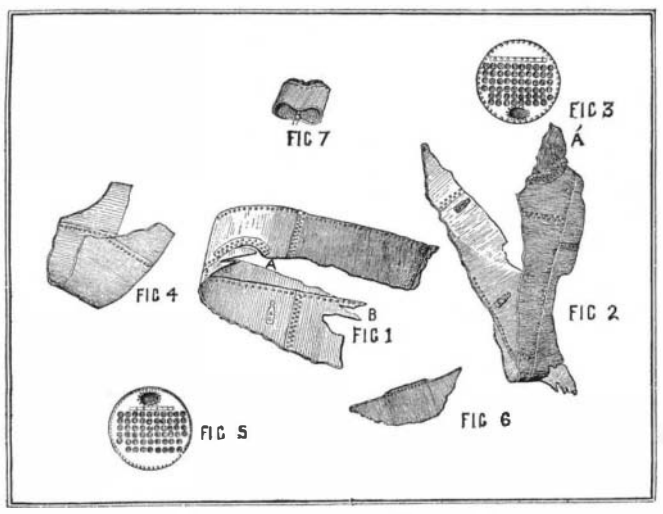
BOILER EXPLOSION AT FRANKLIN, IND.

To the Editor of the Scientific American:

Accompanying sketches show details of boiler which exploded at Franklin, Ind., on the morning of February 12. The boiler was used at a flour mill owned by Messrs. McDaniels & Wright; it had been put in new about a year ago; it was a horizontal tubular, 5 feet in diameter and 16 feet long, containing sixty-two 3½ inch tubes. It had a steam dome, about 40 inches in diameter and 24 inches high, riveted on at the second sheet (taking in part of the third sheet) with a double row of rivets. The boiler was set on a stand at the rear, the front resting on the cast iron front. The



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tubes are not shown, as they were scattered in all directions, and their being shown would not aid in a correct understanding of the accident.

The initial point of rupture was at the dome, shown at A' A', Figs. 1 and 2, passing round the line of rivets, and then through the sheet and through the rivet holes of the first ring of plates, Fig. 4; at the heads the dome was blown away nearly intact, as were both the heads, Figs. 3 and 5.

By cutting out (in paper) the pieces, Figs. 1 and 2, placing the latter against the former at A' and B, and twisting them into a cylinder, the shape of the boiler is obtained; by adding the portions shown in Figs. 4 and 6, the whole boiler is obtained, and it shows that the rent commenced at the dome, and tore apart like the paring of an apple. If this had occurred under a pressure of water, there would have been no further damage after the pressure was relieved; but in the case of steam contained in a boiler, with the usual amount of water, say at 80 pounds pressure, the conditions are altogether different. Water boils at 212° in an open vessel; the temperature of steam at 80 pounds pressure is 312°. Now suppose, as in this case, a rupture takes place, the whole volume of water remaining in the boiler endeavors to form into steam, because it seeks to get down from 312° to 212°; and in that effort the 100° makes steam. It is this sudden change in the normal conditions which causes the total destruction of the boiler, and of course when it starts the rupture follows the easiest direction, and a crack from the edge of a rivet hole into a sheet would start the crack through the sheet.

The plan view accompanying shows the position of the mill and the direction in which the portions were thrown; by comparison with the other sheet each portion can be identified.

A boiler of this size should have been set in the brickwork on rollers, the boiler being provided with brackets for the purpose, and very likely the additional strain caused by the mode of setting had a good deal to do with weakening the seams of the boiler. The iron was stamped Coaldale I. Co., Pena., C. H. No. 1. A. R. P.

A NUGGET of gold weighing 21 pounds (about $5,000) has been found at the Berlin diggings, Victoria, and brought into Dunolly by two miners. The gold field was celebrated for nuggets some years since, and the present find will no doubt lead to the discovery of others.

TARPON FISHING WITH ROD AND REEL.

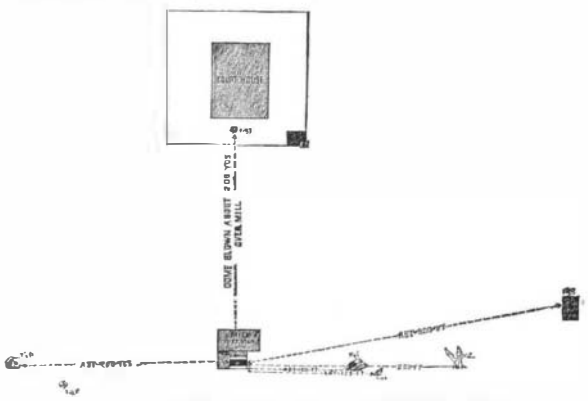
Mr. W. H. Wood, of this city, has demonstrated the fact that it is feasible to take and kill with ordinary rod and reel the mighty tarpon of Florida, by capturing one weighing 117 pounds, which we show in the accompanying sketch. For the past two years quite a discussion has taken place in some of the newspapers between anglers as to the possibility of taking the tarpon with ordinary tackle, which so interested Mr. Wood that, finding during the month of March last he had the leisure to spare, he ordered the following outfit made and started for Punta Rassa, Florida, where he made his headquarters. He had a reel made of rubber and white metal to hold 1,200 feet of twenty-one thread line, without gearing, had a square handle, and was 5⅛ inches in diameter and $2\frac{3}{16}$ inches wide in the clear. Two strong bamboo rods, each 5 feet long, and a gaff hook mounted on an ash hoe handle, also formed part of the equipment. The hooks used were large cod 0, baited with mullet tied on with fine copper wire.

Mr. Wood thus describes the capture of his first fish: "We caught sight of the back fin of a tarpon lying within two feet of the bushes, and as we were running slowly toward him I saw another some fifty feet out from the mangroves. I told my man to stop the skiff, and I then cast my bait (which consisted of the side of a mullet cut in the same manner as a menhaden bait is cut, and put on the hook in the same way and wired on) to within five or six feet of the mouth of the tarpon, which was lying still at the time. I cast out the bait near his head, and he whirled, making toward it, in taking which he was obliged to show his tail out of water, which was shoal, and as he was taking the bait I drew out from my reel through the tip some fifteen to twenty feet of extra line. After getting the bait he moved slowly away, taking the slack line, and just the instant the slack was all taken up, I drew and hooked him, when he came instantaneously entirely out of the water, trying to shake out the bait; then the trouble began.

We paddled after him, and he racing and leaping until he had made six leaps and had run say half a mile, when I found I was tiring him out, as he could not then leap entirely out of the water. After getting him pretty well tired out I suggested gaffing him, but my man thought he might knock the skiff to pieces, so we awaited the arrival of the sail boat, when I stepped out of the skiff into the boat, and reeled the fish toward me, and when he got within reach Mr. Smith gaffed him through the gills in a splendid manner, and almost with the same movement drew him into the sail boat. The feat was accomplished. A tarpon had been caught with a twenty-one thread line on a five foot bamboo rod and the large tarpon reel (owing to following him with the skiff), not having out at any time more than 250 feet of line. The time was 26½ minutes from the moment the fish made his first leap to the time we placed him back in the skiff a minute after he was drawn on board. The tarpon was 5 feet 9 inches long, and weighed 93 pounds."

The following is the score made by Mr. Wood during his trip:

No.	Length.	Weight.	Time catching.
1	5 ft. 9 in.	93 pounds.	26½ minutes.
2	5 " 7 "	81 "	21½ "
3	6 "	111 "	33 "
4	5 " 11 "	105 "	5 "
5	6 " 1 "	117 "	45 "



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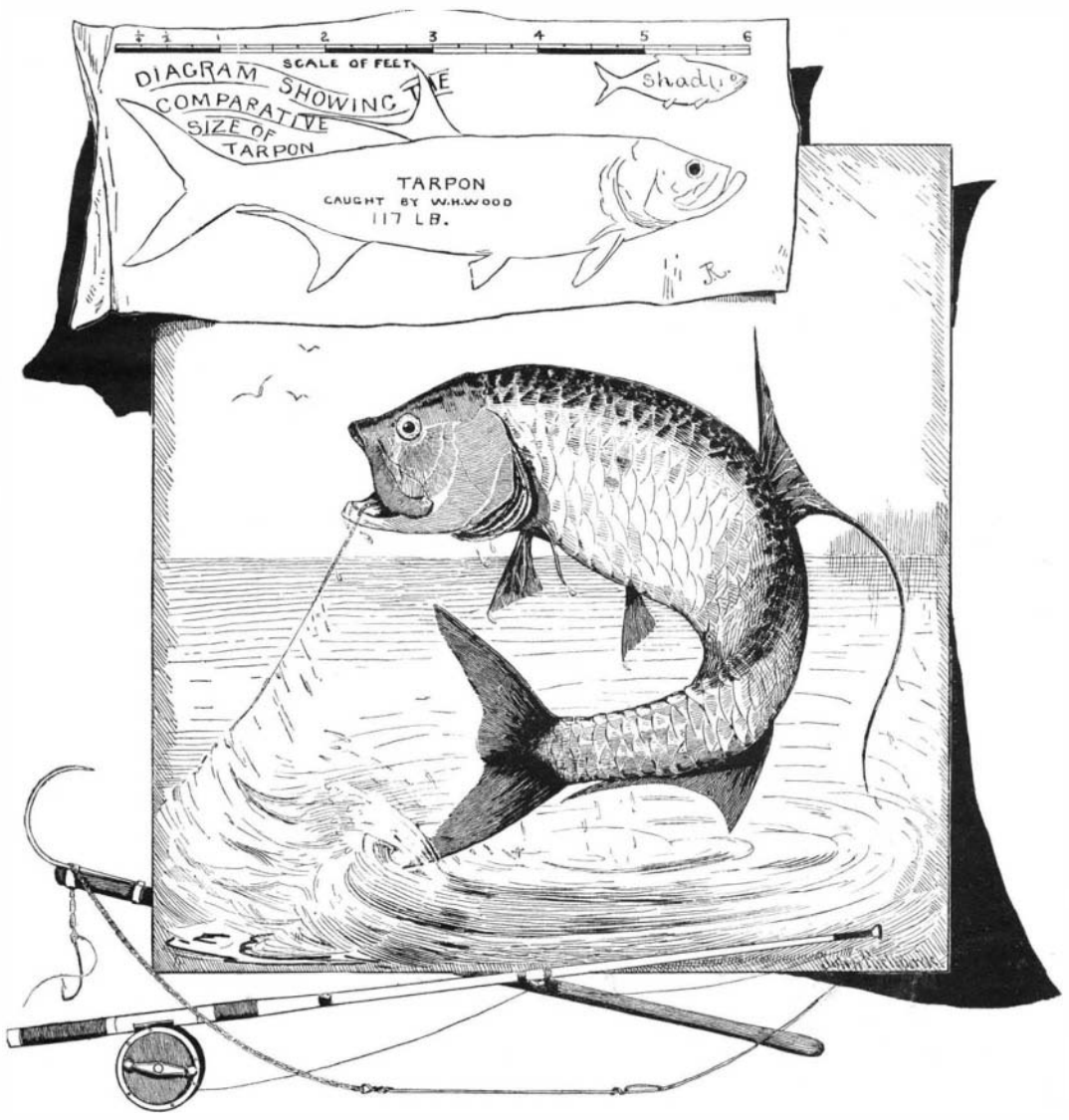
This would make an average weight of over one hundred and one pounds.

Mr. Wood describes the violent manner in which the tarpon shakes its head in leaping as something wonderful, and thinks that fish No. 4, which took but five minutes to land, broke its vertebra in one of its early aerial flights, as the fish was nearly if not quite dead when brought to gaff. The flesh of this fish is a delicate rosy tint, and is said to be quite savory.

Mr. Wood considers the tarpon the coming king of all game for sporting fishermen. His taking the still bait, his response to being hooked by immediately leaping out of the water, his swift running between leaps, his beautiful shape and superb metallic luster, added to his magnificent proportions, make him a delight to the sporting fisherman who captures him.



TARPON FISHING WITH ROD AND REEL.

Cost of Gas and Electricity in New York.

Stephen McCormick, Secretary of the Gas Commission, has reported to the city of New York regarding the relative cost of gas and electricity for lighting streets. The city has 647 electric lights, costing annually $165,308.50. These displaced 3,016 gas lamps, costing $52,780. The Common Council has requested that 2,093 additional electric lights be put in use, displacing 5,345 gas lamps. The cost of these electric lights will be $534,761.50 a year, while the gas lamps over the same area cost $93,537.50. Should the additional electric lights be authorized, there will be on Manhattan Island 2,740 electric lights, costing $700,070, and 13,685 gas lamps, costing $232,986.50. As the cost of lighting the Twenty-third and Twenty-fourth wards is $117,630, the entire cost of lighting the city would be $1,050,686.50. Mr. McCormick says that it would not be wise to remove the gas lamps in areas covered by electric lights, as there might be emergencies that would compel the city to use gas. He has not discovered any advantage that the electric light possesses except instantaneous lighting. The Gas Commission is now considering proposals from gas and electric light companies for lighting streets and public buildings for the ensuing year.

A Singular Tank Explosion.

A tank of half inch wrought iron, with cast iron heads an inch thick, used to heat water for a hundred horse power boiler in a Lynn shoe factory, recently exploded, blowing the top head through the roof of the one story boiler house, so that a piece fell through the roof of the factory, a four story building, 65 feet high. The tank was three feet in diameter and six feet long, and the piece of iron which came through the roof weighed twenty-six pounds, but no one was injured.

The Falls of Niagara.

BY RICHARD A. PROCTOR.

I write these lines in view of the Falls of Niagara. The very room in which I am writing, though the walls of the house to which it belongs are of more than the usual strength, vibrates like the cabin of an ocean steamer. The roar of the mighty Horseshoe Cataract, combined with the more distant but distinguishable tones of the American Cataract, fills the air with resounding evidence of the might of gravity. *That* is with me the special influence of this stupendous natural phenomenon. It seems to speak to me of the energy of that force which alone, of all the forces known to man, seems to be the constant, ever-present attribute of every particle of matter. When I first saw Niagara from a great distance, the idea of solemn calm, which Dickens found most impressive even when close to the great cataract, forced itself on me as the chief and overruling idea suggested by the contemplation of the imposing spectacle presented here. Even then, however, the sense of constant increasing energy associated itself with the sense of calm and almost of rest. If two ideas so incongruous as rest and work can ever fill the mind simultaneously, it is when, as at Niagara, we see a force at work unceasingly. Restfully, though unrestingly—restfully, because so easily and steadfastly—the great cataract does its work. The consciousness that for thousands of years the same processes have been at work, cutting their way through the strata of the raised land separating Erie from Ontario, the thought that for thousands of years the work will continue, till at last the waters of Erie will find vent in a tremendous cataclysm by which the whole face of the region between Erie and Ontario will be altered, is suggestive of power so immense that its exercise year by year, day by day, minute by minute, seems, when compared with its totality, like rest rather than like work.

But close by the ever-rushing masses of water, especially by the shores of the Upper or of the Lower Rapids, one cannot escape the sense of energetic action—at least, I cannot, for my own part. The feeling comes on me that *here* one sees gravity at its work. Here is the mighty terrestrial energy which yet is but a sample on an exceedingly small scale of the energy which operates throughout all space, on suns as on planets, on systems of suns as on solar systems, on systems of such galaxies, and on higher and higher orders of systems absolutely without end. We recognize terrestrial gravity at its work here, however, only because it has here work to do on such a scale as to afford some idea of the real meaning of gravity, and yet within such compass that we can grasp the sense of the work that gravity is doing. And it is because, vast though the work is in one sense, it is so exceedingly minute in another, that the scene presented by Niagara is so impressive when rightly understood. Here gravity works on just so much of the waters of the great lake system between British North America and the United States as corresponds with the rainfall on the area whose drainage reaches Lakes Superior, Michigan, Huron, and Erie. The supply is intermittent, the outflow almost uniform. Very slight is the difference which a wet or a dry season makes in the waters of Niagara. But to think that the rainfall of this area, a downfall which seems locally insignificant, is here concentrated into such mighty masses of water! and, still more, to think that the gently-acting forces by which the waters of the sea are raised into the air in the form of cloud, and falling thence as rain (in which a portion of their energy of position is parted with), are here represented by forces acting with such resistless energy, such constant noise and turmoil!

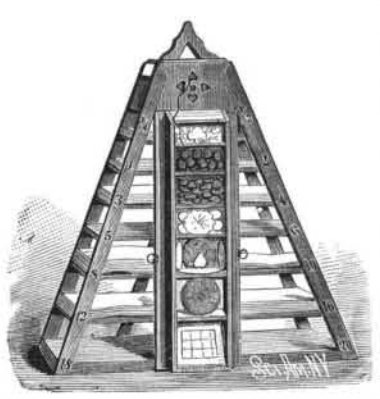
To the mere accident (in a sense) that the water raised from the seas has here fallen on upraised regions instead of on the lower levels, to the mere difference of height between the places on which they fall and the sea level from which the sun's heat raised them, we owe the tremendous forces represented by the Falls of Niagara and the Upper and Lower Rapids of this short but most active river. Nay, we may go further, and yet be far within the limits of Niagara's wonders. The clouds which float in the air over North America contain within them potential energies enormously exceeding all the forces at work here in Niagara, for they represent not alone the drainage of the Great Lake Valley, but of the whole area drained by the Missouri, the Mississippi, and the other mighty rivers of the continent. A small portion of these energies, finding its way along the Lake Valley to Niagara, is concentrated into the tremendous exhibition of force which is so impressive—nay, so appalling—to all who stay long enough near Niagara to apprehend rightly its significance.

Here, then, we have Niagara telling us of terrestrial gravity, not only by appealing to our senses of sight and sound in such sort as to overwhelm and confound us by its gathered energies, but also by appealing to our reason so as to assure us that "these are but a portion" of the great force of gravity; "they utter but a whisper of its might, the thunder of its power who can understand?" If, in drawing but a most minute fraction of the earth's rainfall through a few hundred feet (the Falls themselves are but 160 feet in height), the earth's gravity can present such impressive evidence of its might, what must we think of the whole energy even of terrestrial gravity? And terrestrial gravity is less than the three-hundredth part of Jupiter's gravity, less than three-hundred-thousandth part of the sun's gravity, while even the stupendous force of solar gravity is dwarfed almost into nothingness by comparison with the attractive might of Sirius, Vega, Altair, and others of that chief order of stars whose bluish-white light tells us of vastly superior mass, and, presumably, of relative youth, from what we know of the laws according to which greater and less masses have longer and shorter stages of cooling—that is, of life. Absolutely as nothing, in turn, is the energy of these compared with the inconceivable energy of the whole universe of suns.

We cannot follow step by step these tremendous progressions of force, or even take a single step along the road which leads to this infinity of might. We are appalled in contemplating them, even as one who stands on the verge of a tremendous abyss whose bottom is lost to his view feels giddy at the contemplation of depths into which he cannot advance even by a single step.—*Newcastle Weekly Chronicle.*

A NEW BAG RACK.

The engraving shows a rack adapted to hold a number of paper bags of different sizes, and also samples of groceries, a ball of twine, cards, etc. The form of the rack is clearly shown. It is made with one or two show-case attachments, and when two are used it is made to revolve. It has a receptacle for cord and two cases for cards, letters, etc. The show-cases are used to display samples of fancy crackers, dried fruits, and candies, and in addition to facilitating the sale of goods they save the merchant from the ravages of those friendly individuals who, at each visit to the store, help themselves to any uncovered eatables within reach. The pyramidal shape of the rack is completed by a perpetual calendar (not shown in the engraving) fastened on the lid of the twine box. The rack is neat and ornamental in appearance, compact, and its use presents all sizes of bags within easy reach of the clerk.



This invention has been patented by Mr. Robert E. Williams, corner of Commerce and Akard Streets, Dallas, Texas.

The Alcoholic Disease.

An examination of alcoholic intemperance in its origin can only terminate in one result—that is, in the conviction that it belongs, both physically and morally, to the class of fermentative or zymotic diseases. No mere deprivation of natural appetite will produce it; never does it exhibit itself till alcohol has been consumed; and what is especially to be remarked is, that alcohol acts in the prodution of the intemperate habit by poisoning the blood and arresting the healthy operation of the nervous system. It attacks the higher faculties; those qualities which give a moral tone, and lead man up to true happiness and a virtuous life. It dethrones reason, and retrogrades its victim to the level of the brute.

In this manner, and in no other, the craving for alcoholic drinks is produced—which is always a physical malady in its inception—until by continuous indulgence it takes a settled and chronic form, leading its victim through the stages of *mania a potu*, *dipsomania*, *epilepsy*, and numerous forms of mental and physical depravity.—*Quarterly Journal.*

How to Carry, Unaided, an Insensible Man.

The following method is adopted by and taught to the firemen of the London Fire Brigade:

A small platform, some forty or fifty feet high, has been erected on the roof of one of the buildings in the drill yard. One-half of the men who are drilling go up to this platform, and prostrate themselves in all kinds of peculiar attitudes, some on their backs, some on their faces, some on their sides, and some curled up. The other half have to go up and fetch them down single handed. The rescuing fireman first straightens out the seemingly lifeless body of his comrade, and rolls it over on to the face. Then, taking hold under each armpit, he raises the body on to his right knee, so that he can put his arm round the waist, and the arm of the insensible man round his own neck. Taking a firm hold, he suddenly straightens himself up, and walks away with his burden in an upright position, and the whole weight of the other's body supported and hooked, as it were, by the arm. He has then to carry his comrade through the window as best he can, and shoot him down the escape.

Ivy Lawns.

Our English agricultural contemporaries have had considerable to say lately on the above subject, but not until now have we seen any directions for preparing the soil for growing the ivy.

A writer in the *Farmers' Gazette* (Dublin) thinks it a wonder that ivy lawns have not hitherto been more generally adopted than they have, especially in soils where lawn grass refuses to grow, and in situations where it cannot properly be mown and kept neat and eye-sweet.

Instead, however, of pointing out the advantages of ivy lawns, or of sounding their well merited praises, I shall probably better fulfill the wishes and satisfy the longings of your interested readers by plainly, and as practically as possible, giving directions for making and maintaining them. A piece of ground to be seen from some desired spot is selected, which may either be level, sloping, convex, concave, or all combined, as nature has designed it. The ground is dug over to a depth of 12 inches, and in digging it care should be taken to either remove or bury all turf, roots, and stones nearer the surface than about a foot. The earth is also to be thoroughly broken and pulverized, and the surface made whatever it is designed to be in regard to shape and form. When the ground is all properly prepared and ready for planting, the plants are brought forward, which consist of the young shoots or tendrils of the common ivy, Hedera helix, which are best procured from walls, where the tendrils can be easily removed by the hand without breaking them. Shoots of one or two years' growth are preferable to that of older lived, as they grow more certainly and quicker.

The common garden line is now stretched along the surface of the prepared ground a few inches in from the outer edge, and if the ground in the direction of the line is undulating, the line must be pegged down with hooked pegs or other means. A notch is now made along the line with the garden spade in the same manner as if for planting potatoes, except that for ivy planting the notch is not so deep, being only from 4 to 5 inches. If the soil is a light loam, or abounds with sand, nothing further is required beyond laying the ivy tendrils in the trench, and covering them to the desired depth; but if, as frequently happens, the soil is either clayey or inert, a little sand should be strewn along the trench before the plants are put in, and again, after being laid, an inch deep or so should be put above them.

The most important part of the work, and that which requires most care and attention, is that of laying the tendrils along the notch, so that the greater portion of the leaves be kept above ground. The length of the leaf stalk, it will be observed, is that by which the depth of the notch has to be regulated. If long, the trench will require to be deep, and if short it will require to be shallow; and, indeed, as is found in practice, some parts of the notch must be one depth and some parts another, so as to suit the description of plant that is to fill it. The tendrils or shoots of the ivy are, as it were, strewn along the trench, overlapping each other a few inches at their junction, and the leaves, as already described, carefully kept above the surface of the ground when filled in, raked, and smoothed over.

The second and succeeding rows are planted and proceeded with the same as the first, and are about nine inches apart from center to center.

During the first and second season after planting, which is best done in April or about the beginning of May, the ground requires to be kept clean of weeds, the same as in nursery culture, after which, by reason of the broad leaf, close and dense foliage, weeds or grass scarcely ever come up.

All that is further required beyond what has already been described is that of annually clipping or mowing off the whole leaves nearly close to the surface of the ground. This should be done in May, as early in the month as convenient, which has the two-fold advantage of clearing off all the damaged and weather-beaten leaves, which the winter's severity commonly inflicts, and of allowing a fresh and new crop to come up and cover the ground quickly, both to afford summer and winter beauty. If the old foliage is cleared off at the beginning of May, the ground will be all recovered with the new soft and shining verdure by the first or second week of June.

We have probably no other evergreen ornamental plant at once so beautiful and accommodating as the common ivy, not only for forming lawns and covering walls, but the applications that can be made of it are almost innumerable, of some of which it may scarcely be said whether they are most ornamental or useful.

The Liquid of Fromherz.

The author has compared two tartaro-cupric liquids, the one prepared with potassa and the other with soda. The first was made up with 41·67 copper sulphate, potassium bitartrate 20·89, and caustic potassa 10·44 gms., made up with water to 1,000 c.c. It is of a fine sky blue, and acts in the known manner upon glucose. The sodic liquid—prepared in the same proportions with pure soda in place of potassa—has no action upon glucose. It is of an intense blue, less azure than the potassic liquid.—*E. J. Maumene.*