

outside wires in the case of interior circuits and about one-third to one-half for exterior circuits. Some engineers prefer to make the capacity of the neutral equal to that of the outside wires in all cases. While this is

Electric Lamp Table.

Terminal Voltage.	Candle Power.	Watts per c.p.	Life (hours).	Name of Lamp.	Kind.	Current. Value.
47—50	700—850	1.4—1.6	8—10	Open arc .....	d.c.	6—10
30—35	.....	.....	6—8	Open arc .....	a.c.	10—15
70—80	400—800	2.0—2.5	100—120	Enclosed arc .....	d.c.	5.0—6.6
70—80	.....	.....	75—100	Enclosed arc .....	a.c.	5.5—8.0
45—60	1000—3000	.5—1.2	15—30	Flaming arc .....	d.c.	6.0—12
45—60	1000—2500	.....	15—30	Flaming arc .....	a.c.	8.0—12
.....	1000—3000	.....	60—70	Regenerative flame arc.....	....	....
75—80	1000—2000	1.2—1.4	150—175	Metallic flame arc.....	d.c.	4.0—5.0
2—250	2—250	2.5—4.0	500—1000	Carbon incandescent .....	a. or d.c.	.2—5.0
100—125	20—40	2.0—2.2	600—900	Tantalum incandescent .....	d.c.	....
2—110	1—400	1.2—1.3	800—1000	Tungsten incandescent .....	a. or d.c.	.3—8.0
25—250	25—1000	1.0—1.2	800—1500	Osram incandescent .....	a. or d.c.	1—1.2
100—240	20—50	2.0—2.5	400—800	Nernst incandescent .....	a. or d.c.	.2— .8
50—150	250—750	.5— .7	800—1500	Mercury-vapor .....	d.c.	3—3.5

## FOREST PLANTING IN KENTUCKY.\*

By J. B. Atkinson.

Timber is as necessary to all mining operations as is labor. Twenty years ago the St. Bernard Mining Co., of Earlington, Ky., began to plant trees on lands that had largely been turned out as no longer valuable for the growth of tobacco and corn.

My experience as a mining man indicated to me that the time would come when timber would be far more valuable and difficult to secure for mining operations. During these twenty years special attention has been given to finding the growth of the white oak; 45 white oaks of Hopkins County, grown on hills, in the valleys, and on the slopes between, were examined as to the ages when the trees reached 12 ins. diameter. The average age was found to be 101 years. The average age when cut was 231 years, with average diameter of 31 ins. The oldest tree when cut was 325 years old, with a diameter of 41 ins., and was 95 years growing to a diameter of 12 ins. The youngest was 142 years old when cut, with a diameter of 27 ins., and was 75 years growing to 12 ins.

From these facts collected I have made a table of the time it takes certain trees, in Kentucky, to grow to a diameter (at the stump) of 12 ins. This is not infallible, but is based on actual tree growth as observed in the forest, and has no reference to isolated growth, or to unusual conditions. The pine oak will grow to 12 ins. diameter in 40 years; black locust, 445; tulip, 50; black walnut, 56; Texas red oak, 58; sweet gum, 62; ash, 72; hickories, 90; white oak, 100 years.

The first tree planting was with the black walnut. The nut was planted in the autumn with the hull on, when the nuts became mature. The ground was prepared as for corn, and the nuts planted 4 ft. apart each way, or 2,770 to the acre, being covered with ½-in. to 1-in. of soil. The land was cultivated for three or four years the same as for corn, and then blue grass sown, the idea being that in 10 or 12 years the trees would be large enough to permit pasturage.

On the poorer of the thrown-out farm lands we plant black locust. This tree, belonging to the pulse family (the family of the clover and the peas), draws its nitrogen from the air and enriches the soils. We plant these trees 7 or 8 ft. apart each way, and cultivate as we do the walnuts.

We also plant the catalpa speciosa, a rapid-growing tree from the Wabash valley. I have found this tree growing from 21 to 24 ins. in diameter at the stump in 38 years. It is spaced 7 or 8 ft., and cultivated like the walnuts for three or four years. The tulip tree, commonly called the yellow poplar, is a most durable tree, and should be planted on good land, the trees 10 ft. apart each way, or 435 to the acre.

Up to the present time, the above-mentioned four varieties are the only ones planted by us for the growing of new forests. From the autumn of 1888 to the spring of 1909, inclusive, my company had planted 430,000 black walnuts on 162 acres; 160,000 catalpa speciosa on 230 acres; 200,000 black locust on 280 acres; 10,000 tulip on 20 acres, and 850,000 black walnuts in vacant places in the forest, largely in bottom lands, a total planting of 1,650,000 trees.

The forest planting of walnuts 20 years ago has been thinned out until the stand is much less than 1,000 to the acre; 29 trees, 25 to 35 ft. high, occupying 1,100 sq. ft., have now an average circumference of 17½ ins., or 5½ ins. diameter. The largest tree is 9.3 ins. diameter, the smallest is 3.4 ins. A young tulip forest, 11 years old from the seed, has produced trees 6 ins. in diameter.

When a natural forest is grazed, the cattle destroy much of the young growth, and my company is fencing its woodlands as rapidly as possible. The preserving of seed trees, together with fencing, will let nature do much to increase growth of present forests. Then reduce the cutting of timber to something below the annual growth, and a good beginning will have been made to restore Kentucky forests to their original glory. Besides this, there are tens of thousands of acres of cleared land in Kentucky that should be returned to the forest. Let the farmer select 10 to 20 acres of medium good land and plant it in walnuts and blue grass. A better or more profitable combination could not exist. On poor land plant the black locust, and presently be possessed of a perpetual woodlot. On meadow lands plant catalpa speciosa, and again have a perpetual and quick-growing forest.

Kentucky has too much land in so-called cultivation. Half the acres, well cultivated, would bring larger and better crops than are now secured. Hence the planted woodlots could be spared. The State has about half its area still covered with forest, and is in better condition to retain its present acreage and increase the annual growth than most of the States of our country. We are a patriotic people, but patriotism alone will not increase the production of our forests or add to its acreage. Legislation is required. If the Com-

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