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The Grand Trunk Railway's Practice in Machining the Stephenson Link Motion.

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At the G.T.R. Point St. Charles shops, Montreal, the process of machining a complete link motion has been developed to a nice degree, many simple labor-saving jigs which not only facilitate but improve the quality of the work, have been introduced, so that today the process is rather unique in its simplicity and thoroughness. The process outlined in this article has been developed step by step by the machine shop foreman, through whose assistance the following information has been obtained.

The Stephenson link motion is rapidly falling into disfavor as compared to the simpler Walschaert gear, but its use is still sufficiently great in new equipment to warrant a description of the process of manufacture, more for the value of the methods and processes used than from the fact that it is to be extensively used in the future. So long as existing locomotives equipped with the Stephenson motion require repair and renewal of parts, just so long will it be a matter of interest to those responsible for its production in the shop.

The motion selected as an example of the method of procedure, is that which is standard for Pacific type locomotives of classes ACEFP, the commonest example of this lot being that series of locomotives commonly called the 900 class. Such a motion is shown assembled in fig. 1. It will be noticed that it has been the aim throughout to keep the parts standard as far as possible, so that the factor of fitting new parts in the event of renewal is reduced to a minimum. This is emphasized by the fact that the one gear is applicable over such a range of types. It has been with this standardizing object in view that the ways and means outlined in this article have been devised.

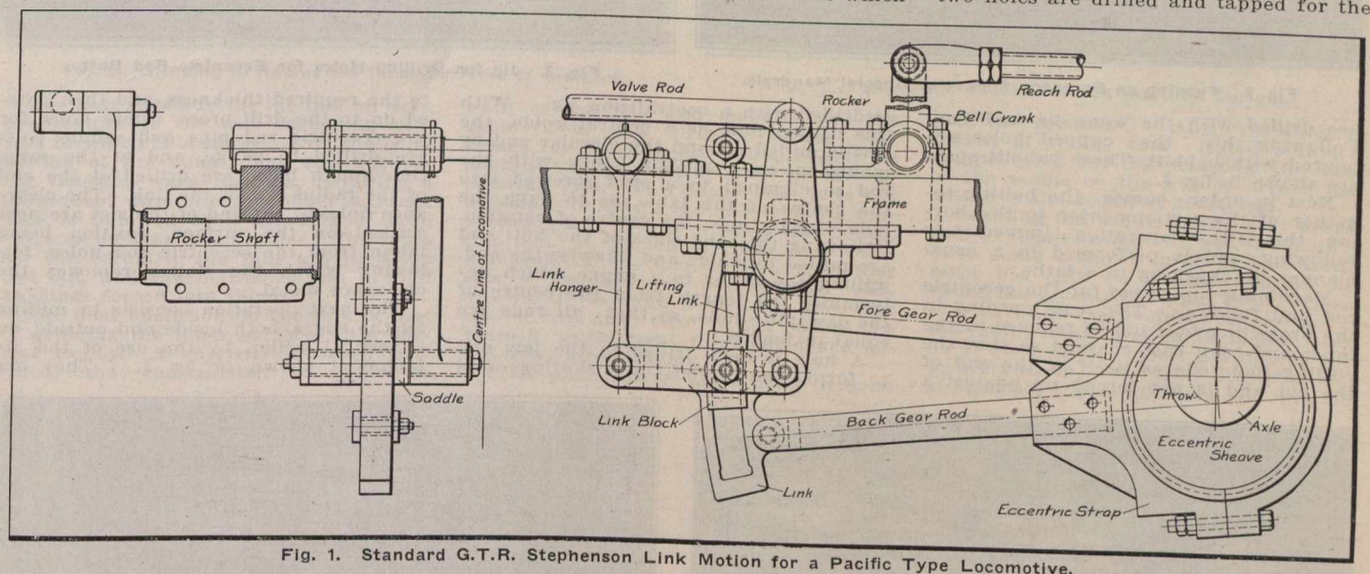

Fig. 1. Standard G.T.R. Stephenson Link Motion for a Pacific Type Locomotive.

THE ECCENTRIC SHEAVE shown partially finished in fig. 2, is made of cast iron in two sections divided in a plane through the centre of the driving axle on which the sheave is to be mounted. The first machining operation is that of planing both sides in a shaper, each section being machined independently to the same thickness. Following this, the mating face of the small section of the sheave is tongued to fit a corresponding groove of the mating surface of the larger section. The two sections are next drilled perpendicularly to the contact faces on each side of the driving axle opening. This is performed in simple jigs. The holes in the smaller section are tapped to receive studs which pass through clearance holes in the larger section, clamping nuts in the cored cavity of this section holding the two parts together.

After clamping together, the next operation is that of boring the driving axle opening by chucking in a lathe, centralizing and boring in a manner familiar to all. Following this comes the operation of slotting a keyway centrally in the bore of the large section. The next operation is rather interesting, being that of turning the outside for the strap fit, and giving the correct amount of throw. This is performed in the manner illustrated in fig. 2. A cast iron block of the driving shaft or axle diameter, is bolted to a small faceplate in an engine lathe, this block being adjusted in location to give the required throw. A keyway in this block is set in a line through the two centres of the lathe and block, so as to correctly engage the keyway of the sheave. The jig block thus mounted and adjusted is ready to receive the sheave, which after being keyed, is clamped to the lathe faceplate for turning to gauge or to an old strap. The value of such a rig lies not so much in its ability to produce a single sheave more rapidly, but rather from the fact that where the sheaves are produced in sets of several at a time, no time is lost in setting up, all that is necessary being to slide the sheave on to the jig block, key and clamp.

The only remaining operation on the sheave is that of drilling two holes for the pinch or set screws which keep the sheave from travelling along the shaft. For this operation, one surface of the sheave is scribed in chalk as shown, in a line through the bosses in the cored cavity of the larger section; and when the sections are parted, by setting up in the drill press to this scribed line, the two holes are drilled and tapped for the set screws to be entered from the cored cavity end.

THE ECCENTRIC STRAP shown in the assembled view, is made in two sections, parted through the centre in the usual manner, and held together by bolts through the projecting flanges. The eccentric rod is attached from a projecting lug of one of the sections.

The first operation is that of milling the engaging surfaces to fit together. Following this comes the operation of drilling the clamping holes, and babbitt and oil holes in the inner face. The method of doing this alone, with jig and tool used, was described in Canadian Railway and Marine World for February last. Briefly, the method is as follows: On the vertical face of a radial drill table, a jig, carrying a plate free to revolve, is mounted. On this plate, contact faces uppermost, a half section of the strap is clamped, the revolving disc being so mounted for the first operation as to have the contact faces level. A drilling gauge, consisting of a steel plate formed to the inner contour of the sheave, with ends projecting over on to the bolting flanges of the sheave, is dropped into position. In the level position, the bolt holes are drilled through