

one operation following the other, but with a suitable air motor and flexible hose it should not be difficult to do both operations at once, although the author is not familiar with any portable air motor on the market powerful enough to do the boring in as short a time as the planing usually occupies. It is also possible to do the milling out of the steamports by a second air motor while the boring is being finished, the whole needing but one attendant, as when on piece work one man regularly attends to three milling machines.

CONCLUSION.

To summarize, air is in practice proving to be a fairly cheap and most convenient transmitter of power, allowing fine sub-division and transportation to remote points with the crowning and unique quality of suffering no appreciable loss when held in storage. For intermittent service it is of great value allowing widely varying speed of tools, dispensing with long lines of shafting and belts, giving free head room, and increasing the shoplight as well as lessening the first cost of roof frames when they have not to carry shafting. The pipes require no coating; they radiate no heat, and therefore can be put in close corners without increasing the fire risk; their direction is readily changed in any plane without risk of pocketing or water-hammer, and leaky joints (we all get them) are not a nuisance or risk. In no case are exhaust pipes required, and in most if not all cases the exhaust adds to the men's comfort.

APPENDIX.

LIST OF PNEUMATIC TOOLS AND MACHINES AT THE TOPEKA WORKSHOPS OF THE A. T. & S. F. Ry. (see *Ry. Review* 25, 4, 96).

- 1 Riveting machine, of 10 ft. reach, with pneumatic crane.
- 1 Riveting machine of 6 ft. reach with frame.
- 1 Combination flange punch and riveter.
- 2 Truck riveters.
- 1 Bridge riveter.
- 1 Frame “
- 1 Tank “
- 1 Mudring “
- 1 Staybolt breaker.
- 1 Staybolt cutter (nipper).
- 20 Rotary motors.
- 4 Brotherhood engines.
- 1 Grinder.
- 1 Saw.
- 6 Hammers (hand).
- 1 Punch.
- 1 Angleiron shears.
- 1 Bolt machine.
- 3 Hammers in smithy.
- 1 Large punch and shears.
- 1 Bulldozer.
- 1 Rail saw.
- 1 Rail drill.
- 2 Rail benders.
- 1 Stamping machine for tin shop.
- 1 Bolt shearer.
- 1 Port miller.
- 3 Letter presses.
- 6 Pulling down jacks.
- 12 Car jacks.
- 2 Drawbar jacks.
- 3 Painting machines.
- 1 Washer maker.
- 3 Rivet holders.