## Correspondence.

### The Perfect Screw.

*To the Editor of the Scientific American:*

The writer of the article, "The Perfect Screw," in your issue of July 19th, evidently don't understand the subject referred to. The inventors of the system are Prof. Wm. A. Rogers and the undersigned, as will be seen by referring to our patent, issued July 1, 1884, No. 301,165.

We do not make any preliminary cuts to determine the errors of the leading screw. The errors are obtained by the aid of a microscope secured upon the tool carriage of the lathe, and a correctly graduated bar mounted in a convenient position upon the lathe bed, so that the movement of the carriage while being drawn along by the leading screw can be compared from point to point directly with the standard bar. The readings may be taken at any point desired, and thus the errors of the leading screw are readily obtained. When these errors are found and tabulated, then the operation of cutting is commenced. The error for the total length is taken out by an automatic movement which varies the speed of the leading screw as it is short or long. The intermediate errors are taken out by the aid of an independent movement of the tool carriage and an indicator.

We have invariably found all of the screws short of the standard length.

In regard to the grinding operation, the article in question might mislead. The grinding is not necessary, except where the greatest accuracy is required, and on very small micrometer screws, such as those used in astronomical works, etc., where a very smooth movement is requisite. The operation of grinding simply removes any little roughness left by the cutting tool. It is impossible to grind out an error which takes in several threads. Our process deals directly with single threads, and these must be cut.

Below is a list of errors from an average screw, three feet long. The readings were taken at every $\frac{2}{5}$ of an inch. One division $=\frac{1}{5000}$ of an inch:

| | | | |
|---|---|---|---|
| 0 | —18 | —41 | —105 |
| 0 | —20 | —46 | —109 |
| — 9 | —13 | —47 | —107 |
| — 1 | —17 | —50 | —112 |
| — 3 | — 8 | —57 | —112 |
| — 6 | —10 | —55 | —114 |
| — 4 | —16 | —58 | —117 |
| — 5 | —14 | —61 | —118 |
| — 1 | —21 | —64 | —122 |
| — 2 | —18 | —68 | —122 |
| — 7 | —22 | —69 | —124 |
| — 5 | —24 | —72 | —127 |
| —11 | —24 | —72 | —127 |
| — 9 | —26 | —72 | —127 |
| — 9 | —24 | —76 | —129 |
| —14 | —25 | —83 | —130 |
| —11 | —29 | —81 | —132 |
| —13 | —27 | —84 | —130 |
| —19 | —29 | —86 | —133 |
| —19 | —30 | —90 | — 135 |
| —18 | —34 | —99 | ——— |
| —17 | —37 | —94 | 5000 |
| —20 | —38 | —98 | |
| —22 | —38 | —102 | |

$=\frac{27}{1000}$ short in 3 feet.

Yours very truly,

GEO. F. BALLOU.

Hartford, Conn., July, 1884.

### Manufacture of Relievo Maps.

The following ingenious method of making relievo maps is by J. J. De Mendonca Cortez, of Lisbon:

In maps which are drawn to scale it is usual to indicate the variations in the contour of the land by a series of continuous curves or lines, each representing a rise of say one hundred feet. In constructing relievo maps according to this invention, as many proofs of the map of the district to be modeled in relief are struck off on metal or paper from the stone or engraved plate as there are hypsometrical or height-indicating curves drawn on the map for the district in question. These proofs or maps are then laid out upon and suitably attached to perfectly smooth and level plates of metal, card, or other suitable material. The thickness of these plates is proportionate to the equidistance of the hypsometrical curves, and care must be taken in laying down the proofs if on paper not to stretch or contract them. The several plates are then laid upon a suitable table and carefully cut out by means of a fine hand knife or saw or other suitable means, care being observed to follow exactly the lines of the hypsometrical curves, and a different height curve being cut around in each plate.

There will result from this operation a series of inner cuttings of different sizes and various contours, and also a series of corresponding outer or marginal cuttings. The inner cuttings are accurately laid the one upon the other in order of size, and fixed by means of glue, solder, or otherwise upon a perfectly level bed plate, by which means an exact and proportioned relievo is obtained of the map under treatment. It should be remarked that if paper proofs have been used it will be necessary, after adjusting but before fixing together the several cuttings or overlays, to detach the paper from the metal or other plates. To effect this detachment without injury to the plates, the latter may be washed in water, spirit, turpentine, or other suitable fluid. This model in relievo, or core, is then marked with several gauge points, by means of which the position of the map to be moulded in relief can be readily adjusted. The next step is to cover this core with a sheet of moistened paper of a thickness equal to that of the paper of the map to be moulded in relief, which thickness can be ascertained by a gauge indicating hundredths and thousandths.

Upon the core thus composed of the inner cuttings and covered with the moistened paper the outer or marginal cuttings are severally adjusted by means of the gauge points above referred to, and in such a way that the narrowest marginal cutting, or that plate which has the largest aperture, is applied next to the base plate; the next sized marginal cutting upon the narrowest; and so on up to the last marginal cutting, or that plate which has the smallest aperture corresponding in size and contour to the inner cutting indicating the highest level of the ground, and forming the top of the core. The cut-out plates being thus perfectly adjusted, two or more holes strictly vertical are made therein, outside the engraved district of the map, to facilitate adjustment; and the moistened paper is then withdrawn. By this means an exact model in relief, or core, and a complementary model in intaglio, or matrix, corresponding accurately thereto will be obtained, and will constitute a die suitable for moulding in relief a map on paper of the proper thickness.

The extent to which the paper of the map to be moulded in relief will bear stretching or distention having been well ascertained, the map is placed upon the core and its position adjusted by the gauge points above mentioned, and moistened as often as may be desired by any suitable means, such as a badger or camel hair brush. The marginal cuttings are then laid in succession over their corresponding sections in the core, and are accurately adjusted by means of the holes made in them, the paper of the map being drawn or pressed more or less as required to conform to the desired contour. The paper being again moistened, another marginal cutting is superposed on the preceding one, and so on to the last one; the strains or distortions of the paper being always gradually and proportionately corrected by the application of gentle pressure and moisture.

Finally, a perfectly level plate is laid upon the top, and the whole is subjected to pressure in a suitable press. The top plate and the marginal cuttings are then carefully removed one by one, beginning at the top, and the map moulded in steps in relievo is removed from the core, thoroughly dried, and then stiffened by strong shellac or other suitable varnish or medium. It is then mounted in a case in such a manner as will best protect it from injury. If a continuous or natural relievo map is desired, the plates must be cut with a bevel along the hypsometrical curves, and the marginal plates must be formed with overhanging bevels to correspond.

### Climbing Plants in Trees.

These give an appearance of robust luxuriance and unrestrained vigor, reminding the spectator of those tropical and semi-tropical climes where nature, under the influence of perpetual heat and moisture, runs riot, producing oftentimes vegetable giants. Some of the most astonishing of these are the climbing plants that ascend the tallest trees of the forest in search of light and space where they can develop their foliage and flowers, traveling from tree to tree, and some throwing out roots in the air that reach to earth, there taking fresh roothold, and extending still further in their stem growth. Our plants, checked in their growth by frost and cold through half the year, cannot vie with these tropical inhabitants of the jungle and the forest, and our nearest approach to them is to be found in the larger forms of ivy, in Ampelopsis hederacea, in Wistaria sinesis, the vine, clematises, and Periploca græca. But the largest and strongest of our climbers, the one that approaches the nearest to these, is Aristolochia sipho. Smaller creepers we have in abundance, but our purpose is with the most rampant ones, good for ascending our biggest trees. When once this becomes established, it will grow fast enough.

It is no use to merely dig a hole at the treeroot and stick the plant in, expecting it will do well; but a good sized hole must be got out near the stem. There are no fibrous roots in that part to draw the goodness out of the soil you give, unless the tree is young, and in that case you had better plant no creeper; or better, a hole may be made some distance off, training the main shoot underground when it has got as thick as the thumb, in the mean time allowing it to grow attached to a stake for support. If merely assisted in its upward climb with a tie here and there, this plant will quickly reach the summit of a tree 50 feet high; it will not then strangle a tree like ivy with its clustering, thick growth, but will creep outward, if the tree is a solitary one, to the extremities of the limbs, letting fall slender shoots and festoons of handsome, broad, heart-shaped foliage, and in warm summers an abundance of its curious pitcher-like brown flowers. Ampelopsis hederacea sorts make a good creeper, the growth being rapid, and its autumn tints most gorgeous. This is not a self-clinging plant, and must, therefore, have assistance at first, although later the interlacing stems clasp the stem and branches of a tree, and will merely require that its leading shoots be led upward and outward.

A. tricuspidata or Veitchii is a very handsome kind, but is less suited to climb a tree than to drape a low fence, the pediment of a statue, or a vase, or to be allowed to cover a low stump or pillar, and having, contrary to the other kinds of ampelopsis, a clinging habit, it gets on without much assistance. Periploca græca is a most hardy, quick growing, deciduous creeper, growing to great lengths in one season; the foliage is deep green in color and lanceolate in form. This is fit for any place where a creeper is desirable; the flowers are inconspicuous, and purplish in color. The clematis, vine, ivies, honeysuckles, and wistarias are too well known to need description, although it may not be amiss no note that Clematis flammula is one of the very fastest growers, and has deliciously scented white flowers, which appear in immense bunches on old plants.

C. vitalba should also not be omitted—indigenous to our country, and found in our southern hedgerows, smothering other plants out of existence. The trumpet honeysuckles, Bignonia radicans, and some such roses as Boursault, Prairie Rambler, Ayrshire, and Jasmine are all good in positions where there is much light, as the beauty of all these few last consists more in their flowers than in the foliage, so that as simple climbers rampant and full of leaf those mentioned at the beginning of this article are the best for the purpose.—*Gardeners' Chronicle.*

### American Engineering Models for a Japan University.

The Imperial University of Tokio, Japan, reorganized in 1860 as the successor of the old Imperial Observatory, founded in 1744, is evidently pushing forward in that full accord with the spirit of modern progress which the Japanese Government has shown in so many ways since the old exclusive barriers were broken down. A notable instance of this is found in a recent order for models, sent by the authorities of the Tokio University, to be built at the engineering school shop of Vanderbilt University at Nashville, Tenn. The order embraces the following:

A model of wrought iron highway truss bridge, 6 feet in length, to be built in brass; a small working compound steam engine, with expansion gear and reversible gear; a small working iron turbine waterwheel, with water governor and sluice gate; two differently constructed cast iron models of steam engine pistons with metallic packing rings; a working model of a steam engine's slide valve and expansion valve, with adjustments and appliances for indicating the relative positions of piston and valves at any part of the stroke; a working model of a surface condenser for a compound engine; a working model of an improved pendulum governor for steam engine, with adjustment for regulation of throttle valve.

The order for the truss bridge was accompanied by working drawings in blue print, but the other pieces are to be designed as well as constructed at the Vanderbilt University. The work will be commenced at the school shops with the opening of the fall session, and will afford the best of practice for the engineering students, of whom the class is so large that it is proposed to make duplicates of the articles ordered, that one set may be kept.

Instruction at the Tokio University is in Japanese, except in the Schools of Law, Chemistry, Engineering, Polytechnics, and Mining, in which the instruction is in English. The School of Engineering is under the charge of Prof. J. A. L. Waddell, an American engineer.

### Cement Pipes for Sewers.

Mr. C. E. Chandler, writing to *Engineering News*, says: A very large proportion of the pipe used for sewers and drains in Norwich during the past ten years has been cement pipe.

I have yet to receive positive evidence that any of it, when properly or even fairly laid, has failed either on account of weakness or inability to withstand the chemicals of the sewage.

The mortar used in making pipe here has been composed of 2 parts of either Newark and Rosendale, or Hoffman's, or Norton's Rosendale cement and 3 parts clean sand. The latter preferably of various degrees of fineness, from the very finest to the size of one's finger end, in such proportions that the finer fills all the chinks in the latter, as the cement finally coats each particle and fills all remaining spaces.

It has been the experience of the maker that a larger proportion of cement inclines the pipe to season crack, and that a smaller proportion makes weaker pipes, with more difficulty in removing the moulds.

It is important that the materials be thoroughly mixed dry, and that the mortar be well rammed in the moulds.

It is also important that the right amount of water be used. Every particle of cement and sand should be wet, but the mortar should be stiff enough so that the rammer should bring up solidly on it and press it firmly together instead of displacing it horizontally.

The cores are usually drawn almost immediately after the pipe is finished, and in good weather the cases removed in about half an hour. The pipe is kept under cover about two weeks, and then preferably put out into the sun and air and well wet every day. This wetting is particularly important.

A curious fact is that an old pipe will absorb less water and is heavier than a new one. Will some reader explain it?

The pipes are considered ready for ordinary use six weeks after they are put out.

They are sometimes used much greener, and may be so used safely if carefully handled and properly laid. When necessary to use them very green, Portland and Rosendale cement is used; one part of the former to two of the latter. A large proportion of Portland makes the mortar set slowly at first, making it difficult to remove the moulds.