

schedules, statements for higher officials, and other reports and charts as requested. Comparative records are valuable for stimulating interest in this work and

these scheduling and routing methods are considerable. Schedule boards indicate infallibly where delays periodically, or persistently, occur and such departments

promptly. Under the day work plan the system acts as a stimulant, and to some extent takes the place of interest in the work automatically removed through abolition of piecework methods. Friction between departments is almost entirely eliminated. It is not possible to unload on one department causes for delay which belong to another.

This system to some extent establishes tasks or jobs. Every conscientious foreman or workman likes to have certain work to perform in a stated time, and feels confident that this is exactly what is wanted. Each schedule date delivered to the foreman or workman becomes a written order to that man to deliver the work on that date. Unnecessary driving will be brought to a minimum. Dates are assigned, and if the work is done on these dates no criticism or censure is necessary. The constant reappearance of the daily delay report stimulates fore-

| PITTSBURGH & LAKE ERIE RAILROAD | | | | Class Rep's..... |
|-------------------------------------|-------------|---------------|-----------------------------------|--------------------------|
| ERECTING SHOP | | | | Engine No..... |
| Foreman | | | | Date In..... |
| Foreman | | | | Date Out..... |
| CLASS OF WORK. | Wanted Date | Date Finished | MATERIAL | Wanted from Machine Shop |
| Engine in Shop Unwheeled | | | Frames or Tongues | |
| Engine Stripped Material Delivered | | | Rockers and Boxes | |
| Boiler off or Stripped | | | Cylinder Bushings | |
| Superheater Units Out | | | Valve Bushings | |
| Flues O. K. | | | Braces, Pads and Waist Sheets | |
| Smoke Box Work | | | Engine Truck Parts | |
| Stay Bolts | | | Engine Truck Wheels | |
| Flue Sheet | | | Spring Rigging Parts | |
| Side Sheet and Crown Sheet | | | Boiler Fittings, Air Pump & Parts | |
| Ash Pan and Grates | | | Motion Work | |
| Boiler Tested | | | Cross Heads | |
| Saddle Bolts & Boiler Waist Sheet | | | Main and Side Rods | |
| Frame Braces and Pads O. K. | | | Piston and Valve Packing | |
| Frame and Cylinder Bolts | | | Throttle Valve and Parts | |
| Cylinders Bushed or Bored | | | Driving and Trailer Boxes | |
| Valve Seats Planed or Bushing Bored | | | Pistons and Rods | |
| Shoes & Wedges and Binders O.K. | | | Valves and Yokes | |
| Spring Rigging Up | | | Steam Pipes and Dry Pipes | |
| Guides Lined | | | Driving and Trailer Wheels | |
| Motion Work Up | | | Eccentrics and Straps | |
| Engine Truck O. K. | | | Engine Brake Rigging Parts | |
| Boiler Fittings, Air Pump & Parts | | | Steam Chest and Cylinder Heads | |
| Steam Pipes and Throttle Valve In | | | Frame and Cylinder Bolts | |
| Boiler Lagged | | | Guides and Knees | |
| Engine Wheeled | | | Shoes and Wedges and Binders | |
| Boiler Jacket O. K. | | | | Wanted from Smith Shop |
| Cab and Running Boards O. K. | | | | |
| Superheater O. K. | | | Frames and Tongues | |
| Main Rods Up | | | Braces or Pads | |
| Velvet Set | | | Rocker Arms or Guides | |
| Boiler Trimmings O. K. | | | Spring Rigging Parts | |
| Pipe Work O. K. | | | Engine Brake Rigging Parts | |
| Brake Rigging O. K. | | | Engine Truck Parts | |
| Side Rods O. K. | | | Binders and Yokes | |
| Eng. Despatched | | | Tender Parts | |

Fig. 4. Erecting Shop Operation Sheet.

| SCHEDULE CONSTANTS—LOCOMOTIVE SHOPS. | | | | | | | | | | | | |
|--------------------------------------|-------------|--------------------------------------|---------------------------|--------------------------------------|---------------------------|-------------------------|------------------------|--------------------------------|------------------------------|----------------------|---------|--|
| ERECTING SHOP | | Foreman | | MACHINE SHOP | | | Foreman | | BOILER SHOP | | Foreman | |
| Operations | Date Wanted | Material | Wanted from Machine Shop | Class of Work | Wanted from Erecting Shop | Wanted from Boiler Shop | Wanted from Smith Shop | Class of Work | Wanted O.K. in Erecting Shop | Wanted in Smith Shop | | |
| Engine in shop unwheeled | 1 | Cylinder bushings | 11 | Cylinder bushings | 2 | 11 | 11 | Flues | 11 | 3 | | |
| Engine stripped, material delivered | 2 | Engine truck wheels | 2 | Engine truck wheels | 2 | 11 | 11 | Flue lengths | | 6 | | |
| Flues out | 3 | Spring rigging | 2 | Boiler fittings | 2 | 12 | 12 | Flues, set | | | | |
| Staybolts and radials out | 6 | Boiler fittings | 2 | Steam pipes | 2 | 13 | 13 | Patches or fire box sheets | | 12 | | |
| Frames and cylinders bolted | 11 | Cross-heads, guides and blocks | 2 | Driving and trailer wheels and boxes | 2 | 13 | 13 | Staybolts and radials out | | 6 | | |
| Cylinders bushed or bored | 12 | Steam pipes | 2 | Shoes and wedges | 12 | 13 | 13 | Staybolts and radials in | | 13 | | |
| Shoes and wedges laid off | 12 | Motion work, eccentric and straps | 2 | Valves and yokes | 2 | 15 | 15 | Boiler tested | | 14 | | |
| Spring rigging up | 13 | Driving and trailer wheels and boxes | 2 | Pistons and rods | 2 | 15 | 15 | Smoke box work and superheater | | 17 | | |
| Flues set | 13 | Shoes and wedges | 12 | Spring rigging | 2 | 9 | 11 | Ash pan and grates | | 17 | | |
| Guides lined | 13 | Engine brake rigging | 2 | Cross-heads, guides and blocks | 2 | 9 | 12 | | | | | |
| Staybolts and radials in | 13 | Valves and yokes | 2 | Motion work, eccentric and straps | 2 | 10 | 13 | | | | | |
| Engine truck O. K. | 13 | Pistons and rods | 2 | Engine brake rigging | 2 | 11 | 15 | | | | | |
| Boiler fittings O. K. | 14 | Main and side rods | 1 | Main and side rods | 1 | 12 | 16 | | | | | |
| Boiler tested | 14 | | | | | | | | | | | |
| Engine wheeled | 14 | Material | Wanted from Erecting Shop | | | | | | | | | |
| Steam pipes in | 14 | Engine brake equipment | 2 | | | | | | | | | |
| Cab and runs O. K. | 15 | | | | | | | | | | | |
| Boiler lagged | 15 | | | | | | | | | | | |
| Boiler jacket O. K. | 15 | | | | | | | | | | | |
| Motion work up | 16 | | | | | | | | | | | |
| Velvet set | 16 | | | | | | | | | | | |
| Main and side rods up | 16 | Engine brake equipment | 2 | Binders | 2 | 9 | 9 | Cab | 15 | 17 | | |
| Ash pan and grates O. K. | 17 | Jacket | 2 | Flue lengths | 6 | | | Tender | 14 | 17 | | |
| Smoke box work and superheater O. K. | 17 | Pipe work | 2 | Flues | 3 | 11 | 11 | Engine | 16 | 18 | | |
| Engine brake rigging O. K. | 17 | | | | | | | | | | | |
| Pipe work O. K. | 17 | | | | | | | | | | | |
| Engine despatched | 18 | | | | | | | | | | | |

Fig. 5. Constant Sheet, or Master Schedule.

keeping departments alive to the fact that they are falling behind and causing delay to the work in entire shop. The benefits derived from the use of

may be built up or strengthened. Under the piecework plan this system has resulted in men making more money, on account of receiving material more

| THE PITTSBURGH & LAKE ERIE RAILROAD COMPANY | | | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|--|--|
| SCHEDULE OFFICE | | | | | | | | | | | |
| REPORT OF ENGINES DESPATCHED McKEES ROCKS SHOP | | | | | | | | | | | |
| MONTH OF.....1917 | | | | | | | | | | | |
| TOTAL..... | | | | | | | | | | | |
| Engine Number | | | | | | | | | | | |
| Class Repairs | | | | | | | | | | | |
| Date In | | | | | | | | | | | |
| Sched. Date Desp. | | | | | | | | | | | |
| Actual Date Desp. | | | | | | | | | | | |
| Days Allow. | | | | | | | | | | | |
| Actual Days | | | | | | | | | | | |
| Days Late | | | | | | | | | | | |
| Days Early | | | | | | | | | | | |
| REMARKS | | | | | | | | | | | |

Fig. 6. Report of Engines Dispatched.

men and workman to better purpose than criticism.

A visit to shops where this system is in operation resulted in unanimous favorable comment from superintendents and foremen due to its operation. The general foreman's duties are greatly simplified. Heretofore he might go from one department to another trying to fix the responsibility for delays. No system can take the place of foremen, but this system can eliminate a large amount of travelling, by supervision from one department to another.

No definite figures are possible giving the saving in money resulting from the use of these methods. We may, however, consider one saving from the standpoint of the potential value of the power. Assuming that the service of a locomotive is worth, on an average, \$50 a day, and if one day is saved in the time that each engine is held on the pit the money saving in a shop having 25 pits and delivering 2 engines per pit, per month, would be \$2,500 a month, or \$30,000 a year. This statement is based upon the assumption that quicker deliveries of power are