THE FOUR-CYLINDER TRIPLE

In the Mid-Summer issue, we described the engine of the steamer NORONIC as a four-cylinder, triple expansion plant with cylinders of 29½, 47½, 58 and 58 inches, and a stroke of 42 inches. One of our readers enquired as to whether we might better have referred to NORONIC's machinery as having been of the quadruple expansion type. The answer, however, is no. In a normal triple expansion engine, the steam is expanded only three times, whereas in a quadruple expansion engine, there are four cylinders of different diameters and the steam is expanded four times. It will be noted that, in the case of NORONIC's machinery, the two low-pressure cylinders were of the same bore.

This type of engine was not at all common on the Great Lakes. In fact, the only Ship of the Month we have featured which was powered by this sort of machinery was CAPE ETERNITY (35), (a) ROCHESTER (20), (c) GEORGIAN (44), (d) AVALON II (45), (e) GEORGIAN (46), (f) HA SIN. She was Ship of the Month No. 76, in the Mid-Summer 1978 issue, and we noted at that time that she had two four-cylinder triples, each of which drove one of her twin propellers. Each engine had cylinders of 16, 25, 31 and 31 inches, and a stroke of 22 inches. We did a bit of research into the origin of the four-cylinder triple back then, and those readers who were not with us in 1978 might be interested to see what we found out about this peculiar machinery.

The last two decades of the nineteenth century and the first two of the twentieth saw the development of the reciprocating steam engine reach its zenith. Triple or quadruple expansion engines (where the steam would pass through either three or four cylinders, expanding and hence dropping in pressure at each cylinder) were normally chosen for screw-driven lake passenger and freight steamers during this period. Engineers, however, constantly experimented with variations on the basic designs and from their fertile imaginations came such hybrids as the four-cylinder and six-cylinder triples, and the five and eight-cylinder quads, many of these engines being designed for deep-sea passenger liners or for warships.

A four-cylinder triple had two cylinders the same size, these being the low-pressure cylinders. One might have expected them to be placed side-by-side but this was not the case. For balance, they were mounted at either end of the engine, with the high-pressure and intermediate cylinders between them. The steam did its job in the high-pressure cylinder, was exhausted from there into the intermediate and, on being exhausted again, was manifolded simultaneously into the two low-pressure cylinders which worked in step. Such engines were normally of relatively short stroke and operated at high speed, although NORONIC's machinery appears to have been of larger size.

Why would machinery of this type be placed in a laker when four-cylinder triples were most frequently used in shore plants and in warships with high-speed engines? The answer relates to two advantages possessed by such engines. First, the four-cylinder triple often was a space-saving device in that the two smaller low-pressure cylinders usually took up less space than the single larger one which would be necessary in a normal triple. As well, the two low-pressure cylinders would get more power out of the expanded steam and thus increase the engine's efficiency by assisting in evacuating the steam from the intermediate cylinder. ROCHESTER was not a large boat, and the saving of space in her engineroom was necessary to accommodate the two engines required to drive her twin shafts. Why it was decided to place such machinery in NORONIC, however, is a mystery to us. Perhaps C.S.L. simply sought to use an engine which would provide the extra power to keep the big steamer on her schedule while achieving a saving in fuel consumption.

Although many four-cylinder triples were used on salt water (and some may still be functioning there, although that possibility seems relatively remote at this late point in time), the engine never achieved wide use on the Great Lakes. None are still in service today on our inland waters and, as far as we know, no such engine is preserved on display. We would like to have been able to see one of them in operation...

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