COMBINATION CONE KILN AND EXTRACTOR

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Forest nurserymen throughout the United States are constantly fighting two basic problems in seed extraction: (1) rising costs of getting the seed out of the cones and (2) maintaining the viability of that seed at the highest level possible.

We at the Idaho Nursery[1] have developed a combination cone kiln and extractor that has contributed greatly to solving both problems.

Hundreds of different cone kilns and seed extractors are being used. The Idaho Nursery in the past has extracted seeds by using the conventional type kiln and extractors with numerous modifications in attempts to maintain high viability. Now we have consolidated two operations into one.

The combination cone kiln and extractor that we now have is shown by the diagram. The machine is adapted to small operations with a daily capacity of approximately 25 bushels of cones. However, as our nursery capacity increases, additional units can be added. Our unit cost a total of $1,800 to construct. This cost included charges for many changes and improvements that were found necessary for efficient operation. Now that we have a pattern, additional units could be constructed for about $1,000.

Adequate heat is supplied to the kiln by two 10-kw. electric heaters with fans. Moist air is removed by an adjustable exhaust vent. Cones are loaded into the kiln by raising the top door and putting the cones through a removable section of the revolving tumbler. The tumbler makes one complete revolution every 5 minutes. When extraction is completed, a lower door is removed, the removable section of the tumbler is rotated to a lower position and the cones fall on a loading chute or on the floor, depending on the type of installation used. The machine is covered with a inch of asbestos to reduce heat losses.

The main advantages of this type of kiln are-

1. As soon as the machine is in operation, personnel are not needed during the extraction process. Kiln drying and seed extraction are accomplished in one operation.

2. High viability is maintained since the seeds are not exposed to high temperatures except for minimum periods. As soon as a seed is released from the cone scales, it falls to the bottom of the extractor and a conveyor belt then carries the seed out of the kiln for dewinging and cleaning.

A study which we started several years ago (table 1) prompted this combination kiln and extractor type of machine. The study, while not duplicated with sufficient replications to be statistically acceptable, did provide information that may be of interest.

Ponderosa pine cones from one source were properly cured and given the following treatments

A. Air-dried in cone storage shed; seed, hand extracted.

B. Cone exposed to 130°F.; seed removed as soon as cone scales opened.

1 Located at the University of Idaho. Moscow. Idaho.

C. Cones exposed to 130°F. with released seed removed every four hours: (1) 4 hours; (2) 8 hours; (3) 12 hours.
D. Cones exposed to 130°F. with all seed removed at the end of extraction (10 hours).

All extracted seed was stored in air-tight containers in seed storage building at 36°F.

Because of the size of samples used for viability tests and with the lack of sufficient replications, this has not been a conclusive study; however, there are some apparent trends.

The seeds not exposed to heat (A) lost a total of 11 percent germination in approximately 5 years of storage. This corresponded closely to treatment (B) in which seeds were removed from the kiln soon after release. Two factors were apparently present in treatment C(1), C(2), and C(3): seeds of highest viability were released first, and the longer seeds were exposed to heat the greater was the viability loss due to storage period.

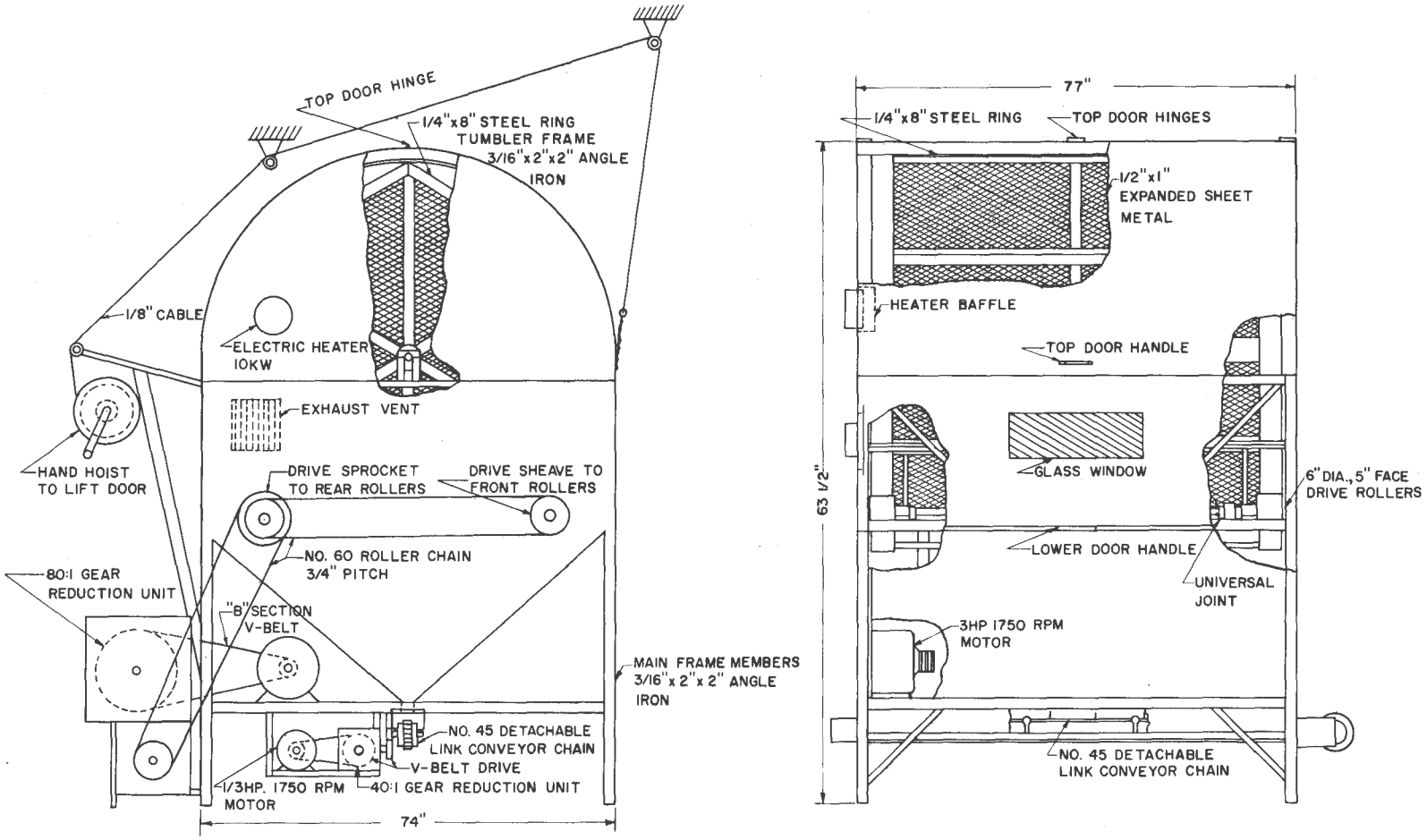
Treatment D lost 23 percent germination through storage which corresponds closely to the 26 percent loss for treatment C(3).

It should also be noted that as many blanks as possible were removed from all the tests through the cleaning process. There were close to 23 percent blanks removed from the original C(3) seed and only 8 percent from the C(1).

TABLE 1.--Ponderosa pine viability test

Treatment	Length of storage	Year planted	Seeds	Germination at 30 days	Treatment	Length of storage	Year planted	Seeds	Germination at 30 days
	Months		*Number*	*Percent*		*Months*		*Number*	*Percent*
A.....	7	1955	500	84	C(2)..	7	1955	400	81
	19	1956	500	87		19	1956	400	80
	31	1957	500	79		31	1957	400	75
	43	1958	500	71		43	1958	400	71
	55	1959	500	80		55	1959	400	72
	67	1960	500	73		67	1960	400	66
B.....	7	1955	500	86	C(3)..	7	1955	300	73
	19	1956	500	81		19	1956	300	69
	31	1957	500	77		31	1957	300	61
	43	1958	500	82		43	1958	300	54
	55	1959	500	76		55	1959	300	55
	67	1960	500	74		67	1960	300	47
C(1)..	7	1955	500	85	D.....	7	1955	500	78
	19	1956	500	86		19	1956	500	66
	31	1957	500	85		31	1957	500	62
	43	1958	500	80		43	1958	500	55
	55	1959	500	77		55	1959	500	53
	67	1960	500	71		67	1960	500	55

CONE KILN & EXTRACTOR



SCALE: 1 1/2" = 1'-0"