# How the Erie Reclaims Couplers

**Designed as a war measure to salvage critical material and conserve manpower, the electric welding and "normalizing" process proves its value through fifteen months of operation**

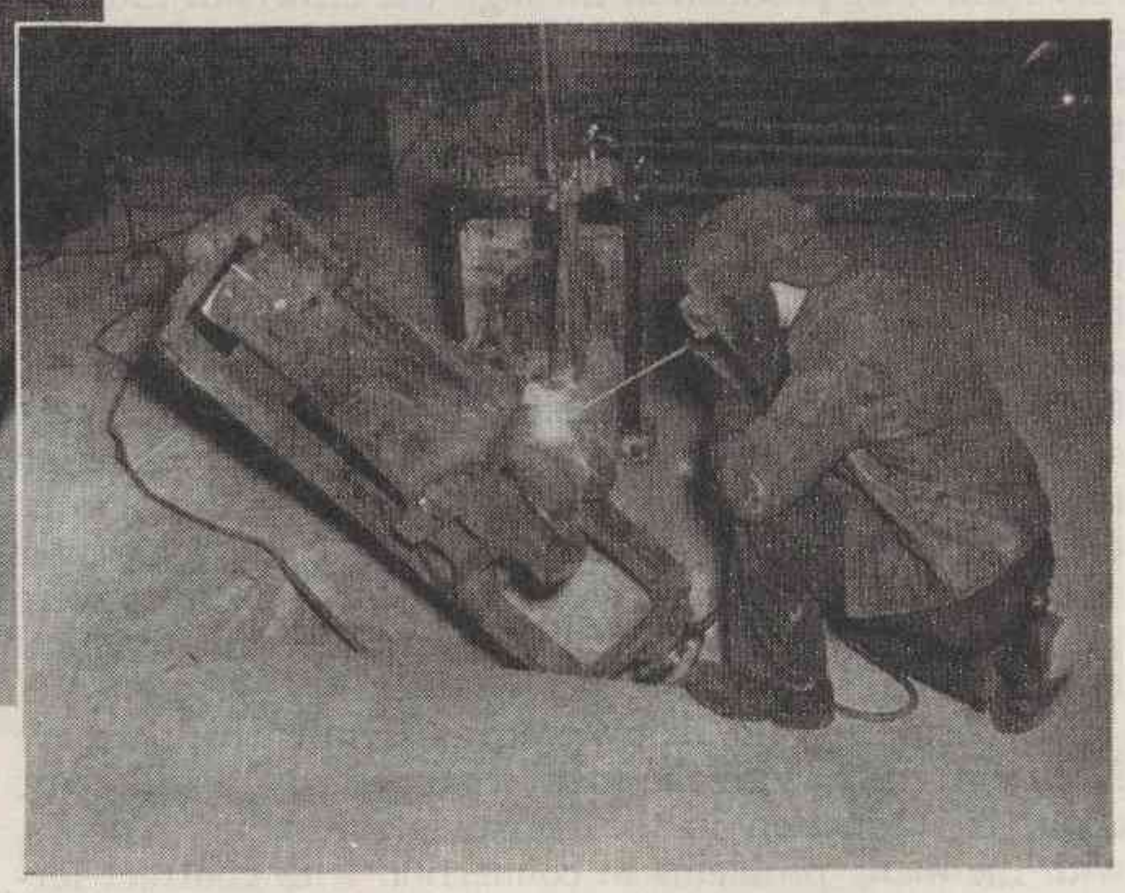
AMONG the huskiest of railroad "War Babies" born of World War II is the process for welding and "normalizing" cast steel car couplers, as is practiced by the Erie at its Meadville, Pa., reclamation plant. Following closely the extensive research and tests that were approved by the Mechanical division of the Association of American Railroads, the Erie's new welding and normalizing shop has been in production since March 1, 1943. Up to the end of May of this year, 5,162 couplers had been reclaimed successfully by welding and normalizing.

Originally devised as a wartime conservation measure designed to salvage critical material, to relieve overcrowded foundries and to conserve manpower, all vitally needed in primary war production, indications now point to the adoption of the procedure as a standard reclamation process. Not only have the reclaimed couplers successfully passed the physical tests to which new couplers are customarily subjected, but the results of several thousand reclaimed couplers placed in service during the last 15 months have been equally successful. Moreover, the new shop facilities are being used further to extend reclamation practices, which include the reclamation of coupler knuckles, lock blocks, lock lifts, cast steel truck side frames, bolsters, center plates, follower blocks, cast steel coupler yokes and miscellaneous other items.

Couplers probably are subjected to more shocks and abuse than any other part of a train. Hundreds of thousands are in use and replacements are frequent by reason of cracks or breaks caused by fatigue and crystallization of the metal. As a pioneer in modern coupler reclamation methods, the Erie collects its damaged cast steel couplers and ships them to its central scrap and reclamation plant at Meadville, Pa., where the damaged couplers are reclaimed by electric-arc welding and subsequent normalizing which relieves heat stresses, corrects fatigue and crystallization and imparts new service life to the couplers.

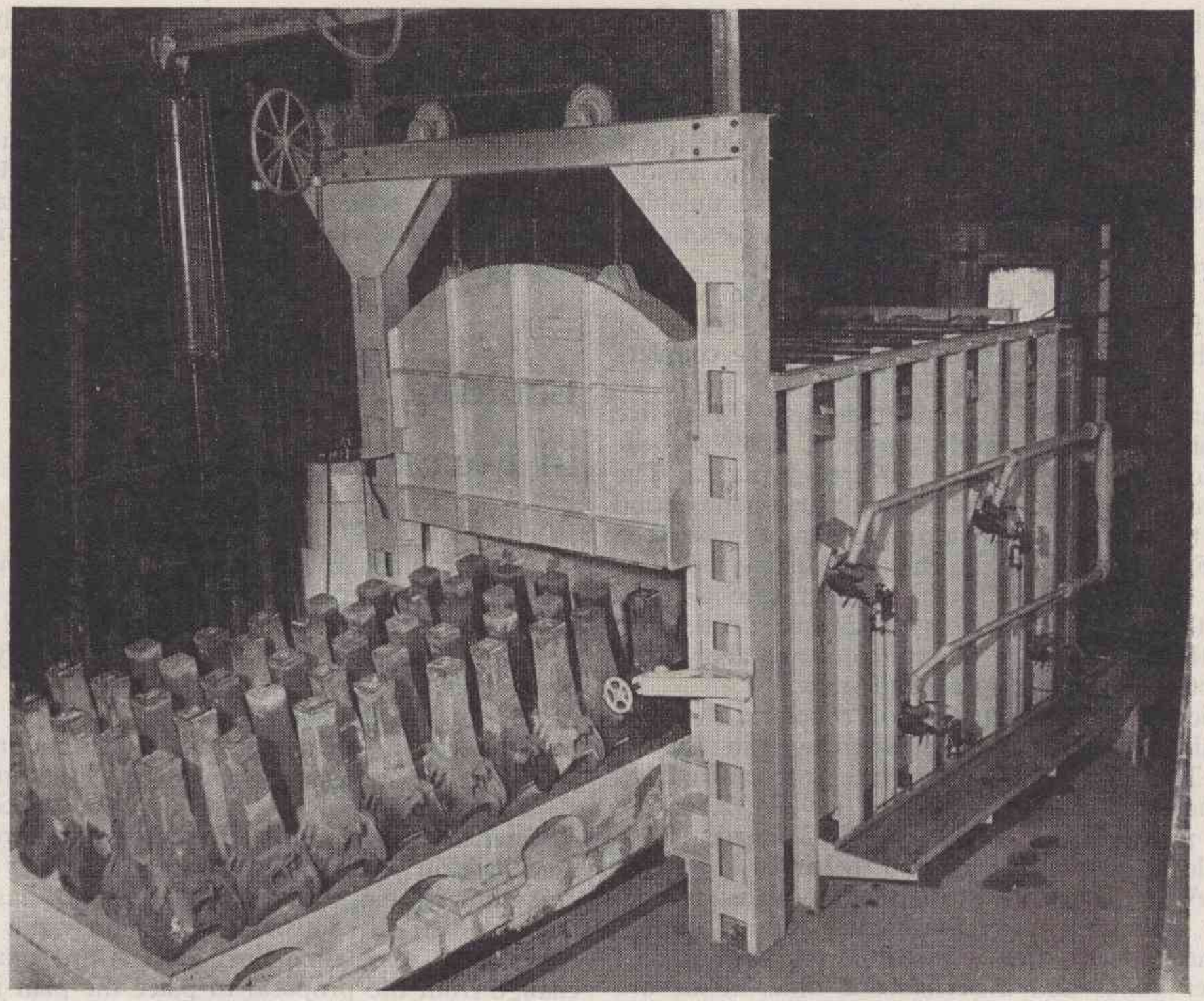
Coupler reclamation on the Erie has been developed as the outgrowth of cooperative tests carried on by the railroads in conjunction with the Coupler and Draft Gear committee of the A. A. R., Mechanical division. It was early in 1942 that couplers were electric-welded, normalized and then given the same tests that are customarily applied to new couplers. All of the reclaimed couplers passed the standard tests successfully and no failures resulted.

As a result of these tests, A. A. R. Interchange Rule 23 subsequently was extended to allow the reclamation of cracked or broken cast steel couplers of Grade B carbon steel by electric-arc welding and controlled normalizing procedures. Later, a series of tests were inaugurated by the Coupler and Draft Gear committee to determine whether to extend the rule to include oxyacetylene welding.



**Three Steps in Welding Car Couplers—**

**(1) Using a Specially Designed Truck to Transfer a Cracked Coupler to the Welding Jig or Positioner, (2) Loosening the Cam Lock Prior to Placing the Coupler in a Desirable Position for Welding, and (3) Welding a Crack in The Head of a Coupler While the Jig is Held in Position for Down-Hand Welding by an Air Brake.**



**A Charge of 45 Welded Couplers Loaded on the Car Floor of the Welding Furnace Which Has Eight Oil Burners and Is Equipped With Pyrometer-Micromax Heat Control**

Since successful reclamation depends upon controlled normalizing, Rule 23 requires that shops undertaking this work must be provided with proper facilities for relieving all stresses created by welding and for relieving service fatigue and removing the crystallization of metal in the couplers. After welding, the couplers must be normalized in a furnace equipped with satisfactory temperature recording apparatus and controls so that the temperature may be raised gradually within a two-hour period to a point between 1,500 and 1,600 deg. F. and subsequently maintained at that point for 1½ to 2 hours. Then the couplers must be removed from the furnace and allowed to cool in still air, protected from drafts, rain and snow; moreover, quenching is not allowed.

## Care and Precision Bring Success

Undoubtedly the success that has followed the Erie's venture in welding and normalizing cast steel couplers, stems from the care and precision with which each step in the process is undertaken. Experienced workmen, good supervision and five separate inspections of the couplers during the reclamation process assure quality production.

After the worn or defective couplers are delivered to the Meadville reclamation plant, they receive their first inspection and those with cracks that may be welded successfully are moved to the forge shop where they are reinspected and heated in a 6-ft. by 8-ft. standard Mahr furnace prior to straightening the shanks and closing the guard arms in an air-operated straightening press. From here the couplers are moved to the welding shop.

The welding and normalizing equipment is housed in a corrugated sheet steel shop building, with a steel frame, that was removed from another location and re-erected at Meadville on an appropriate concrete foundation and provided with a concrete floor. The equipment consists of an air-operated rotary-type facing machine and an electrically-operated standard shaper, each with appropriate jigs specially designed; oxyacetylene cutting torches; two coupler positioners or jigs to aid in welding, and coupler hand trucks, all specially-designed and built in their shop; five 300-ampere electric welding machines, and one car-floor-type Mahr heat treating furnace, 6-ft. by 12-ft., equipped with automatic temperature control and recording devices to provide tape records from a recording pyrometer.

When the couplers are received at the welding shop they are carefully inspected for cracks and, by using an oxyacetylene cutting torch, the metal is removed along the entire length of each crack, to provide for the application of the arc-weld. The next step is the application of a gage to determine the amount of welding required to be applied to the butt of a straight-shank coupler to restore its normal length. Where the wear is light, the butt is built up directly with weld-metal; however, in other instances excessive batter frequently necessitates welding a plate directly to the butt. In these cases the coupler is placed in a special jig of a shaper and the butt is squared up to receive the rebuilding plate.

Next, one of the specially-designed hand trucks is used to move the coupler to a welding booth, where it is secured to a welding jig or positioner which allows the coupler to be swung through a complete circle and so placed for the convenient down-hand welding of cracks or breaks at any point on the coupler shank or body.

After building up the butt and the keyway, and welding the cracks with shielded-arc electrodes, the coupler is removed to the facing machine for squaring the butt and the coupler subsequently is removed to the finishing location where it is inspected again and the welds inside the head or lock portion are thoroughly ground to remove any protrusions or obstructions. After these finishing operations, the coupler is marked with steel dies in accordance with A. A. R. specifications.

Prior to normalizing, the couplers receive another inspection for the possible detection of any cracks or checks in the head and, if none are found, the couplers are loaded to the furnace car-floor with the aid of an air-hoist that is operated from a monorail. Forty-five couplers, placed in an upright position, comprise the charge which is rolled into the oil-fired furnace. The automatic controls are so adjusted that a two-hour period is required to raise the temperature gradually to between 1525 deg. F. and 1550 deg. F., the normalizing temperature. The charge is held at this temperature for two hours and then is removed from the furnace to the still air inside the shop, where the couplers are allowed to cool, protected from drafts, rain and snow.

In addition to the reclamation of couplers, the Erie welding and normalizing shop also is engaged in reclaiming coupler knuckles and building up their worn surfaces in accordance with Reclamation Practice No. 2, as described on page c-72 of the A. A. R. Manual. Lock blocks and lock lifts are built up and reclaimed in accordance with A. A. R. regulations. Center plates are reclaimed by welding cracks, normalizing and finishing. Worn surfaces are built up on cast follower blocks. Cast steel coupler yokes and miscellaneous other items are reclaimed by building up worn surfaces and welding cracks in accordance with A. A. R. rules.

The development and application of the welding and normalizing process at the Erie's Meadville reclamation plant was undertaken under the direction of John McMullen, consulting engineer, and James J. Collins, supervisor scrap and reclamation, who is in charge of the system's scrap and reclamation plant; this plant is under the general supervision of C. K. Reasor, acting manager of stores.

## Materials Control Plan Approved

(*Continued from page 1155*)

brought about by contract termination, no other changes in the C. M. P. are indicated. We are aware that minor changes in the plan may cause a great deal of extra work on the part of industry and are careful to avoid changes that might have such a result.

Last year I appealed to you to help develop the plan and to assist the government in making the plan work. You answered this appeal with action, and today we all know that the plan has been successful. I have another request to make this year—that you continue to comply with our regulations, that you enforce upon your organization, and, to the extent that you can, upon your suppliers and customers, the discipline called for in the successful operation of the plan. It is to your best interest that you comply with the regulations—it is your duty to your country, your government and your company to adhere strictly to the rules set forth in the C. M. P.

Keep competent people on the job. Do not exceed authorized production schedules. Return excess allotments promptly. When contracts are cut back, when authorized schedules are changed, act quickly with your suppliers. By so doing, the materials that we need to fill our war programs will be available promptly, when they no longer are needed for the purpose for which they were originally authorized. Prompt adjustment will give us a clearer picture—so that we can relax unnecessary controls sooner. Unnecessary accumulations of inventory will be eliminated, thereby decreasing the cost of the war.

## Looking Ahead in Forest Products

(*Continued from page 1153*)

proposed control will allow the mill to sell the remainder of its production only to distributors. The control will be applied at that point, for the sales of the distributors will be restricted to certified orders from duly authorized purchasers.

The proposed control will not change the present priority system, insofar as it applies to lumber. All persons who have been granted purchase authorizations should be able to obtain the allotted quantity, and the preference ratings will determine only the order of shipment within a quarterly period.

As this is being written, the W. P. B. has announced that the over-all control of lumber may not be put into effect until some time during the third quarter. This change from the proposal to place the plan in operation at the beginning of the third quarter was necessitated to permit mills and distributors sufficient time to adjust to the new procedure.

Contrary to rumors to the effect that the reference to cross and switch ties in the definition of products in order L-335 presaged dire restrictions of tie production and the diversion of the timber to lumber sawmills, there is no evidence that any such move has been or is being contemplated by the W. P. B. Neither is there any evidence that the W. P. B. contemplates any action that might force those railways now in possession of substantial stocks of ties to share them with other roads whose inventories are insufficient to meet the demands of this season's tie renewal program. In all probability, L-335 in its amended form will list cross and switch ties as exceptions to the definition of lumber.

The new control places a ceiling on purchases and therefore the problems connected with its operation will, in large measure, devolve upon the consumers. The success of its operation depends upon many factors, the chief of which include the filing of true requirements by the claimants, resisting the temptation to inflate requirements and in conserving lumber in every way, for the control of distribution will not in any way remove the need for sensible conservation in consumption.

The administration of an over-all lumber control faces many complexities and difficulties. The very nature of the industry and the wide variety of species, sizes and grades of the product are not conducive to simplified procedure. Its proponents expect that the early operation of the control measure will develop defects that will require remedial measures. However, the W. P. B.'s new plan for over-all control of lumber is designed to provide an adequate supply for our armed forces and supplies for industrial and individual consumers based upon the relation of essential needs to the available supply.