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Siphons.

At a recent meeting of the Polytechnic Association of the American Institute the president, Mr. T. D. Stetson, detailed some experiments which he had recently made.

The ordinary siphon, consisting of a simple bent tube, acts by the difference of length of the two columns of liquid. There is a tendency to form a vacuum at the top of the tube. The superior gravity of the longest raises the shorter column by the atmospheric pressure. The partial vacuum results in the liberation of the small quantity of air always contained in the water, and the formation of what is known as an air trap.

In attempting to avoid this difficulty by the use of a large vessel or air receiver some curious results were obtained.

The first object was to make a self-emptying air chamber. The plan adopted to accomplish this result was to carry both pipes into the air chamber, and take one to the very top, where it was turned over in such a way as to make a fall of water through the air space when the siphon was in operation. This plan would in all probability be successful in a perfectly constructed apparatus. In order, however, to observe the operation, Mr. Stetson had made the air chamber of glass, and he found himself unable to preserve a perfectly tight joint sufficiently long to determine the question definitely.

A siphon having a large chamber at the bend, into which one pipe enters at a much higher level than the other, he found developed, with just sufficient air inclosed, the very unexpected property of acting like a check valve. It opposes a greater resistance to the passage of water in one direction than in the other—the difference in resistance depending on the difference of area between the water surface in the chamber and that in the pipe entering at the highest level. In draining marshes on a large or small scale, in draining any area subject to tidal fluctuations or fluctuations from freshets, especially in connecting a cellar drain with the sewer where the sewer is liable to rise and make a back-flow under extraordinary circumstances, this offers a valuable means for opposing the return flow of the water. By properly propor-

tioning the chamber to the pipe, the excess of head necessary to force the water through the wrong way could be made almost anything we please.

Mr. Sutton said that siphons are very interesting pieces of apparatus and work very curiously. In the early days in California, where capital was abundant but the means limited, siphons were often used to drain mines in the gravel, especially when they came to the bed rock, and tunnels would be necessary to drain the water off in the ordinary way from a rock basin. In such cases the siphons were used to take the water over the "rim of the bed rock."

These siphons almost always stopped working after a little, from an accumulation of air in the bend. They always stopped, in fact, save when they were put in by experienced men. The speaker then detailed an instance where he put in a siphon going over a rim of rock some 150 feet in length. The outside end was of iron pipe, but the inside end was rubber hose. As the works were carried further in, some 250 feet of rubber hose was added; the head being very small, there was but slight tendency to collapse. At each end a stop valve was placed, and at the highest point there was an air chamber. This was formed of an empty whisky cask, which was a thing easily got and adapted to the purpose. The cask and siphon were filled through a tunnel at the top, the valve on the top of the cask was then closed and the others opened, and the siphon would commence to work. It was necessary to have two valves, one at each end of the pipe, because at that time they could not buy in San Francisco a pump capable of filling the pipe. At night the whole was shut off, and in the morning it was started long enough before work began to properly reduce the water level. The air chamber would fill with air in about two hours, but just before it was supposed to be filled the valves were shut and the barrel filled up again with water through the tunnel.

ATTRACTIVE SUBURBAN RESIDENCES.

Very much has been done by our architects and builders during recent years to develop artistic individuality and home-like attractiveness in the construction and surround-

ings of suburban residences of the more expensive sort. Yet it is still too much the fashion to carry into semi-rural neighborhoods, where ground space is reasonably cheap, the unbroken blocks of houses characteristic of the city, and made necessary there by the high cost of land.

The outskirts of our cities, where garden and lawn spaces are not luxuries beyond the means of the moderately well-to-do, show a serious lack of dwellings intermediate in character between the city block and the detached residence, though the need of such homes must be wide and urgent. When the average business man seeks a home at a distance from the center of traffic, he does not want to find it in a row of houses which might as well have been planned for and set up in the heart of the city. Though unable to own or hire a detached house, he is not unwilling to pay for a reasonable amount of land not built upon, provided it is properly used to enhance the beauty and healthfulness of his home. For such reasons we are inclined to think that there is a large opportunity for capitalists and speculative builders to make good investments in dwellings of the class described, in many suburban localities made accessible to the business men of New York and other cities, by the increasing means of rapid transit everywhere prevailing.

The accompanying illustration, showing the elevation and grounds of a section of three villas, from a block of nine residences in Hanover, Germany, gives a good idea of what the suburban homes we have in mind might look like.

The second engraving shows the plans of the main floors, and the artistic manner in which the grounds are laid out. With such changes of plan as would be required to adapt them to the needs of American households, such dwellings, we believe, would sell readily or rent to desirable tenants at rates that would make them as profitable to the builder or owner as delightful to the occupants. In size the houses are well suited for the majority of well-to-do American families, such for example as make up a large part of the population of Brooklyn; and their architectural beauty speaks for itself. The cost of the houses need not be great;

[Continued on page 402.]



SUGGESTIONS IN ARCHITECTURE.—GROUP OF ORNAMENTAL VILLAS AND GROUNDS.

ATTRACTIVE SUBURBAN RESIDENCES.

[Continued from first page.]

and the present price of building plots in good localities in Brooklyn is such as to justify the devotion of the space allowed for architectural effects and ornamental grounds. We call to mind the brow of the hill near Prospect Park, overlooking the Bay of New York, as a site particularly well adapted for this style of houses; and there is no end of equally suitable places in the upper part of New York and along the Hudson River.

All the buildings in the block from which our illustration was taken are in the same style of architecture, "Italian Renaissance," but no two are exactly alike. The designer, Professor H. Köhler, wisely abstaining from profuse or elaborate ornamentation, has secured a charming architectural effect by the elegant proportions and graceful arrangement of the parts of each and all the buildings.

The houses shown are of brick covered with cement, painted of old ivory color, the sills, lintels, cornices, columns, etc., being of freestone. The crests, capitals, rosettes, vases, balusters, medallions, and statuary are of terra-cotta, closely resembling the freestone in color. The chimneys are also of terra-cotta, with small caps, as heavy chimneys would have marred the architectural effect.

Our manufacturers of terra-cotta ornaments and architectural fittings are now supplying artistic wares in such abundance and at such prices that builders are able to produce almost any effect desired at comparatively small expense.

The cost of buildings like those we have chosen for illustration, might doubtless be diminished without injury to the architectural effect by substituting terra-cotta for the freestone trimmings, to a greater extent than are used in the Hanoverian structures above described.

We hope to learn that some capitalist or builder has taken a hint from our illustrations, re-engraved from our German contemporary the *Zeitschrift des Architekten und Ingenieur Vereins zu Hannover*, and have commenced a block of buildings after the plan shown in the perspective view, with a spacious ornamental court yard in front, after the manner illustrated.

The iron railing, the reader will observe, is a pattern so chaste and ornamental that it almost comes under the head of art work, and so in the details of the entire structure a degree of harmony is observable which does not characterize the works of some of our most distinguished architects, whose talents are employed on more pretentious and costly houses.

The Balloon House.

The name given to this mode of construction indicates its lightness and total want of any heavy element of solidity. Yet it undoubtedly possesses strength, and the facility with which it can be put together gives it a peculiar claim on the man who desires to save time, labor, and money, in the erection of a ready home which possesses the capability of being rendered comfortable.

Frame together at the angles a stout sill, say four by six inches, which has been bored on the under side with an auger at six places (at the four corners and midway of the length). Set this sill on six stout cedar posts, driven four feet into the ground.

Next, nail up, at each of the four corners, a pair of boards abutting each other; and, to strengthen these, temporarily nail on the inner angle of each pair of board blocks at a couple of feet apart. This done, and the height of the house being decided upon, baffle that height on the upper ends of these corner boards just erected. Set a piece of scantling, three inches thick by four inches wide, along from corner to corner of end, and nail the upright boards to it. Do the same at the other end. Now connect these two end pieces by similar pieces across the front and rear, halved down and spiked on the end pieces at their angle of meeting. Proceed to board up the four sides, nailing them securely at bottom and top. Measure off for the location of doors and windows, and nail up boards where their frames are to be secured. When the flooring of the joists is all in place, and the boarding of the walls all up, then fit in and nail the window and door frames in their places.

Meantime the roof may be constructed. Run the ceiling joists out two feet beyond the walls, nailing them on to the front and rear pieces, and spike the rafters to the sides of

them, at their ends; also spiking the rafters to one another at their tops. Or, better still, saw off and nail them to a ridge board set on edge from gable to gable. This plan will secure the perfect uniformity of the roof throughout. Also, instead of spiking the lower ends of the rafters to the projecting ceiling joists, nail flooring boarding across these joists, out to their ends, and saw off the ends of the rafters, so as to fit down on this boarding, and spike them firmly down through it into the ceiling joists. This plan will effectually inclose the eaves without any further trouble. In the other case, the eaves will require to be boarded up under the ceiling joists.

Saw off all the projecting ends of the upright boards of

in the nearest village, brought home, and put up, when bricks or bricklayers to build a flue may prove a serious, if not insurmountable, want. Where it becomes necessary to make a continuation, two of these drain pipes can be joined together by basswood splints secured with wire, and then coating this connection with mortar of wood ashes, clay, and sand.—*N. W. Lumberman.*

RECENT INVENTIONS.

An improved plow sulky has been patented by Mr. Henry Weber, Jr., of Grand Meadow, Minn. This sulky is provided with improved adjusting and controlling devices.

Messrs. John A. Moore and James W. Brown, of Woodville, Tenn., have patented a fire-escape which can be converted into a door shutter, window blind, or ladder at will; it consists of a hinged frame from which the lazy-tongs are suspended, and within which they may be closed up by suitable devices to form a blind or shutter, said fire-escape frame being hinged to a door or window frame so as to swing outward and inward, after the manner of an ordinary blind or shutter.

Mr. Millard F. Lemonnier, of Ida Grove, Iowa, has patented a sieve for thrashing machines so constructed as to cause the air blast from the fan blower to act more effectively to clean the grain than sieves constructed in the ordinary manner. It consists of a board three-fourths of an inch in thickness, having holes from three-eighths to four-eighths of an inch in diameter formed through it, and having inclined grooves formed in its lower side at the sides of the holes toward the fan blower, by which the air blast is guided into and deflected through the holes.

Alice B. Wood, of Beaver Dam, Wis., has patented a corn popper formed of two hemispheres of wire work or netting, which are hinged to each other and are provided with a device for locking them together. One of the hemispheres is attached to a rod passing longitudinally through a wooden cylindrical handle, and is provided with an arm at the end for turning the rod so as to revolve the ball containing the corn.

An improvement in shirts has been patented by Mr. Julius Herzog, of New York city. The invention consists in a chest-protecting shield combined with a dress shirt, as a permanent portion thereof, and in a manner not to interfere with the work of starching and ironing the shirt bosom, and also to allow of unequal shrinkage of the material.

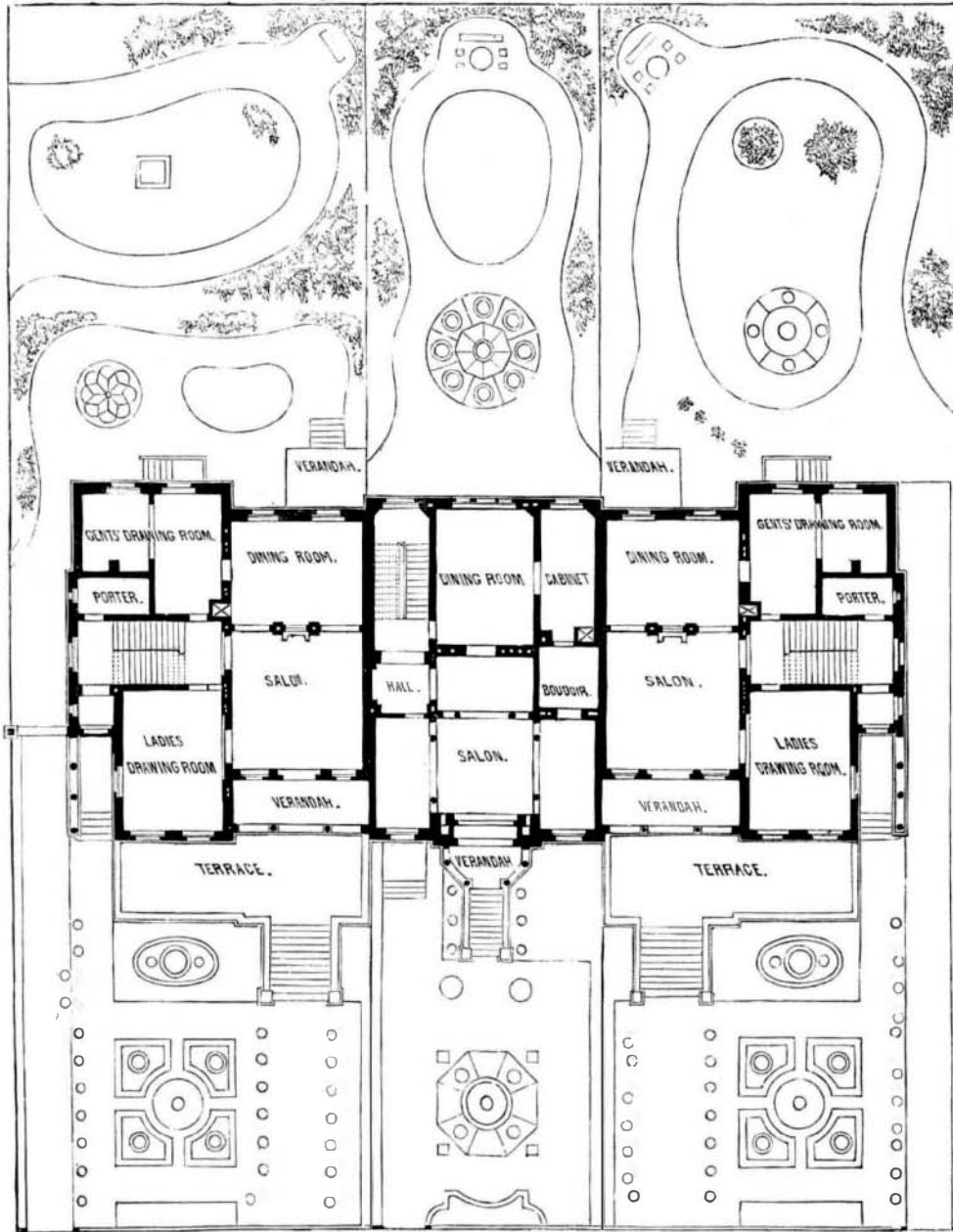
A portable wire stock fence, suitable for temporarily inclosing large tracts of land in grazing districts, where it is often necessary to remove cattle from one pasture to another, has been patented by Mr. Charles S. Giger, of Highland, Ill. The improvement consists in a removable fence support of novel and peculiar construction, adapted for holding the barbed wires of a stock fence in position.

The modern forms of school seats and seat backs are constructed of a series of slats tongued and grooved to match and glued together, and secured to cross pieces or hinge irons by means of screws or otherwise. This means of fastening the slats has proved unsatisfactory, chiefly on account of the shrinkage of the wood, which leaves widening gaps between the slats that cannot be conveniently closed. Mr. Asbury Moore, of Sidney, Ohio, has patented an improvement intended to remedy this defect. This inventor inserts a rigid iron rod through the slats at each end of the seat and back, and applies a screw nut to the ends of the rods, for drawing the slats closer together to compensate for shrinkage. The rods are likewise attached to iron ribs by means of iron ties of peculiar construction.

An improvement in metallic loops for holding a hame tug and trace together to prevent the buckle connecting the two from becoming disengaged, has been patented by Mr. Gerhard Freese, of Bloomington, Ill. It consists in a metal loop of quadrangular shape, slightly tapering or contracted at one end, and provided with lugs of peculiar arrangement on the inner sides for wedging and holding the tug.

Mr. Sylvester W. Sheldon, of New York city has patented a barrel cover, so constructed as to be conveniently handled and kept in place upon a barrel while having their upper and lower sides level, so that they can be packed in small space for storage and transportation.

Mr. Thomas F. Dunn, of Saccarappa, Me., has patented a machine for making cotton batting, so constructed as to receive the cotton from two or more carding machines, press it into batting, and roll it into a lap or roll, with paper or other suitable material interposed between the layers of batting.



PLAN OF VILLA AND GROUNDS.

the walls, level with the upper edge of the ceiling joists; and, where a joist comes, cut these boards accurately to fit against it. In order to make the construction perfectly weather-tight, close attention must be given to these matters, small in themselves, yet of infinite importance in making a house comfortable.

Board over the roof, and afterward saw out the hole for the chimney flue.

If stoves are used, it is not necessary to build a chimney. Construct a flue resting on the ceiling joists, or on a stout frame resting on the flooring joists below, and have one or two stovepipe holes with thimbles in. If two, or even three stovepipes enter it, the size of the flue may be sixteen by twelve inches. If but one is to be provided for, eight inches by twelve will be sufficient. The frame on which this flue stands may be five or six feet high, and be inclosed so as to form a closet or locker. Cover all the external joints of the boarding with slips two inches wide and an inch and a quarter thick, planing off their outer corners. Cover the inner joints with rough slips, and these will answer for furring whereon to nail the lathing for plastering.

These slips on both sides of the inch boarding tend to stiffen it very much. On the exterior they abut against a baseboard below, and a fascia board above.

The roof is usually shingled on rough boarding, and the exterior may be painted and sanded. The strips or battens, as well as the trimmings around doors and windows, may be of a darker tint, or even be a direct contrast.

In order to make these balloon houses warmer, they should be lined with thick brown paper on the inside of the boarding before the inside furring is nailed on.

A material called building paper is largely manufactured for this purpose, and may be had in any quantity in all the cities of the Union.

It may be advisable, in this as in other cheap modes of construction, instead of building chimney flues, to use terra cotta drain pipes for that purpose. These can often be had