

fresh fruit, as they don't require sugar, while fresh fruit does.

"We pack them hot, right from the trays. If they stand open the miller will get into them. Turn them from the tray into the barrel, and keep them perfectly close. Just as soon as a barrel was full, I headed them up."—*J. B. Durand, before Missouri Hort. Soc.*

### HINTS TO ENGINEERS.\*

BY EDWIN WOODWARD.

The endless uses to which the steam engine is now put makes it a machine of incalculable worth, and while its worth when used with ordinary care is so great, the evils and disasters arising from the careless or more often ignorant engineer, makes it sometimes seem a questionable blessing. With every new industry requiring power, it is the ultimate duty of the engine to furnish it, and at every change of method such as we are daily, or at most yearly, meeting with, we see some new application of steam power.

This is especially true now, in the agricultural sections of the country, where the saw-mill, having done its work, is replaced by the steam threshing engine, which also drives the lath and picket mill. The small semi-portable is now very available to drive the tubular well, run feed mills, churns, chopping machines, pump water, and a thousand other duties constantly rising before the face of the agriculturist. What is more, their use is imperative, and not of volition. Need being the incentive, the engine is bought with the comforting assurance that "It will almost take care of itself. Keep plenty of water in the boiler and fire enough to keep the steam up, plenty of oil, and that is all there is of it."

A boy is given charge of it. The boiler, being new and tough, stands the abuse well, and before many weeks the boy "Knows how to run an engine as well as any one," and with this extensive practice and uniform success to recommend him, gets a more responsible position, with a steam plant, perhaps not so new, but his past luck, in the minds of the owners, insures safety; and with no new recklessness—only too much fire, too little water—an explosion is the usual result.

The loss of property is of little importance compared with the loss of life or the maiming of the innocent victims of—what? Ignorance, criminal neglect on the part of the Legislature in not giving us a law requiring evidence of the ability of the man in charge, or rapacity of the manufacturer? Let the guilty ones answer.

A person who is to take charge of a boiler should make himself familiar with all the needs or defects of it. In the first place its strength should be known, and this is best found by a force pump, warm water—cold water pressure is injurious—and a test gauge, or a steam gauge known to be correct, and the test made at least 20 per cent greater than the maximum steam pressure to be used. Knowing the boiler to be strong enough, the next step is to examine the pump, which should be in perfect working order. Having absolute evidence that the pump can supply, the business of

supplying is a mere matter of routine, but a pump that will sometimes work and sometimes will not, is eligible for the most rigid and instantaneous examination. It may fail when its work is most important. Granted motion to the piston or plunger, a pump fails because it leaks. There can be no other reason, and the leak should be found and repaired. Leaky valves are common and should be ground. Leaky pistons are not so common, but sometimes occur. Repairing is the remedy. Leaky plungers are common. They need returning. The rod must be straight as far as in contact with the packing. The packing around the plungers is sometimes neglected too long, gets filled with dirt and sediment, and hardens and scores an otherwise perfect rod, and so leak.

The stuffing box should have a generous allowance of hemp—not drawn tightly around the rod, but the box well filled, and the gland screwed down tight enough to prevent a leak. Too tight only ruins the elasticity of the packing, and causes undue friction. The suction pipe should be also looked to. It is usually the source of exasperating leaks. It is usually made up of poorly-fitted nipples, elbows, couplings, and to complete the train of evils, a globe valve without any gland, and poorly packed. Freezing weather often opens the weld at the top of the water, or in some water pocket not properly drained. Any of these causes will destroy the efficiency of a pump, and are so known to exist—effectiveness is wanting. A leak on the delivery side of a pump is instantly visible, the water spurting at every stroke.

Leaks affect injectors the same as pumps, and in addition, the accumulation of lime and other mineral deposits in the jets stops the free flowing of the water. The heat of the steam is the usual cause of the deposits, and where this is excessive it would be well to discard the injector and feed with the pump. In many small industries it is impracticable to use a feed-water heater and purifier, but when this is not so it will be found a great aid, for one of the most important cares of an engineer is to keep the boiler clean. No scale should be permitted to collect. Mud should be allowed no place in a boiler. The writer has seen the sheets in the water leg of a locomotive type of a boiler sprung half an inch between stay bolts six inches apart, from accumulation of scale lodging and burning fast there.

There are many compounds in the market that are recommended for dissolving scale. They should be used with care. Some are strong enough to "dissolve the boiler."

### ESTIMATING.

A short way to estimate the cost of a plain house: I do not approve of the method in full, for the reason that I think my way of estimating is far better and more correct than any plan that I have ever seen in print. I first commence with the excavation.

Each cubic yard of dirt to be left on the lot, as thrown out, 20 cents. All sand and clay to be used by contractor free that is found in the cellar and trenches.

Stone to be of freestone rock-work, face 25 cubic feet to the perch, at \$4.50 to the perch.

Cellar, 12×20 feet, to cost: Grates, \$1 each; outside cellar stairs, complete, with doors, \$6.

\* *In Scientific Machinist*