Practice of Safe-ending Tubes at the Grand Trunk Railway Stratford Shops.

In shops such as those of the G.T.R. at Stratford, Ont., more attention to the proper planning of the work through the shops is required than in a small shop where the number of locomotives to be handled is small. In the Stratford shops, practically

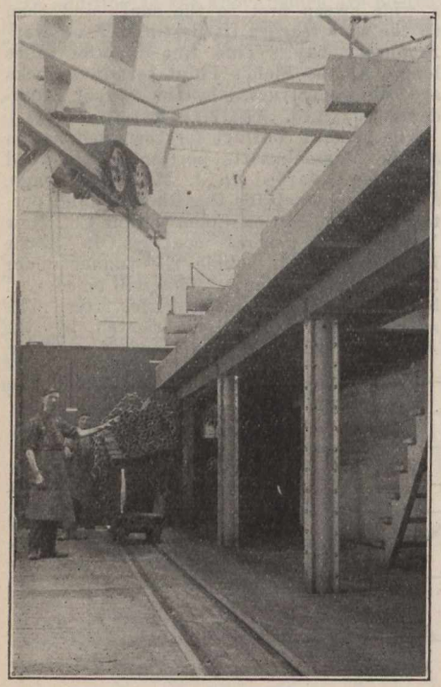

Fig. 1.—Lifting Tubes to Rattler.

all the locomotives on the Middle and Southern divisions and a large percentage of the Northern division, are handled for repairs, and when the repairs are classed as heavy, calling for the total dismantling of the locomotive, the tubes at the same time require safe-ending. Considering the extensive mileage, and the nature of the country through which most of the company's lines operate, developing heavy traffic, the number of locomotives at all times undergoing repairs calling for the safe-ending of the tubes is large.

The safe-ending department is located in one end of the locomotive shop, adjacent to the erecting floor, from which the tubes are received. The whole floor of the machine part of this department is covered with boiler plate, for the easy movement of the tube-carrying trucks in the course of transition through the several stages of the process.

The first step in the process is the removal of the tubes from the boiler in the usual manner. The tubes as removed are placed in trucks of the form shown in fig. 1, these trucks being mounted on a platform in front of the locomotive smokebox, where the tubes can be easily handled without the operator who is removing them, moving from the one position. The truck, loaded with the complete set of tubes from one boiler, is picked up by the travelling crane and carried down the shop to the safe-ending department, and deposited on the plated floor.

Down the centre of the shop, on one side of the safe-ending department there is the built up structure to the right in fig. 1, which houses the tube cleaning apparatus. The tube truck on the plated floor is run along on to the track in fig. 1, a jib crane operating over its whole length.

There are two tube cleaners, of the box rattler type, with supporting trunnions at the level of the platform on the right. There is a box structure closing in the rattler, and on the platform side of this housing are doors for the insertion of the tubes in the opening in the rattler. On to this platform is raised the set of tubes from the truck, leaving the latter on the track, the tubes being deposited in a pile. Through the door openings, the tubes are rolled, until the whole are introduced into the rattler. The doors are then closed, and the rattler put in motion, a stream of water being incidentally turned in from one of the end trunnions. This continues until the tubes are thoroughly free from scale.

After the proper period of cleaning, the rattler is stopped, with its door downwards, the latter on opening dropping the tubes into a truck placed in the box enclosure directly beneath the rattler. The door from which the tubes are removed is in the background in fig. 2, the tubes as removed being in front, to the right, in the same illustration.

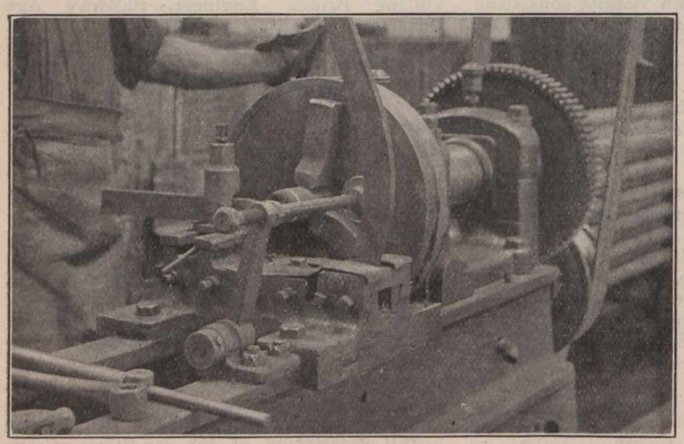

Fig. 2.—Cutting off First Bad End.

The next operation is that of removing one of the damaged ends in the manner shown in fig. 2. This machine is located right at the outlet from the rattler, so that a minimum of handling by the operator is required. The machine employed is of the hollow spindle type, built primarily for this purpose. The tool carriage is secured in a stationary position on the lathe bed, and to the front of the tool carriage there is a swing stop, which can be swung out in line with the tube, so that the operator has a stop against which to push the tube when entering it from the other end, where the chuck face is invisible to him. The firebox, or lightly damaged end, is the one operated on, a very short piece being removed with a cutting off tool. The cutting off tool is so ground on the end as to give a scarfed edge to the tube end. The tool is operated across the carriage by the vertical lever in the hands of the operator. The scarfed tubes are piled in another truck on the near side of the machine on leaving

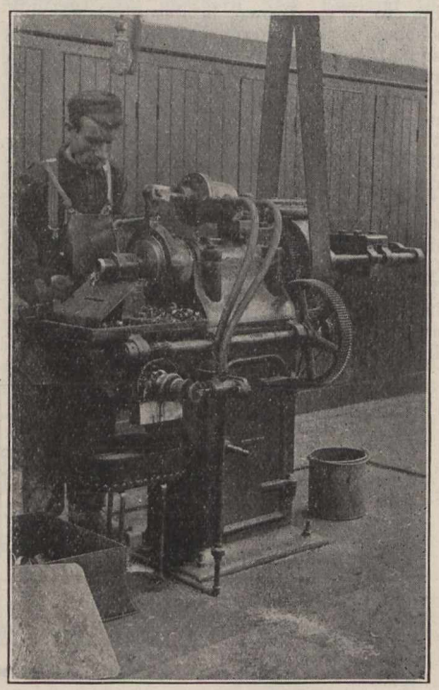

Fig. 4.—Automatic Safe-end Machine.

it. All this part of the shop is floored with plate. This machine is midway between the two rattlers, and so can handle either equally well.

In line with this last machine, and in the rear of the position in fig. 2, are located the machines for the next operation of applying

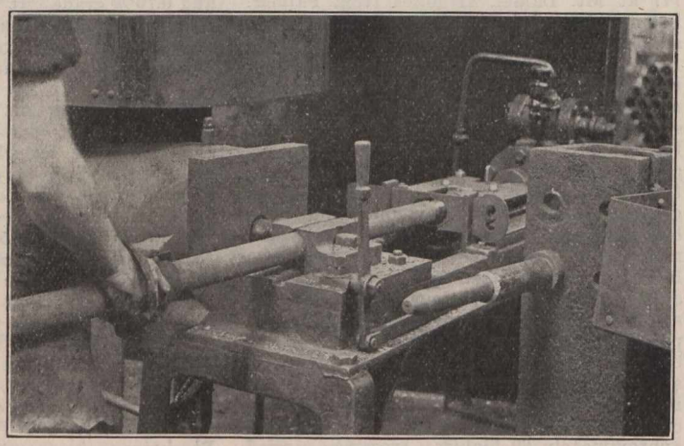

Fig. 3.—Flaring the Cut-off End.

the safe-end. This is shown in fig. 3. The truck from the last position is pushed along only a few feet into position on the left of the operator in this illustration. From this truck, they are taken one at a time and placed in the oil furnace in the left background for heating to a working heat on the scarfed end. The machine in the centre of the view is for expanding the ends to fit over the safe-end. The heated tube is placed in the vise jaws of the machine up to the cross plate, used for locating the tubes. The vise jaw to the left is operated by the cylinder, to the