadth of the tread. The dimensions which, perhaps, are most suitable for country houses, are seven and a half inches rise, and ten inches width of tread. If the rise is increased, the breadth may be diminished, so as to keep the product of the two dimensions, when multiplied together, near seventy-five. These sizes must be often varied with the height and the room which may be occupied, but, in good stairways, the rise ought to be less than eight inches. It will be seen that the room occupied is more than is sometimes thought necessary. If the story is ten feet high, a straight staircase would cover a space of the lower floor more than thirteen feet long, and require a well-hole in the second nearly eleven feet long. To bring the head of the stairs near the center of the house, it is common to have a platform a few steps down from the top. In high stories, this allows more available room below, while it occupies more of the room of the second story than if there is but one ascent. To accomplish the same object, and to save room, winding stairs are used, but are always to be avoided, where possible, as each step is reckoned at twice the cost of a straight one, and is never pleasant, or safe, after it is up.

The stairs, forming the connection between the upper and lower parts of the dwelling, may contribute much to its cheerful and united appearance, by showing themselves to be easy, capacious, open and inviting. If in sight, they always form an agreeable feature, unless the story to which they lead is itself so uncomfortable that any suggestion of it is repulsive. For saving labor, and for the protection of carpets and furniture, a back flight, ascending near the kitchen, and shut off by a door at the bottom, is, however, required in most country houses.

The arrangement of doors is often such that, without some caution, two or more, in opening, interfere with each other. But care in regard to the hanging of them will prevent much of the annoyance. This is a matter generally left to the carpenter's journeyman, who hangs the doors with more reference to the right or left hand make of the latches he has, than to any other consideration.

Attention has so often been directed to the fact that the solid contents of a cube are greater than those of any other right-angled figure of equal surface, that most people, following Loudon, and those who have copied from him, seem to consider it an axiom, that any departure from a perfect parallelogram, in the form of a house, is at a sacrifice of economy. Some have carried their mathematics still further, and urged that everything should be formed in octagons. As appendages to single rooms, octagonal forms are sometimes both convenient and pleasing to the sight, especially when it is desirable to obtain light, or views in more than one direction, or to secure entrances

at corners of rooms; but for an area to be divided, there is no shape more inconvenient or wasteful than this. The rooms can have no regular form, without the sacrifice of many triangular spaces, alike useless, whether inclosed or not. There is little chance to place ordinary furniture, the connection of room is inconvenient, the house, externally, is as unsightly as it is possible to make it, while the greatly increased amount of partitions usually runs its cost up to or above that of a rectangular building of the same capacity. People who have occasion to pack square goods, do not choose casks for the purpose.

For the economy of building and economy of living, the general form of houses must be rectangular, but it need not be a square nor a regular parallelogram; because *a b c* is just as long as *a d c*, it takes no more wall for a square house than an irregular one of the same extreme dimensions, the floors and roof being all the additional expense. It is therefore said that the square one is the most valuable one for its cost. This is not true, if the room so taken in is not needed or cannot be used to advantage, or if the addition materially impairs the value of the original structure.

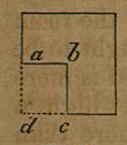

Fig. 6.

Irregularities are frequently desirable to afford light to special parts of the interior. The construction of the roof sometimes demands a change of form, and sometimes it is required for the improvement of the general proportion and outline of the building. In the little cottage represented in figures 7 and 8 the entry communicates, without waste of space, with each of the three rooms. If the corner in

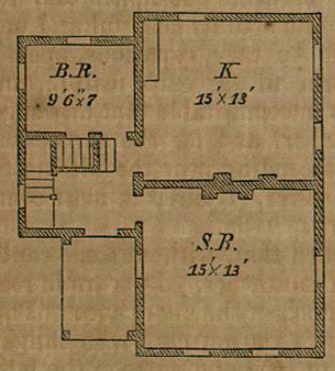

Fig. 7. First story.

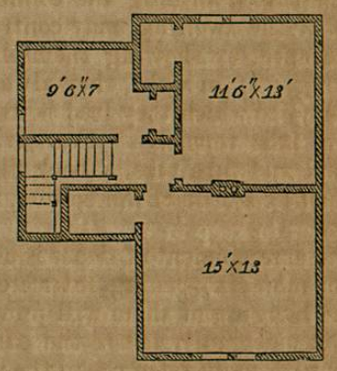

Fig. 8. Second story.

front of it were filled out, it would still be necessary to carry the hall back as far as it now extends, so that the room would only be useful for entrance purposes. The side window of the sitting room would be lost, and so would the advantage of the snug corner for the entrance and veranda. The roof would require an entire change, and the whole arrangement and appearance of the exterior would be different. Look at the perspective view, (figure 9,) fancy its modifications, and say whether it would be better to make them, at the additional cost of floors and roof, for the sake of the greater entry which would have been secured.