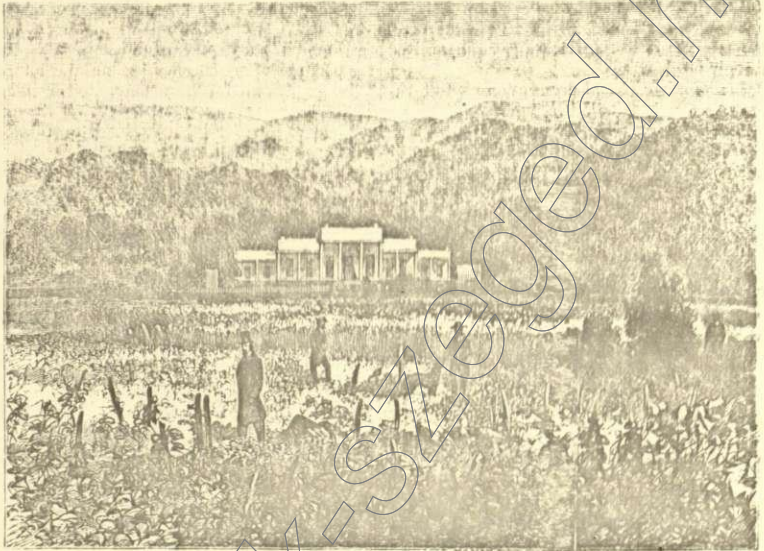


## WINE-MAKING IN CALIFORNIA.



BUENA VISTA RANCHE AND VINEYARD.

**I**f any reliance can be placed upon statistics, the production of Wine is the most important branch of agricultural industry on earth. At all events, there are only to be compared with it the culture of rice—which forms the staple food of nearly one-third of the human race—and that of wheat. Europe is the main seat of wine culture. According to official reports there are in Europe twelve and a quarter millions of acres devoted to the growth of the grape, producing a little more than three thousand millions of gallons a year, which, estimating the average value at place of production at twenty-five cents a gallon, is worth on the spot more than 775,000,000 of dollars. Making the most liberal estimate of the cotton crop of the world, in its palmy days, it will be hard to bring the value up to more than one-third of this sum. Moreover, as wine is to a considerable extent an article of commerce, fifty cents a gallon would not be a high estimate for its average value at the place of consumption. Thus the real value of the wine crop of Europe would be more than 1,500,000,000 of dollars a year. If these figures are exaggerated the fault is not ours. We find them in official reports, which ought to be reliable.

We are assured on as good authority as that of Mr. Haraszthy that California has five millions of acres suited to grape-culture; that in a considerable part the vine flourishes better than in the most favored regions of Europe; so that when, in a generation or so, this shall be planted with vines, the wine product of that State will be worth, on the spot, at only twenty-five cents a gallon, more than five hundred million dollars.

(The exact figures, as worked out by Mr. Haraszthy, are \$551,858,208 33.)

Making all due allowances for the enthusiasm of a sanguine vine-grower, and guided only by what has actually been demonstrated, we may be certain that the production of wine is to become a leading branch of the industry of the Golden State. We therefore present an account of the processes of grape-culture and wine-making as now conducted in California, at the largest establishment of the kind in the world.

The "Buena Vista Vinicultural Association" is an incorporated Company, composed chiefly of residents of San Francisco. The estate has the largest vineyard in the world, and upon it the business of wine-making has here reached a higher development—in so far as the application of machinery is concerned—than in any other vineyard in America. There are a greater variety of grape, a greater variety of production here, than in any other vineyard of the State, and its extent and production are rapidly increasing.

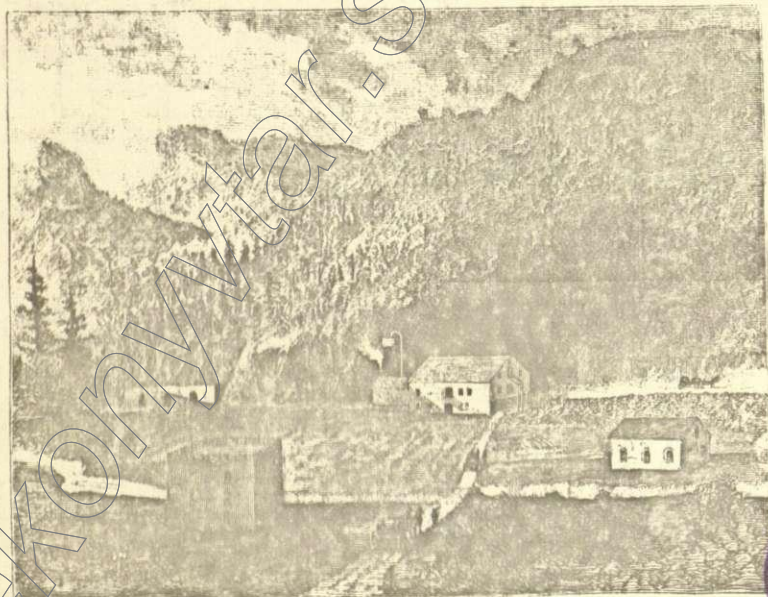
The estate of the Association, lying within thirty miles of San Francisco, contains 6000 acres in one body, bordering on the town of Sonoma, and running six miles eastward toward Napa City. About 4000 acres are valley land, the remainder well timbered and hilly. The property is bounded on the north by a fine creek, which runs during the whole year; also on the northeast of the boundary-line is a large creek, called the Caneros. Besides these several others cross the estate in all directions, one forming a cascade of from two to three hundred feet



fall, in groves of evergreen, pine, redwood, live-oak, madronia, wild chestnut, laurel, and mansanito; the laurel, madronia, and mansanito—all evergreens—are most beautiful in foliage and bark. On the estate there are over 50,000 cords of wood; and the mineral springs are celebrated for their healing qualities. There are four different springs—one yellow sulphur, one white sulphur, one magnesia and sulphur, and one yellow sulphur, magnesia, and iron. All the springs are 80° warm; three of them have bathing-houses built over them. There is also a large soda-water spring, which furnishes excellent strong and effervescing soda-water, which requires no artificial means except to cork well the bottle. The land is volcanic, and varies in quality throughout the domain. Some is dark-burned by volcanic fires—some is gray, yellow, darkish blue, and black. This variety renders the estate so eminently qualified for the production of the grape, for all foreign vines may be planted in the same soil that they had in their native place. The soil mostly contains magnesia; and to this may perhaps be attributed the fact that Buena Vista produces from its imported vines equal to celebrated European varieties, especially for the making of Champagne.

Of the 6000 acres about 400 are planted in vines; 260 of them with Mission, or native, vines—as those are called which were imported from Spain by the Catholic missionaries from 1715 to 1740; and 140 acres with vines imported from all parts of Europe. The vines are

planted eight feet apart, so that a two-horse plow can easily pass between them. Of the 290,000 vines, 1300 were planted in 1832, 6700 in 1854, 13,000 in 1857, 31,000 in 1858, 30,000 in 1859, 70,000 in 1860, and 135,000 in 1861. The vines thirty-one years old are healthy, and bear the most abundantly. They were planted by an Indian who endeavored to establish a home under the law of the Mexican republic, which offered grants of land to red men engaged in the cultivation of the soil. Salvador Vallejo became the next owner; then Benjamin Kelay, then Julius K. Ross, from whom Mr. A. Haraszthy purchased it in 1856. In the following years Mr. Haraszthy added various tracts of land to the estate. The titles of the estate went through the different forums of courts, were approved, and finally recognized by the United States Government. Up to the time of the purchase of Mr. Haraszthy there were but 7900 vines planted on the estate, and only on spots where they could be irrigated during the summer months. It was well known to Californians that vines were profitable, and never failed to bear, but it was universally believed that all vines required watering. There were but few spots where vines could be watered, therefore but few vineyards were planted in California, and in Sonoma but two: the above mentioned and that of General Vallejo—about 30 acres altogether. When Mr. Haraszthy became proprietor of the Buena Vista property he at once planted 13,000 vines on lands without irrigating them, but using the plow instead of water, contending that by stirring the



WORKS OF THE BUENA VISTA VINCULTURAL ASSOCIATION.





ground repeatedly during the summer months the moisture would be drawn from the atmosphere, and the plants would flourish in the loose soil. The old settlers of the valley felt sorry that the new proprietor should waste his money on so hopeless an enterprise. The vines, however, thrived, much to the amazement of the unbelievers, who then said that the vines might grow, but would not bear grapes without irrigation. They waited two years, when many of the more thrifty vines had grapes much finer and sweeter than those before raised on watered vines. This gave conclusive evidence of the practicability of raising vines without water. Then every body began to plant, seeing that Mr. Haraszthy annually increased by thousands his plantation on land which for grain culture was not worth a cent; and now the Valley, which in 1856 had but 30 acres of vines, has more than 2000 acres in thrifty vineyards. Land in the neighborhood of Buena Vista went up from \$6 to \$130 the acre.

This impulse was not only felt in Sonoma, but throughout the upper part of California. The State Agricultural Society watched the progress of the promising enterprise. As early as 1858 the Board of the Society requested Mr. Haraszthy to write an essay on wine-planting, wine-making, etc. With this request he complied by writing an essay which was received with great enthusiasm; extracts were published in most of the newspapers, and thousands were printed by the Legislature and distributed among the people. Many who never before knew anything of vine-raising or wine-making, by this work were made familiar with the business, and found that, after all, there was no mystery in it. The proof of this is the fact that, according to the State statistics taken in 1860, there were 1,540,134 vines, large and small; and of those the old Spanish settlement of Los Angeles had 726,000 vines, the remainder were scattered through the State in old Missions and Spanish ranches, where they were irrigated. In 1862 the standing Committee of the Legislature on Vines report 20,000,000 of vines planted throughout the State.

The success which attended this enterprise, and the untold wealth which it promised the State, soon manifested itself to every one; and to foster the rapidly growing enterprise the Legislature, in 1861, appointed a Commission to report on the Ways and Means best adapted to promote the improvement and growth of the grape in California. Mr. Haraszthy being appointed one of the commissioners, proceeded to Europe, where he traveled through the principal vine-growing States. Being in an official capacity, and supplied by Mr. Seward, Secretary of State, with a letter to the different Ministers and Consuls of the United States; he had access to all reports from Government committees on vine-raising and wine-making. Besides this, his position as commissioner procured him introductions to the most scientific men, who had spent their lives in practically cultivating and

making wine. These gentlemen freely gave him their mode and experience. All these, together with his personal experience, he has collected into a large and valuable book, which has received a wide circulation, not only in the United States but through Europe.\*

During his European tour Mr. Haraszthy collected 380 of the most distinguished varieties of vines in Europe; these are now planted on the Buena Vista estate, where they are flourishing beyond all belief. So that the Buena Vista estate may be said to possess all known valuable varieties of grape-vines in the civilized world.

In planting vines the soil is plowed, subsoiled, and well harrowed, then lined off every eight feet each way. A two-foot stake is stuck into the ground when this is done, and the lines are perfectly straight; holes are dug two feet in diameter and twenty inches deep, the surface soil being thrown on one side and the bottom soil on the other. Then to each row are two men; one with vines which he places in the holes, spreads their roots, while the other man, with his hoe, covers the roots with the surface ground, and fills up the hole with the bottom earth. When this is done he slightly presses down the soil around the vine with his feet. This is all that is necessary to plant the vine. In Buena Vista the planting is done in December, January, and February. Much caution is used in selecting the ground for the vines imported from Europe. The soil is first analyzed, and they are placed in such earth and locality as they had in their native country.

In the month of March the old as well as the young vines are plowed, with two-horse plows, first one way then the other. After this men with hoes follow, and hoe all around each vine; this is done after every plowing, and so the vines are cultivated four times each way. This lasts till July, after which time nothing more is done to the vine till the gathering of the fruit.

The old vines are pruned in the months of December and January. The best wood on the vine is selected, and cut down to spurs of three buds. The spurs are in accordance with the age and strength of the vine. These from six to ten years old are pruned to six, and even eight spurs, to bear from ten to fifteen pounds of good healthy grapes; older vines are pruned to more wood and bearing. The cutting is done with shears made for this purpose, and imported from France and Germany. They cut smoother and squarer than the knife. Young vines, one year old, are cut down to two buds; all sprouts from the side and root are carefully cut away. The two-year-old vines are pruned in the same manner, with this difference, that two spurs are left on the vine to form a sort of head. The three-year-old vines are cut to two buds but three spurs, and then they bear grapes. In the following years they are pruned according to their strength.

\* *Grape Culture, Vines, and Wine-Making; with Notes upon Agriculture and Horticulture.* By A. HARASZTHY. With numerous Illustrations. Harper & Brothers.



Gathering the grapes is generally done in October or November.\* Men with wooden boxes similar to a claret box, and holding about fifty pounds of grapes, will each take a row of vines. They cut the grape bunches with scissors made for this purpose, fill their boxes, and carry them to a wagon, which is provided for every five men. This wagon follows with empty boxes, which are taken off as the full ones are loaded on. Thirty-five boxes form a load, which is then taken to the Press-House. One man will gather in a good vineyard 2000 pounds per day.

The wagon with the grapes is driven to the platform of the Press-House, where there is a car on two massive cast-iron wheels. On this car the boxes and grapes are placed. When full the car is drawn up to the wine-press. This is done by a two-inch rope fastened to the upper end of the car, and also attached to an iron axle turned by a drum, which is propelled by a leather belt fixed on the engine below. When the car is loaded a bell gives the signal to the engineer. He starts the drum which pulls the rope, and thus the loaded car is raised to the third story, where there is a platform; and next the platform is the Grape-Crusher, consisting of two cylinders two and a half feet long and twelve inches thick. The cylinders are supplied with a hopper, like a grain-mill, to hold the grapes. These cylinders have a cog-wheel on one side and a fly-wheel on the other. The whole is moved by a wheel, on which the belt runs, driven by the engine.

The grapes are thrown from the platform into

the hopper, a box at a time, by a man standing on the car; another man is beside the crusher, and moves the bunches into the hopper; by this process one load, containing about 1750 pounds, is crushed in five or six minutes. As the grapes run through the cylinders they are thoroughly crushed, and fall down into a large wooden square box beneath the crusher. But the cylinders are so arranged that the seeds are never broken, for that would be injurious to the wine. The box has a double bottom; the top one is perforated with holes, which permits the grape juice to run through into the other bottom, from whence it is carried by a spout, and through an iron tube to the basement floor, where there are twelve large vats placed to receive the juices pressed out by the crusher. The tanks are placed in a row close to a large reservoir, which is sunk in the ground beneath the tanks. The reason for not at once letting the juices into the reservoir is that the *must* may first settle for five or six hours in the tanks. All the foreign substance and dust that may be on the grapes, and would be in the *must*, in the six hours will settle to the bottom of the tanks. From thence the *must* is drawn into the reservoir. This prevents the wine having a "ground taste."

The square box before mentioned stands over the press, and from this the press is filled with the crushed grapes. This press has an iron screw five inches in diameter and six feet long; its thread is very fine, so as to give the greatest possible power. This screw is in the centre of a

square box, measuring six feet each way, and

\* The vine is sometimes propagated from the seed; but this method is rarely used, as it takes from six to ten years to produce grapes, and the grapes are seldom of the same quality as the original. By this mode, however, many choice varieties have been produced. The usual method is by seedlings, in several ways. Sometimes by *Buds*, shown in Figure 1. Sound, strong buds are cut from vines early in spring, with half an inch of wood attached to them. These are planted in hot-beds and kept moderately moist. In a couple of months a bud will send out shoots two feet long.—Through *Cuttings*, as shown in Figure 2. Well-matured vines with many buds are chosen, from the lower part of the vine usually, with some of the last year's wood attached, as the best roots will start from this. European authorities say that if the cuttings are made in the spring it is best to place them in water six or eight inches deep, and plant them when the buds have started about half an inch. The cuttings will send up shoots and send down roots, as shown in Figure 3. Through *Side Shoots*, or *Layers*. For this method a well-matured branch of a healthy vine is taken, placed in the ground so that it will be from eight to twelve inches deep, and have two, three, or four buds above ground. In Europe there are many fancy modes of producing vines. Sometimes a little basket is placed in the ground, about a foot from an old vine; through this basket the layer is led, and allowed to have two buds above ground. At the proper time this layer is cut off from the mother plant, and, with the basket which contains it, is planted in the place intended for it. Rooted vines produced in this manner will bear fruit within one



Figure 1.

year from planting. Another method is to lead a vine through the bottom of a flower-pot filled with rich soil. In the autumn, when the grapes are ripe, the vine in the pot is cut from the mother plant, the pot carefully removed, and the shoot transplanted. To promote the formation of roots the vine is sometimes split up a couple of inches, and the split part put with a wedge. In a large establishment like that of the California Association, where immediate practical results are aimed at, the simple method of cuttings is chiefly employed. We trust, however, that the slow method of raising from seeds will not be neglected. One first-class new variety thus produced will amply repay the cost and trouble.



Figure 2.

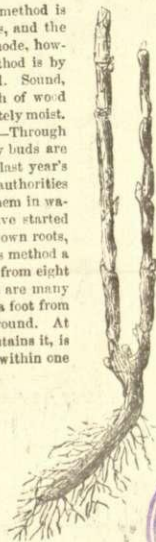


Figure 3.

One first-class new



four feet deep. The sides are slid in, and have a quarter of an inch space between, so that the juice—but not the seeds or stems—may escape. The press is worked by the steam-engine. The pressure, when full, is 282,000 pounds. The wood-work is made of heavy beams, and it required three thousand square feet of timber to complete it. Additional presses will be made in order to be able to work up in time the increased produce. The filling of the press is done in the following manner: Six inches of crushed grapes, then three-inch square pieces of

wood, then again six inches of crushed grapes, and then the pieces of wood till the press is full, when it contains about eight thousand pounds of crushed grapes.\*

When it is full the pressing commences; this requires an hour and ten minutes. When no more juice runs the stems, seeds, and skins are thrown into baskets and taken to the fermenting tanks, which stand in the basement, and will be described hereafter. When the tank is full and contains thirty-five thousand pounds, water is let into it from a tank standing on the

\* From Mr. Haraszthy's work on Grape-Culture we extract a few hints on various methods of training and pruning. The main object to be attained is to have the vine form a stout and healthy head; the more healthy the head, the more durable and fruitful the vine. To form this head the young shoot is cut off close to the old wood. Vines may be trained in three ways: First, *Free*; Second, on *Props*; Third, on *Trellises*. For wine-making the methods are the best which permit the grapes to grow as near the ground as possible; for the perfect ripening of the grapes



Figure 1.



Figure 2.

depends more on the heat radiated from the earth than upon that which comes directly from the sun. Figure 1 shows the form of *Head-Pruning*. All shoots with year-old wood are pruned off, and of the new ones four to ten are left, which are pruned so that each has one bud left. After the blooming the young shoots may be brought upward and tied together, the ends being cut off above the place where they are tied. The vine-head then presents the shape of a balloon, the grapes hanging in wreaths all around; in this position each cluster has the full benefit of air, light,

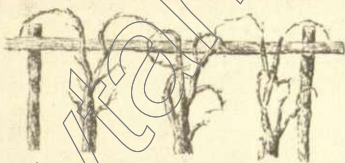


Figure 3.

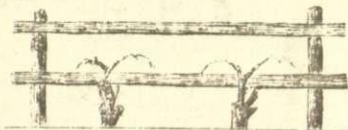


Figure 4.

and sun. *Bush-Pruning* differs from the foregoing only in leaving a few of the last year's shoots on the vine, which are pruned down to two or three buds. If there are ten or a dozen of these shoots left (as in Figure 2) they may be directed, some tied over the stem balloon-wise, and others supported by props. Various methods of training upon trellises are shown in Figures 3, 4, and 5. The height is the only essential point in which they differ; two and a half and six feet are the usual limits.

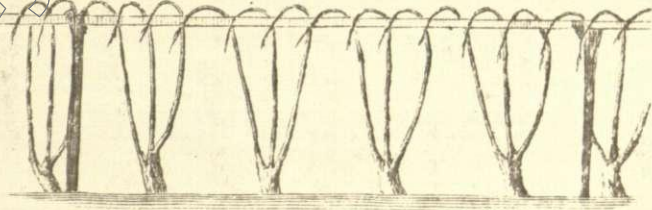


Figure 5.

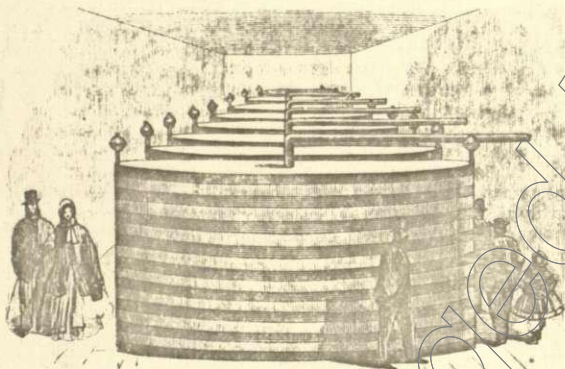


second floor, and filled by a large pump driven by steam. The water is obtained from the crystal stream running in front of the cellar. When within one foot of being full the man-hole is closed, leaving only a glass tube open for the gas to escape into a jar of water. This mass is suffered to ferment from five to ten days. When it has sufficiently fermented it is drawn off into the reservoir already mentioned, from which, by a steam-pump throwing one hundred gallons per minute, it is pumped into a reservoir standing outside of the building on the side-hill. From thence the wine is led to the different cellars and tanks. This wine is called "Picquet," and is used to make brandy.

The above is the process used to make first quality of white wine out of blue grapes, but when grapes are crushed for making red wine the press is not just then used. But the crushed grapes falling from the grape-crusher into the square wooden box placed under the crusher as described, are taken—stems, seeds, skins, and all—to the fermenting vats in the basement. Each of these holds 4000 gallons, and reaches to the second floor. In the head of each of these tanks is a square hole through which the grapes are thrown into the fermenting tanks below, and the product is red wine.

It has been said above that, for making white wine, the juice runs from the square box and press into tanks below, where it is left to settle for several hours. It is then drawn into a reservoir sunk into the ground, from which the steam-pump brings the wine into a tank standing on the side-hill, from which it is conveyed into the different cellars by 8-inch pipes into the 4000-gallon tanks. One of these tanks is filled within 18 inches of the top, as already mentioned in describing the process of making red wine. The fermentation will in three to five days be so violent that one can hear the fluid bubble and spatter like boiling water. It generally requires from eight to fifteen days for such a tank to become quiet. It then begins to clear and assume a wine color.

Nothing more is done to this tank till January, except to keep it constantly filled with similar wine. Then the tank is tapped at the bottom, and the wine drawn into the next standing tank in the following manner: A hose is attached to the faucet, and through it the wine runs into a reservoir, from which it is pumped by hand into the next tank, which has been made ready for it by clearing and sulphuring. The emptied tank is now cleared and sulphured



THE TANKS.

for the reception of the wine from the one next below it; and so on, one tank in each cellar always standing empty ready for the contents of its neighbor. By this means, no matter how many thousands of gallons of wine are to be drawn off, only one extra tank is needed. The white wine is drawn off three times during the first year, twice during the second, once during the third, and then it is left in the tanks until sent to market.

The process of making "Champagne" presents some peculiarities. In the beginning of February, when the white wine is first drawn from the tank, it is cleared with isinglass or some similar substance; tannin is added. A small tank, holding 3000 bottles, is then placed in the basement of the Press-House. This tank is filled from the white wine intended for Champagne. Then the required quantity of rock-candy is dissolved, thrown in, and well stirred. One man draws it into bottles which are corked by another, wired by a third, who has a machine to help tighten the wire; and then a fourth man hoists the bottles to the first floor, where they are piled up in racks. The piles are seven feet high, and eight feet long. The bottles are laid in tiers on small laths. There are six avenues between the piles, which resemble walls, made of bottles. Here the bottles lie for two or three months till the wine has fermented. When the fermentation is too vehement—that is, when more than eight per cent. of the bottles are found to be bursting they are removed to a cooler place in the cellar below. This checks the too rapid fermentation. When the wine has fully fermented, and is ready for clearing, the bottles are put on racks with the neck downward. Every day they are shaken by hand so that the sediment may settle in the neck and on the cork. This process lasts six weeks.

When the Champagne is perfectly clear in the bottle, and the sediment is all in the neck, the operation of disgorging commences. This is extremely difficult, and requires an experienced person. The "disgorger" takes the bottle in hand carefully so as not to disturb the sediment.





He twists off the wire, the cork flies out, and with it all the sediment which had collected. As soon as all this has been popped out, the operator places his thumb on the mouth of the bottle to prevent more wine or gas escaping, and hands the bottle to a man who stands ready to fill up the bottle with the required liquid, which is dissolved candy, fine old brandy, sherry, or Madeira, according to the taste of the customers at the place where the Champagne is to be sent. If it is to be sent to England it is not made so sweet, but "stronger." When filled, the bottle is recorked by a machine, only the finest corks being used. One man ties on the twine while the other fastens the wire. This done, it is given to the person who affixes the labels. Then it passes to the hands of others who wrap it up as carefully as though it were a new-born infant, and pack it in baskets for transportation.

Attached to the Press-House is a machine-shop, where the different apparatus are placed, viz., a steam-engine with double cylinders, a large steam-boiler, which has pipes leading to the distillery about 300 feet distant. A cast-iron pipe is also connected with the boiler, and the large steam-chest where the staves for the tanks are cured, also lumber for building purposes. This chest is 30 feet long, 4 feet wide,  $3\frac{1}{2}$  feet high. The green redwood staves are placed in it in such a manner that the steam may penetrate between the staves; when the chest is filled steam is let in continually for from sixteen to twenty hours. At first the water running out of the chest will be as black as ink, then gradually it becomes clearer, and clearer till it is white, when the staves are done. When taken out, they are dry, and have lost nearly one-half of their former weight. Not a particle of sap remains in them. They are now much easier for the coopers to work than unseasoned wood. All lumber used for doors, window sashes, etc., must be seasoned; without this steam-chest the Company would be at a loss to supply themselves with tanks for the annually increasing produce. It may be here mentioned that the vine-growers felt considerable uneasiness as to how, and from where, they should get oak-wood for making the required barrels, tanks, etc. They appointed committees to report whence and how to import staves. Dalmatia, through Venice, and Canada were recommended. But it was all too expensive, and would have made the cost for a gallon from twelve to thirteen cents. California oak is too porous, and will not do. These facts were a damper to the vine-growing interest till Mr. Haraszthy demonstrated the utility of redwood for tanks, etc. Having foreseen the difficulty about staves, in 1859 he had some small barrels made, applied steam to them by means of an India-rubber hose from a brandy distillery, for at that time there was on the estate no steam-boiler. He steamed a barrel for an hour, then had it washed with clear spring water, and filled with old wine, as new wine will acquire taste much readier than the old. An oak barrel was filled with the same wine at

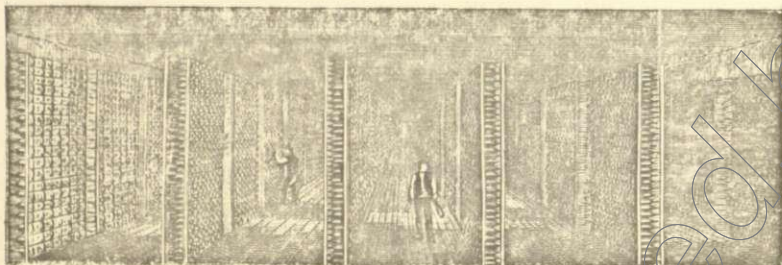
the same time, so as to ascertain whether the wine in the redwood barrel acquired any foreign taste. The wine was left in for years, but it gave not the slightest taste. Not satisfied with this one test, he increased the number of his tanks, etc., and conclusively proved that the experiment was perfect. This is a great saving, for the redwood abounds, is easily worked, and durable. There are posts planted in the ground that have been there for a hundred years, having been placed there by the old priests, and they are still perfectly sound. The cost per gallon of casks made of this wood is three cents.

Next to the steam-chest is placed a grain-mill, which grinds the barley or wheat for the horses of the estate. Much wheat is used for horse feed. This mill is also driven by steam. There are also several circular saws driven by steam: these are used by the carpenters for sawing lumber for building purposes, making boxes in which to ship the wine or grapes to market. In this building are placed different pumps; some from the reservoir to the tank on the side-hill, others to pump water to the different reservoirs, all worked by the steam-engine.

In the Distillery are three tanks made of redwood three-inch staves, each holding 2300 gallons of wine. Tank No. 1 is on the lowest floor; in it a copper steam-pipe is placed. This tank is filled from tank No. 2 by a valve, No. 2 is filled from No. 3, and No. 3 by a cast-iron pipe from the reservoir on the side-hill. When all three tanks are full steam is let into No. 1. In one hour it commences to boil. When boiling the alcoholic vapor rises, and passes into No. 2, in which is a copper warmer. The wine in No. 2, surrounding this warmer, is not only warmed by this but also precipitates the watery parts rising up from No. 2. The alcoholic vapor rises through No. 3, which has a similar warmer, which again warms the wine, and precipitates the watery vapor that rising from the first, passed through the second, and entered the third tank. Then the spirit rises and enters a globe which is surrounded with running water. From the globe the spirit descends into pan No. 1, and on these pans cold water is also running. All these pans and the globe are made of copper, and will separate such watery vapor as may have penetrated through the tanks Nos. 2 and 3, or through the globe, so that the pure wine spirit will run into the "worm," where it cools. This worm is 220 feet long, made of copper, and placed in a large tank filled with water. The spirit runs through this worm.

At the other end of the worm is a tube into which the spirit runs; this tube is furnished with an "Alcoholometer," which gives the exact strength of the brandy. The brandy comes out of this tube at a temperature of from  $94^{\circ}$  to  $70^{\circ}$ . When at  $70^{\circ}$  the wine in No. 1 is let out, filled from No. 2, which of course is now boiling hot, and begins to make the brandy run in ten minutes; No. 2 is filled from No. 3, which is lukewarm. By this much fuel is saved, also time, for this apparatus can make 1000 gallons of brandy in





THE CELLARS.

24 hours. There is nothing used but pure wine for making brandy or "Cognac." The newly-made Cognac is put into kegs of 25 gallons, and transferred to the rock cellar. Brandy made with steam is healthier than if made in copper stills; for a still heated by fire will burn the fluid more or less, or at least will give it a smoky taste.

There are at present six cellars excavated in the solid rock. Their dimensions are 12 feet high, 16 feet wide. The tanks stand in the middle, are 8 feet high, and 12 feet in diameter. The length of some of the cellars is 140 feet, and they are annually lengthened as the increasing crop requires. Their temperature is 60°, and seldom varies more than one or two degrees during the year. They are kept very clean, nothing being allowed in them which will decay; for wine, like milk, will quickly assume any foreign odor. Whenever a barrel is emptied it is immediately taken to the machine-shop, thoroughly steamed, washed, sulphured, and replaced in its former position. The cleanliness of the cellars and their utensils is considered so important that oil lamps are not used, for fear that the smoke may affect the wine. Therefore sperm candles light all the cellars.

When the wine is considered "ripe" enough for bottling, which varies from three to five years, according to the quality, light wine being sooner ripe—a preparation of isinglass is made. The very best isinglass is put overnight into a dish of pure wine to soak; next morning it is worked up to paste with the hand; more is added to form the thickness of cream. This done, it is taken to the barrel which is to be cleared; a tub is placed before the barrel; a siphon is placed in the bung hole; from six to ten gallons of wine are taken from the barrel and put into the tub; the isinglass is poured into the wine mass, beaten to a foam with sticks or a clean chain. This foamy substance is gradually poured back into the barrel, whose contents are thoroughly stirred up, so as to be mixed with it. The bung-hole is then closed, and remains so for twenty or thirty days, when the wine is drawn off into a clean barrel, and the same process renewed. Some wine requires to be cleared three times. Red wine is cleared in a similar manner, only that instead of isinglass

fresh eggs are used, as isinglass would injure the color of the red wine.

After the clearing process is satisfactorily accomplished the wine is drawn into bottles, which are cleanly washed in running water. The corking of the bottles is done by machinery. The best corks are used for the finer wines; for much good wine is lost in many establishments on account of bad corking. An experienced man is employed to inspect and select the corks to be used. From the corker the bottle is handed to the man who wraps on the lead, then to the labeler, then to the person putting on the paper wrapper, and finally to the packer, who places twelve bottles in straw in a box; then twelve boxes are placed in one large box, which, being bound with iron hoops, is ready to be shipped.

In the Vinegar Factory are six tanks, holding 1000 gallons each. The inside of one tank is filled with vine-cuttings loosely placed. The wine destined for vinegar is let into tank No. 1, where it stands twenty-four hours. It is then drawn into No. 2; and so on successively into the whole six, always remaining twenty-four hours in each tank. Generally in one month's time the vinegar is excellent. The temperature of the place is kept at eighty degrees by means of a stove.

Making raisins is done in a very simple manner. The grapes for raisins are picked in the heat of the day, when they are free from the morning dew, and carried to a drying establishment on the side-hill. The drying-pan is forty feet long, twelve feet wide, two feet deep, and is made as follows: The hill is very steep, about an angle of forty degrees; it is solid rock. The rock was excavated the above length and width to the depth of four and a half feet. In this excavation are four floors built even, running from the lower part of the hill upward the whole length. These floors are covered with sheet-iron. On the surface of this iron red gravelly clay is strown four inches thick. The grape-bunches are placed on the pan. During the day, when the sun is shining, no fire is used, but toward evening a fire is made beneath; and by this means the pan is warmed. There being four inches of clay on the sheet-iron plates, the heat is gradual, and keeps the soil warm during





the night. Every evening the pan is covered with boards, to prevent the dew falling on the grapes. It, requires from twelve to fourteen days before the raisins are ready to be packed. Three pounds of grapes will give two pounds of raisins. The grape-vines for raisins were imported from Malaga and Smyrna. As yet there are but few raisins made, as the vines are just beginning to bear. In a couple more years there will be from forty to fifty tons produced.

