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THE THREE-CYLINDER LOCOMOTIVE AND THE MISSOURI PACIFIC

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In my series of articles discussing the Pacific type locomotive and its development and use on the Missouri Pacific, I mentioned the three-cylinder 4-6-2, number 6000. This locomotive, ordered September 8, 1924 and delivered in January, 1925 was one of two three-cylinder engines on the Missouri Pacific. The other was a heavy Mikado or 2-8-2 numbered 1699. Ordered at the same time, it was delivered several weeks after the 6000, as the builder, the American Locomotive Company, made arrangements for it to be tested on the Altoona Test Plant of the Pennsylvania Railroad Company. The results of these tests were widely acclaimed in trade journals of the day and were used as a sales pitch by the American Locomotive Company.

The last of the 19th century and the first decade of the 20th century saw the locomotive builders of America striving for more and more efficient operation of the steam locomotive. Trains were becoming heavier and speeds continued to increase, especially in passenger service. The various compound systems were developed and, in many cases, brought to a high degree of efficiency. Many roads, among the largest the Santa Fe, invested heavily in compound power. The development of a practical superheater in 1910 quickly ended the movement along that line and the next ten years seemed to be devoted to merely increasing the size of already standardized locomotives. Trains Magazine asserts that the three-cylinder principle was evolved in 1846. It lay dormant for sixty years and then the Erie and Wyoming Valley rebuilt three Mogul 2-6-0 type locomotives with three cylinders. These were followed in 1910 by three Atlantic 4-4-2 types and one ten-wheel 4-6-0 type on the Philadelphia and Reading. These locomotives were used in high speed service but were eventually rebuilt as two-cylinder engines due to excessive breakage of crank axles. In 1922 the American Locomotive Company and the New York Central again dusted off the three-cylinder principle and two 4-8-2 type locomotives, called "Mohawks" on the Central, were rebuilt from conventional two-cylinder types. These locomotives, numbered 2568 and 2569, were equipped with the newly developed "Gresley" combining lever to handle steam distribution to the third cylinder. Tests of these engines demonstrated marked advantages over conventional two-cylinder locomotives and the American Locomotive Company committed themselves wholeheartedly to "pushing" this type of motive power.

In 1923 the Lehigh Valley ordered six 4-8-2 types. Numbered 5000-5005 these were the first three-cylinder locomotives to be built originally as such or from "scratch". These particular engines were rebuilt in 1939 with two cylinders. In 1925 the Delaware, Lackawanna and Western built five 4-8-2's with 73-inch drivers for passenger service. Numbered 1450 through 1454 they were rebuilt as conventional in 1930. In 1926 and 1927 the Delaware, Lackawanna and Western built some forty more 4-8-2's with lower drivers and designed for freight service. These locomotives served with three cylinders until dismantled at the end of steam. In August, 1925, the first three-cylinder locomotive of many was delivered to the Union Pacific. Numbered 8000 this was a large 4-10-2 type en-

gine and was followed by nine more of the same type. These locomotives were rebuilt in Los Angeles Shops in 1942 as two cylinder. Starting in 1926 and continuing until 1930 the Union Pacific received their famous 9000 series 4-12-2's. A total of 88 of these massive locomotives were built and operated until the 1950's. The Southern Pacific bought 16 large three-cylinder 4-10-2's in 1925 followed by 23 more in 1926 and another 10 in 1927. These locomotives also operated until the end of steam as three-cylinder power. Other roads buying from American included the Wabash, the Louisville and Nashville, the New Haven and the Belt Railway of Chicago. Several 4-6-2's were built and exported to Mexico, and Brazil ordered some narrow-gauge 4-10-2's. There seems to be one salient feature running through the orders of most of these locomotives. Except for the BRC switchers, some 0-8-0s for the New Haven and the L&N, Wabash and Missouri Pacific 2-8-2's, all of them had a four-wheel pilot truck! Apparently this was desirable even for locomotives to be used for slow speed service.

In 1926 the mighty Baldwin Locomotive Works invaded the three-cylinder field and turned out their 60000th unit, a massive 4-10-2. This behemoth not only had three cylinders but was in addition a compound. It made an apparently successful tour of many of the larger roads in the United States and then returned to Philadelphia. There it was presented to the Franklin Institute where it remains to this day. The orders did not come pouring in to Baldwin. As near as I can determine, the only order they received of any size was ten huge 4-8-2 locomotives built for the Denver and Rio Grande Western. Numbered 1600-1609 these were dual purpose machines with 67-inch drivers and fought the grades of Tennessee Pass with the Scenic Limited and other D&RGW trains until dieselization in the late 1940's.

The dying gasp of the three-cylinder dream was uttered in 1931. The New York Central and the American Locomotive Company put their heads together and came up with number 800. This was a three-cylinder compound with a 4-8-4 wheel arrangement and the unheard of steam pressure of 1300 pounds! This multi-pressure three-cylinder compound embodied the theories and experiments of Dr. Wilheim Schmidt, the father of the superheater, and gave many New York Central enginemen heart failure with her wildly fluctuating water glass. In August, 1939, she was put to the torch. A similar 2-10-4 was constructed for the Canadian Pacific in 1931. Numbered 8000, she was scrapped in 1940.

In the February, 1925 issue of the Missouri Pacific Magazine appear photographs and a glowing account of the receipt of Engine 6000. Proudly it was acclaimed as the first three-cylinder locomotive west of the Mississippi River. Measuring 88 feet long and weighing 540,000 lbs., it exerted a tractive effort of 47,100 lbs. Boiler pressure was 190 lbs. and the six-wheel tender trucks carried sixteen tons of soft coal and 12,000 gallons of water. All three cylinders were 22½ x 28 inches. Railway Age Magazine reports in May, 1925: "The Pacific type locomotive, No. 6000, after having been broken in in freight service, was placed in passenger service and has made a number of runs between Kansas City, Mo., and St. Louis and between Hoxie, Arkansas and St. Louis. Between the latter points a particularly difficult two per cent grade, four miles long, is encountered. Locomotive No. 6000, handling Train No. 4, Hoxie to St. Louis, with eleven

cars, was able to negotiate this grade without trouble and reached the top at a speed of 23 miles per hour."

Engine 1699 was delivered some weeks later and was 83 feet long and weighed 526,800 lbs. Steam pressure was 200 lbs, and tractive effort pegged at 65,700 lbs. The two outside cylinders were 23 x 32 while the third or inside cylinder was 23 x 28 inches. There were many advantages claimed for the three-cylinder locomotive. Chief of these was that it afforded more power, gave greater starting ability, reduced wear on mechanism, rail and right-of-way construction and resulted in substantial fuel savings. Railway Age in its annual review for 1924 pronounces the development of the three-cylinder simple locomotive the outstanding event of the year in the locomotive field. "Its performance during the past year seems to have assured its acceptance," the review declares, and adds "Opponents of the three-cylinder locomotive have, in the past, dwelt upon the probably increased maintenance cost due to the introduction of the third cylinder, but this objection seems to be obscured by the increase in revenue-producing capacity." Be that as it may, the three-cylinder locomotives were not altogether successful. The American Locomotive Company itself declared the need for "specialized maintenance". They also recognized that in order to meet the maintenance costs of conventional power, a large enough number must be operated to justify the "specialized maintenance". They admitted that the inside mechanism was virtually inaccessible.

Just how long No. 6000 remained at the head end of fast passenger trains is not known. I recall seeing it in service on local freight between Kansas City and Atchison, Kansas in 1939 and by 1941 it was stored at North Little Rock. In 1942 it was rebuilt as the 6001, equipped with "poppet-valves", and worked many more years on the main line. The Missouri Pacific Magazine in 1942 announced that No. 6001 as rebuilt had increased its monthly mileage by the ratio of 5.9 to 1 over the engine as the three-cylinder 6000. The 1699 was never duplicated and was eventually rebuilt into a conventional 2-8-2 number 1571. I have been unable to determine just where and when this was done but it was probably at Sedalia about 1940. As the 1699 it operated in the shadow of Sedalia Shops. I can only remember seeing it one time. About 1935 it made a trip from Nevada, Missouri to Joplin and return on the local. I lived at Carthage, Missouri at the time and fascinated by the rippling exhaust, followed it around the yards while they were doing station switching. Someone told me, just who I don't remember, that this engine was prone to derail easily, especially on switches. I have no reason to doubt this and this probably kept it on locals and drag freight service. My father, now retired after 48 years of service on the Missouri Pacific, was night yard clerk at Cornell, Kansas during the winter of 1932-33 and recalls that this engine was used in mine run service there and he weighed many a car of "Jayhawk" coal behind it. He remembers it as a dandy at weighing - probably that added power at starting was responsible.

Wayne Couch recalls that while working out of St. Louis he fired both of these experiments. He says he had special reason to remember the 6000 because it was hand-fired!

Just as the superheater doomed the development of the compound locomotive so the "super power" locomotives with generous heating surface and boiler capacity cou-

pled with high drivers and brought to such a high degree of efficiency by the Lima Locomotive Company drew down the curtain on further development of the three-cylinder steamers. The three-cylinder engine was never, in any of its forms, particularly successful in high speed service. The need for "specialized" maintenance overshadowed the good features of such power. Altogether about 250 units were built in the United States and they make an interesting chapter in the great railroad story.

OUR MAY 9 MEETING WILL HAVE A VARIETY OF FEATURES INCLUDING... slides of Austrian railways by Walter O'Rourke, a report and film of a recent excursion over the old New Orleans & Northeastern by Jim Wilson and a report by Charlie Ost on a narrow-gauge railroad in Arkansas...

OPERATING in 1971.

Meeting time is Sunday, May 9, 2:00 p.m., Missouri Pacific Union Station, Room 305, Third and Victory, Little Rock.