DUAL-END DRIVE JOURNAL-TRUING AND AXLE LATHES

FARREL COMPANY, DIVISION OF USM CORPORATION, ROCHESTER, N.Y.
Bulletin 3001-B
Fig. 1—Right-hand headstock and carriage of Farrel lathe.
TRULY VERSATILE LATHES

Farrel dual-end drive journal-truing and axle lathes provide the speed, economy and accuracy demanded in today's axle production. Having a speed range suitable for carbide tooling, they will . . .

1 Finish turn and burnish either new or used, car or Diesel axles, in standard AAR sizes from $3\frac{3}{4}\ " \times \ 7\ " \ up \ to \ 7\ " \times \ 12\ "$.

2 Turn and burnish inside journals of mounted wheel sets, with tread diameters up to 46".

3 Turn center portion, between wheel seats, of straight barrel axles.

Because of end-drive construction, the machine can be loaded and unloaded swiftly and easily. Automated loading and unloading devices can be provided to simplify axle handling.

ADVANTAGES

• Dual-end drive provides equalized distribution of work-head horsepower to the workpiece.
• Spindle speeds up to 250 revolutions per minute.
• Infinite feed increments...through rheostat...adjustable during cut.
• Push-button chucking...no spindle centers to tighten and lock.
• No chucking marks or indentations anywhere on axles or wheel sets.
• Chucking arrangement permits rolling axle or wheel set into or out of the lathe without interference...or straight through if desired.
• Magnetic feed clutches permit burnishing radii under power longitudinal feed with safety. No damage to the machine can result from this design.
• Opposed, equalizing burnishing rolls have radial adjustment to provide precise alignment of the rolls for superior finishes.
• No expensive foundation required.
• No coolant required.
• End pressure through leaf springs is positive and safe.
• All electrical conduit and lubrication piping enclosed but readily accessible for ease of maintenance.

Fig. 2—Over-all view of the lathe.
GENERAL DESCRIPTION

BED
The bed is a close-grained Meehanite® casting of box construction, with ample depth and numerous cross ties. Bedway construction is continuous without wheel gaps, and is equipped with flat, hardened-and-ground steel wear plates for carriage ways. Provision is made in the center of the bed for a hydraulic lift, which can accommodate automatic loading devices.

CHIP CHUTES
Chip disposal is through the rear wall of the bed. No chip pit is required under the machine.

HEADSTOCKS
Each headstock is a complete driving unit with individual motor connected through V-belts. The spindles are mounted in antifriction bearings, and antifriction bearings are provided for taking the thrust load. Drive is through bronze worm wheel on spindle, and hardened-steel worm, running in oil. Spindle bearings have forced-feed lubrication.

The axle is driven at both ends, through self-aligning friction driver plates, which adapt to uneven axle ends. Large-diameter centers, revolving with the spindles, are backed by high-capacity springs to insure accurate centering. For safety, the compressed length of these springs is such that the centers cannot be fully withdrawn from the chucked axle. A calibrated spring mechanism is provided on the
right-hand headstock, which indicates the chucking load and allows for thermal linear expansion of the axle.

The left-hand headstock has adjustment along the bed by hand-operated screw. This headstock can be furnished with a retractable center for automatic loading.

**END-PRESSURE MECHANISM**

End pressure for the friction drive is provided by a motor-driven mechanism located on the right-hand end of the bed. The mechanism traverses the right-hand headstock through a nut and screw for chucking and unchucking the axle. A magnetic clutch, controlled by a micro switch actuated by the leaf springs, is provided for chucking and unchucking.

**CARRIAGES**

The heavy-duty carriages are of the offset type with a long bearing on the bed. The guide is on both sides of the rack bar, which is bolted to the front of the bed. Carriages are equipped with renewable alloy aluminum wear liners on the surfaces which bear on top of the bed ways and also on the surfaces that contact the front of the rack bar. Carriages and cross slides have adjustable taper gibbs to compensate for wear. Carriage feeds are through a heavy feed shaft, with single keyway, and steel apron gears to a rack and pinion. No lead screw or shear nuts are employed. All gearing in the apron runs in oil. The carriage bridge is of extra-heavy box-section construction to withstand burnishing stresses.

Cross slides are of heavy design with hardened-and-ground steel wear plates on the top of the front slides. Front tool posts are of the turret type for carrying both the tool holders and the burnishing rolls. Heavy-duty swivel tool holders, with removable single-point carbide tools, are provided for turning and generating the radii.

A block, equipped with a burnishing roll mounted in antifriction bearings, is provided on each rear cross slide. Both the front turret tool post and the rear burnishing tool block are provided with radial adjustment for precision alignment of the burnishing rolls. The front and rear rolls constitute an opposed burnishing arrangement. The front and rear cross slides are connected by a screw having sufficient end play to equalize the burnishing-roll pressure. This relieves thrust on the spindle centers and the bed ways. A slip clutch in the feed mechanism permits continuous rolling operation, and eliminates manual application of longitudinal pressure when rolling axle fillets. Hydraulic, opposed burnishing can be furnished at additional cost. Chip guards, between front and rear cross slides, protect the cross-feed screws and the ways on top of the carriages.

**ELECTRONIC FEED**

The carriage longitudinal feeds are powered by an individual, direct-current, adjustable-speed motor with adjustable-voltage control. The motor drives through a worm and wheel reduction unit, mounted on the right end of the bed, to the spline feed shaft. Feed is varied by changing the speed of the motor, and direction of feed is changed by reversing the direction of motor rotation. Rate of feed, which is selected by means of a dial on the push-button station, can be adjusted in infinite increments without stopping the cut.

The feed motor and spindle-drive motors are electrically interlocked, and cross-controlled so that any pre-selected feed, in inches per revolution, remains constant regardless of changes in spindle speeds. Hand feed is also provided for carriages and cross slides.

**MAIN DRIVE**

Spindles are driven by individual motors mounted on each head. Motors may be of either of the following types: (1) alternating-current, two-speed motors with standard spindle-speed range of 100 and 200 RPM or 125 and 250 RPM; or (2) direct-current motors with adjustable-voltage control, providing a spindle-speed range of 25 to 250 RPM. With either type, speeds are instantly obtainable on the push-button station. (Individual special arrangements are available to suit particular requirements.)

**CONTROLS**

A single push-button station is provided for controlling the following functions of the machine: "start", "stop" and selection of spindle speeds; "forward", "reverse", "stop" and selection of carriage feeds; "chuck" and "unchuck" for positioning right-hand headstock. Push buttons are also provided on each carriage in "cast-in" receptacles for making a selection between hand and power feed.
**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>CAPACITY</th>
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<tbody>
<tr>
<td>Swing over the bed</td>
<td>49”</td>
</tr>
<tr>
<td>Maximum wheel-tread diameter accommodated by swing</td>
<td>46”</td>
</tr>
<tr>
<td>Maximum turning diameter</td>
<td>13 1/2”</td>
</tr>
<tr>
<td>Minimum turning diameter</td>
<td>3 1/4”</td>
</tr>
<tr>
<td>Maximum distance between centers</td>
<td>108”</td>
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<tr>
<td>Minimum distance between centers</td>
<td>66”</td>
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<table>
<thead>
<tr>
<th>BED</th>
<th></th>
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<tbody>
<tr>
<td>Length</td>
<td>17’8”</td>
</tr>
<tr>
<td>Depth</td>
<td>28”</td>
</tr>
<tr>
<td>Center height from bottom of bed</td>
<td>46 3/4”</td>
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<tr>
<td>Width across ways</td>
<td>40”</td>
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<table>
<thead>
<tr>
<th>CARRIAGES</th>
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<tbody>
<tr>
<td>Bearing length on front wear plate</td>
<td>32”</td>
</tr>
<tr>
<td>Width of cross slide</td>
<td>12”</td>
</tr>
<tr>
<td>Depth of carriage bridge</td>
<td>9”</td>
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<tr>
<td>Feed range per revolution of spindle (approximate)</td>
<td>.008” to .078”</td>
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<thead>
<tr>
<th>DRIVING HEADSTOCKS</th>
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<tbody>
<tr>
<td>Diameter of spindles</td>
<td>6”</td>
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<tr>
<td>Length of spindles</td>
<td>30”</td>
</tr>
<tr>
<td>Motor horsepower</td>
<td></td>
</tr>
<tr>
<td>Alternating-current motors</td>
<td>5/10 x 2</td>
</tr>
<tr>
<td>Adjustable-voltage drives</td>
<td>10 x 2</td>
</tr>
<tr>
<td>Standard spindle speeds (rpm)</td>
<td></td>
</tr>
<tr>
<td>Alternating-current motors</td>
<td>100/200 or 125/250</td>
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<tr>
<td>Adjustable-voltage drives</td>
<td>25 to 250</td>
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<tr>
<th>APPROXIMATE WEIGHT</th>
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<tr>
<td>Net (in pounds)</td>
<td>29,000</td>
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<tr>
<th>DIMENSIONS</th>
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<tr>
<td>Floor space required</td>
<td>5’5” x 21’0”</td>
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<tr>
<td>Operating-width clearance required</td>
<td>9’4”</td>
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<tr>
<td>Over-all height</td>
<td>6’3”</td>
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The specifications, design and construction as detailed in this bulletin are subject to change without notice.

**STANDARD EQUIPMENT**

The following equipment is furnished with each lathe:

- **1** Gauge for setting tool bits in swivel tool holders.
- **2** Six removable scales for each carriage (to be marked and used to aid the operator in obtaining proper length collars, journals, dust-guard seats and wheel seats, and to indicate where to start generating the various radii).
- **3** Six sets of standard right-hand and left-hand carbide tool bits (brazed-on type).
- **4** One set of four air-hardened, tool-steel, burnishing rolls, mounted on antifriction bearings, 1/8” and 3/16” radii.
- **5** One hook to tie the right-hand carriage to the right-hand headstock so that, in unloading axles, as the headstock backs away, the carriage is pulled with it. (This is particularly useful when using a roll-in type of loading device.)
- **6** Necessary wrenches and alemite-type grease gun.
- **7** Two sets of operating and instruction manuals.
OPTIONAL EQUIPMENT

The following special designs and extra equipment can be furnished at additional cost:

AUTOMATED LOADING
The end-drive construction of the Farrel lathe permits the use of automated loading and unloading devices. These devices are available to meet individual requirements.

AUTOMATIC LUBRICATION
Automatic lubrication can be provided if requested.

AUXILIARY BURNISHING
This attachment is for burnishing the inside face of axle end collars.

AXLE REST
Manually adjusted axle rests can be incorporated to simplify loading and unloading.

HYDRAULIC BURNISHING
Hydraulic opposed burnishing can be furnished, at additional cost, in place of the standard design.

HYDRAULIC LIFT
When the machine is to be equipped with an automated or semiautomated loading device, a hydraulic lift can be incorporated in the center of the bed. This can be furnished as original equipment or added later.

RETRACTABLE CENTER
Incorporated in the left-hand head, in conjunction with hydraulic lift, this device hydraulically extends and retracts the center, during chucking and unchucking operations, to prevent interference during automated loading and unloading.

SPECIAL TOOL AND BURNISHING ROLL BLOCKS
For turning and rolling inside journals of mounted wheel sets. No additional carriages are required since one of the standard carriages can be moved between the wheels.
OTHER FARREL EQUIPMENT

In addition to the dual-end drive journal-truing and axle lathes described in this bulletin, Farrel also makes the following equipment for the railroad industry:

- Diesel-wheel borers
- Car-wheel borers
- Tracer-controlled wheel lathes
- Automated hydraulic burnishing machines
- Tracer-controlled end-drive axle and journal lathes
- Hegenscheidt-Farrel underfloor wheel-truing machines
- Standard wheel presses
- Automated wheel demounting presses
- Double-end mounting and demounting presses
- Completely automated wheel shops

All units comprising this line have been time tested in the shops of leading railroads and allied railroad industries throughout the world. This equipment is designed to effect cost savings in the all-important wheel-and-axle maintenance and manufacturing function by raising productivity without adding to manpower requirements.

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