

As the plant is a biennial, harvested during the first year of its growth, it cannot be called ripe or mature at any time before maturation of seed, but the proper season for its extraction is indicated when the thermometer in the autumn months has, during several successive days, fallen as low as 45 or 50 degrees of Fahrenheit's thermometer, and when consequently the first frosts may be anticipated.

HARVESTING.—This is done with hand graips, or much better with a mold-board or gridiron plow, the coulter of which has been removed.

The plants are taken up, well shaken, and laid in rows, with the roots pointed all one way. The tops, or collars, are then cut off by means of a strong, heavy, sharp knife, which does the work by one stroke.

Care must be taken to "decapitate" the beet root fully, so as to prevent vegetation or sprouting of new leaf buds during the winter months, which would develop themselves at the expense of the sugar. The roots must be cleaned, but without excess, as a little dirt left on them will hurt them much less than rough handling and bruising.

The season for harvesting will vary from the beginning of September to the end of October, according to localities, seasons, and periods of sowing the seed. The later the harvest is gathered the more advantageous will it prove to be in the end to the manufacturer.

PRESERVATION.—The beginning of the beet root harvest and of sugar making for the campaign are simultaneous. The beets needed for immediate consumption, or for use within a few days after the gathering, are laid in the open air in layers, which must not exceed three feet in thickness, and must be frequently stirred if their sojourn is accidentally prolonged beyond this length of time.

The roots destined to be worked during the winter months must be preserved from frost, and are placed in long trenches dug in the ground near the factory buildings. These trenches are generally made about ten feet wide and seven and a half feet deep. Their bottoms have a gentle slope from each side toward the center, where longitudinal drains are dug out for the purpose of collecting any water which might percolate through the pile of beets. This water is carried off by a long, narrow ditch, dug at a lower level than the trench, and put into connection with it by means of drainage pipes.

The bottom of the trench is next covered with small poles or faggots, laid across so as to bridge the central drain, and the beet roots are carefully filled in, care being taken to leave air holes or chimneys (made by converging poles or boards) at distances of every twelve or fifteen feet. The beets are piled somewhat higher than the upper level of the trench.

As long as the weather remains fine, and no frost is apprehended, all that has to be done is to cover the upper surface of the beets with a few inches of straw, or dried leaves, in order to protect them from the action of the sun, which is apt to induce heating and consequent fermentation and putrefaction.

As soon as the cold weather sets in, a portion of the earth dug up in making the trenches is placed in a layer of from 1 to 2½ feet in thickness on the top of the covering of straw or dried leaves. This protection is only removed as the beets are needed for the supply of the works. One single thing has to be attended to during the winter, namely, to close the air holes or chimneys whenever the weather is frosty, and to open them on mild or rainy days.

PLACE IN ROTATION OF CROPS.—It is improvident, and bad farming to cultivate the beet root twice or more years in succession on the same piece of land.

In Europe it is brought once only in a triennial or quadrennial system, this last being preferable as requiring the labor of only one manuring during a period of four years.

Here are examples of rotations such as we can conscientiously recommend:

I.		
1st year.....	Beets, manured.	
2d ".....	Barley or oats.	
3d ".....	Clover or sainfoin.	
4th ".....	Wheat.	
5th ".....	Beets, manured.	
II.		
1st year.....	Beets, manured.	
2d ".....	Wheat.	
3d ".....	Clover.	
4th ".....	Rye or oats.	
5th ".....	Beets, manured.	
III.		
1st year.....	Potatoes, well manured.	
2d ".....	Beets, not manured.	
3d ".....	Wheat. [age crop.]	
4th ".....	Clover, hay, or some for- 5th ".....	Potatoes, manured.

MANURE AND FERTILIZERS.—In order to obtain a twenty-tun crop of beet root without impoverishing the soil on which it has been grown, we have to return to it the whole of the leaves which were cut off at the period of harvesting, and further, to add by means of farm-yard manure, and by other fertilizers, either natural or artificial, the following substances per acre in the quantities here given:

Nitrogen.....	747	pounds.
Sulphuric acid.....	45	"
Phosphoric acid.....	166.5	"
Lime.....	189	"
Potash.....	1,125	"

These figures, with a large allowance for waste and losses, will allow intelligent agriculturists to make their own calculations as regards the needed quantities of the manure they may choose to employ. Let us remark, in conclusion, that during the processes of making beet root sugar many very valuable refuse, or so-called waste substances are produced, all of which are of the highest value as fertilizers, and are

carefully collected as such. These are: The waste dust or refuse bone-black left after washing; the exhausted lime of defecation; the pressed scums; the worn-out woolen sacks from the pulp presses; the ashes from under the boilers; the small roots and rootlets from the root washer; and, finally, the dung of the animals fed upon the beet root pulp after the sugar has been manufactured therefrom.

Editorial Summary.

WE learn that a bill for the inspection of steam boilers has been introduced into the Pennsylvania Legislature. It provides that within thirty days the Governor shall appoint one suitable person, to serve for three years, in each Congressional district, as inspectors. They shall examine all except locomotive and low-pressure boilers, and shall keep a "lock-up" safety valve on each boiler. The owners shall have their boilers ready for inspection when notified, and shall pay four dollars for inspection, and shall attach a low-water indicator, connected with the steam whistle.

WORKMEN AND THEIR TOOLS.—A good test of a good workman—one of the best apart from his workmanship—is his care of tools. If he leaves a worn out or dilapidated tool in its imperfect state until he gets time to put it into shape, he lacks in the organ of order, which should be the shop's, as Pope says it is Heaven's first law. But if he repairs the tool soon as it is injured, whether wanted for use at the time or not, he can be depended upon. A carpenter may be known by his chips; but a workman at any business may be known by the state of his tools.

EFFECT OF TREES ON CLIMATE.—The dryness of the Egyptian climate is such that rain is unknown in Upper Egypt, and in olden time it never rained oftener than five or six days in a year on the Nile delta. The viceroy, Mehemed Ali, caused twenty millions of trees to be planted on this delta; these have now attained their full size, and the number of rainy days has increased to forty annually. Such is the power which man can exert over nature in the matter of varying meteorological conditions.

A "NEW England Mechanics' and Art Association" has been organized at Boston, of which ex-Governor Bullock, of Worcester, Mass., is President. The circular before us, which we are requested to notice, does not give any information respecting the purposes of the association, but we should judge, from the number and character of the gentlemen who are its sponsors, that a good deal may be expected from it.

MONUMENT TO HUMBOLDT.—It is proposed by a number of our citizens to commemorate the centennial birthday of Humboldt by the erection of a monument to his memory, in the Central Park, at a cost of \$2,500. Subscriptions are solicited in behalf of this commendable undertaking by a committee of well-known gentlemen, of which Christian E. Detmold, of this city, is the treasurer.

IMPROVED PRINTING MECHANISM.—One of Bullock's patent presses, at the Government printing office, Washington, attended by two persons, does the entire work which recently required for its execution no less than eighteen of the Adams presses, coupled with the labor of twenty persons. The steam power used to drive the Bullock press is not much greater than that needed for one of the old presses.

INK FROM ELDER.—In a receipt for making ink from elder, on page 180, an incongruity has crept in. The sentence reading "add to 12½ parts of the filtered juice one ounce of sulphate of iron," etc., should read, add to 12½ ounces of the filtered juice one ounce of sulphate of iron, etc.

A NEW chemical laboratory, just completed at the University of Leipsic, is the largest and most perfect, in regard to its internal arrangements, of any in Germany. The corner stone was laid in August, 1867, and the building was opened to students in last November.

THERE are only seventy-five miles of rail remaining to be laid on the Pacific Railroad, and it is expected that a locomotive will run through to San Francisco early in the summer. The highest point on the road is 7,500 feet above the sea.

WE are out of some of the back numbers of this volume. Subscribers who write for missing numbers will always be supplied when it is possible for us to do so. We make this statement to answer several applications.

WE are indebted to General H. A. Barnum, of Syracuse, N. Y., for a copy of Report of the Inspectors of State Prisons, for 1869, for which he will please accept our acknowledgments.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The new American Print Works, at Fall River, Mass., are nearly finished, and are filling with machinery. The Mechanics' Mills, in the same town, are receiving machinery, and will commence running in about three months. They will run 50,000 spindles, 1,200 looms, and will weave 13,000,000 yards of print cloths per annum.

A powerful steam saw mill on wheels is building at Worcester, Mass. It is to be moved about the country and used wherever wanted. The machine weighs twelve tons.

Almost one thousand passengers were delayed along the line of the Union Pacific Railroad by the recent snow blockade.

It has been estimated that at present rates of cutting, the pine timber of Michigan will be exhausted in 17 years.

The Georgia White Oak Lumber Company have now in operation a floating steam factory turning out 1,500 finished staves per day.

Part of a brewery at Morrisiana, N. Y., was crushed on Saturday by several thousand tons of rock and earth falling upon it from a hill in the rear.

The Turner's Falls (Mass.) Water Power Company have leased 200-horse power, with privilege of 400 more, to a gentleman of New York, who will employ it in making paper pulp from poplar wood.

Two millions of cattle are, upon the authority of Letheby, killed annually in South America for the fat skins and bones solely.

A green corn company is erecting at Farmington, Me., a factory 100 feet by 60 feet and three stories in height.

There are 107 cabinet manufacturing establishments in New York city, employing in the aggregate 3,000 men.

The Philadelphia Water Works supply water to 959 manufacturing establishments.

Kansas has already 600 miles of railroad in active operation.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at \$10 a line, under the head of "Business and Personal."

All reference to back numbers should be by volume and page.

C. L. H., of Ohio.—An aqueous solution of gum-arabic is the best varnish for leaves and flowers.

W. S. S., of N. Y.—Your communication upon rat-proof buildings fails to explain how they should be constructed. In its present shape we cannot regard it in any other light than as an advertisement of a patent.

E. J. F., of Me.—An application of glycerin to the tubs will not injure the taste of butter, and the article is harmless. You can get it at the druggists.

L. O. B., of Ind., wishes to know a practical method of scouring wool oil containing petroleum, out of cloth or yarn. He says the yarn when this oil has been used, turns yellow after standing awhile, and never comes out as white as when pure lard oil has been used, and when he attempted to scour with lye or country soap, he could not get good results. Can any of our correspondents give the desired information.

Wm. S. C., of—The usual estimate of a horse power, 33,000 lbs. raised one foot in one minute, is the work that average horses will perform steadily with suitable machinery. The best method of applying the power of a horse to propulsion of machinery is in our opinion, the endless chain horse power in common use if properly made and set with reference to the machinery to be driven.

J. Van O., of Pa.—We have practiced the following method for drying chlorine gas, with excellent results. Take of pumice stone a quantity of small fragments the size of a pea, soak them in strong sulphuric acid, then calcine them until acid fumes cease to be disengaged. These fragments are then re-saturated with sulphuric acid and inclosed in a tube through which the gas is passed in the ordinary manner of drying other gases. The sulphuric acid will seize the water contained in the gas the latter passing over in a dry state.

J. E. C., of Iowa.—When the same length of belt is to be used to give different speeds, the centers of the pulleys remaining equidistant, the diameter of the driver must be increased as that of the driven is diminished, or vice versa and the speed of the circumference of both the driver and driven pulley will increase exactly as the diameter of the driver is increased. The number of revolutions made by the driven pulley will be to the number of revolutions made by the driver, as the diameter of the driven pulley is to that of the driver. Thus if the diameter of the driver be 4 and that of the driven 2, and the number of revolutions of the driver be 60, the proportion will be, 2 : 4 :: 60 : 120 the number of revolutions made by the driven pulley.

F. P. H., of Mass.—We know of no "water-proof glue" for uniting wood. Many recipes are published which assume to be water-proof, but we do not believe in any of them, as glues are dissolved in water, and of course water will re-dissolve them. India rubber (virgin) dissolved 4 parts in 30 parts naphtha, or benzine, and 65 parts ground or powdered shellac melted in it make as near an approach to water-proof glue as anything we know. It will also unite metal and wood if the surfaces are clean. Molesworth, in his "Engineer's Pocket Book" gives the following: "For a glue to resist moisture, melt 1 lb. of glue in two quarts of skimmed milk. A strong glue, add powdered chalk to common glue. His marine glue is similar to that, the formula of which is given above. We cannot tell you where "machines for plaiting silk fishing lines" are to be obtained.

J. S. C., of Pa.—We do not consider the question of the precise instant when the gun receives the recoil of the explosion—whether at the time of ignition of the powder, or when the bullet leaves the barrel, thus creating a vacuum—of sufficient value to occupy a space in our columns.

H. A. S., of Me., says he saw in the SCIENTIFIC AMERICAN about two years ago a statement of the erection of a flour mill in New York, to hull the wheat before grinding. He asks "What became of it and why don't the owners advertise?"

S. W. H., and Bro., of Mo., say that they use an exhaust pipe of tin, four inches diameter, for leading their exhaust to a heater. It drops two feet from the engine cylinder, traverses ten feet horizontally, and then rises four feet to the heater. In starting the engine March 5th, the horizontal portion collapsed. "What" they ask "is the reason?" The only cause is the pressure of the atmosphere without, and a vacuum within the pipe. Probably an examination would show that the communication with the atmosphere was closed either by the action of the back pressure valve opening outward or by the water. Sheet tin is in any case a poor material for conducting steam.

W. S. T., of N. H.—Number of feet traversed by minute of your little engine is 562; pressure, about 4 lbs. on piston, result less than one-sixteenth of one horse power.

T. F. H., of Conn.—A good dark bronze dipis made by dissolving iron scales (scales from the forge) 1 lb., arsenic 1 oz., zinc 1 oz. in 1 lb. muriatic acid; the zinc to be added to the solution just before using. The metal to receive it should be cleaned by diluted acid.

L. V. G., of Ohio.—For an ordinary foot lathe for wood or light metal work, a wheel of iron from 30 to 36 inches diameter is sufficient for a driver, weighing 150 to 175 lbs. The live spindle should run in brass composition or Babbitt metal.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

BUOY FOR RAISING SUNKEN VESSELS.—Joseph C. Fuller, executor of the estate of Elisha Fitzgerald, deceased, has petitioned for the extension of the above patent. Day of hearing, May 31, 1869.

MACHINE FOR PEGGING BOOTS AND SHOES.—Alpheus C. Gallahue, of New York city, has petitioned for the extension of the above patent. Day of hearing, May 31, 1869.

MACHINE FOR MITERING PRINTERS' RULE.—William McDonald, of Morrisania, N. Y., has applied for an extension of the above patent. Day of hearing, June 14, 1869.

CARD EXHIBITOR.—Wright Duryea, of New York city, has applied for an extension of the above patent. Day of hearing May 31, 1869.