The Lightning, above, was the first steam locomotive built at the Schenectady works in 1848. Just 100 years and 75,000 locomotives later came the last one, shown at right.

**END OF AN ERA**

Nobody blew a whistle or rang a bell as the big steam locomotive was eased out of the erection building and pulled into the running shed. The pulling was done—prophetically enough—by a purring diesel-electric switcher.

Workmen from the far corners of the cavernous old erection building gathered around. They were strangely silent and appeared to be only half believing what they saw. To the casual observer there was nothing unusual about the looks of this locomotive—a conventional 2-8-4 type. It was built under contract by the American Locomotive Company in Schenectady for the Pittsburgh and Lake Erie Railroad.

"If anybody had ever told me—" said one of the workmen to Frank J. Close, superintendent of the steam shop. The man didn't finish his sentence, but Close and his assistant, F. L. McMahon, nodded their heads in perfect understanding.

The boiler of the new locomotive was filled with water and she was coaled up. Still nobody budged. After a time the steam-pressure gauge registered full-boiler pressure. Then followed the familiar sequence of blowing out the boiler tubes and setting the safety valves. The injectors were tested. The water pumps. The air brakes. The stoker.

P. T. Egbert, vice-president in charge of the locomotive division, and several other top executives joined the waiting group. A photographer's flash bulb exploded. A foreman waved a "go ahead" signal to the test engineer and under its own steam the locomotive chugged out of the running shed to mark the end of an era in the shops of the American Locomotive Company.

This particular locomotive happened to be the last steam engine off the regular production line of the plant which has been building locomotives for 100 years. From now on, unless something unforeseen occurs, all of their production will be

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4-4-0 Gov. Marcy, 1851
4-4-0 American type, 1860
4-4-0 American type, 1898
Stanton Mason, "junior engineer" of Scotia, N. Y., eyes 4500-hp. diesel streamlined diesel-electric locomotives. "We didn't plan it this way," says Mr. Egbert. "It's simply a matter of demand. All the railroads want diesels. The handwriting has been on the wall for a number of years and we've been preparing for this day since the early 1920s. That's when we built our first diesel."

Despite any handwriting on the wall, the decision of Alco (contraction for American Locomotive Company) to discontinue steam production comes as a blow to railroading fans throughout the world. There are volumes of statistics proving the economy of diesel operation as compared to steam. But statistics are a poor substitute for the thrill a railroad fan gets in watching an old iron horse under full steam flinging back its plume of smoke and splitting the air with its warning whistle. The sounds and the smells of a hurtling diesel in all its gleaming efficiency can never replace the colorful iron horse in the heart of a true steam-locomotive fan.

Time out for a backward glance over 100 years of locomotive building. This production record is a study in mechanical evolution during Alco's building of more than 75,000 locomotives. The record bridges three wars and several depressions; it embraces advancements in mechanics that have revolutionized our way of life.

Back in 1848—the year before the California gold rush—an infant company known as the Schenectady Locomotive Engine Manufactory produced its first product. This was a spiffily little engine with a high smokestack, lots of polished brass, red paint and gold trim. It must have been something of a curiosity to the boatmen and passengers traveling on the Erie Canal, which passed the doors of the plant. The rivermen, with their hundreds of miles of navigable waterways, laughed at the locomotive named Lightning and probably joked about it being all dressed up with no place to go. There weren't many miles of railroad track in the country at that time. The Lightning was a good engine; in fact, it was way ahead of its time. It weighed about 15 tons, had 84-inch drivers and, although it was built to haul nine cars at 9 to 15 m.p.h., it once pulled an eight-car train at 80 m.p.h. The little locomotive was sold to the Utica and Schenectady Railroad and was doomed to only one year of service. It was just too powerful for the roadbeds of that day.

Local railroad magnates were not impressed with the Lightning's performance and further orders were not forthcoming. After three years of struggle, the "manufactory" quietly folded up. The Lightning was its only product and if anybody had told the company directors that this locomotive would be famous a hundred years later they would have been dumfounded. The company was quickly reorganized in 1851 by John Ellis, one of the early stockholders. Ellis and his four sons guided the company, now known as the Schenectady Locomotive Works, for more than half a century. In its first year they built five locomotives and one of these, the Governor Marcy, was destined for fame. Pictures of the Marcy have been widely reproduced as one of the first 4-4-0 types of locomotive. (To the uninitiated, the numerals from left to right tell the number of wheels composing the leading truck, the number of driving wheels and the number of wheels on
Big Boy, the world's largest steam locomotive, weighs 755,000 pounds. Sketch shows the weight distribution

the rear truck. The 4-4-0 is also known as the 8-wheel or American type.

Walter McQueen, ingenious master mechanic and one of the greatest steam-locomotive builders of all time, served as superintendent and later as vice-president of the company. McQueen made things hum and by 1855 the plant was turning out one $7500 locomotive every eight days. By this time, coal-burning locomotives were being generally accepted. The speedy Schenectady locomotives made record-keepers dizzy by breaking one record after another. One of the favorite speed runs of the day was to Niagara Falls. Jokesters of the era quipped that at breakneck speeds of 35 m.p.h. a passenger no more than opened his lunch basket than he was at the Falls.

In 1857 there was a general business panic and the plant with its 440 workers suffered a severe slump. The next year only two locomotives were built and the company was reorganized. Three years later came the Civil War with high prices and government orders for as many locomotives as could be built. The plant delivered 84 locomotives to the government between 1861 and 1863. Historians agree that these locomotives played a vital part in the course of the war. The McQueen engine became nationally famous.

The proof of the quality of the engines built by McQueen may be seen today on a fruit-belt run between Stockton and Linden, Calif. The locomotive on this run was built in 1867, originally for the Central Pacific, and is now the property of the Stockton Terminal and Eastern Railroad.

During these early years the plant became known as the “Big Shop” and, although it was to change its official name many years later, the east side of the plant
The scene has shifted at Alco to the building of diesel-electric locomotives; here a 1500-hp. diesel engine is being lowered into framework.

Below, 4-8-4 Niagara-type locomotive is one of the most popular in U. S.

is said to have been the first locomotive to pass over these connecting rails which linked the East and West to inaugurate a great step in transportation which was to unite the nation.

Up until this time, the Ellises, McQueen and his top assistants had concentrated on the 4-4-0 type of locomotive. Their basic problem concerned boiler capacity because the bigger the boiler the faster the McQueen engines would run. In the two decades after 1870 other types were added to the line—the 2-6-0, 4-6-2, 4-8-0 and the 4-4-2. Albert J. Pitkin, noted for his work at the Baldwin Locomotive Works in Philadelphia, joined the company in 1882 as chief draftsman.

Pitkin was an exponent of heavy and powerful locomotives which were a boon to a rapidly growing freight and passenger business. He designed the first cross-compound locomotive which uses one high-pressure and one low-pressure cylinder. In this engine the steam is used twice, which saves coal and water. The compound locomotive was developed in various designs and not widely used until about 1910 when superheating became general.

After Pitkin joined the Big Shop the locomotives soon were averaging four times as much in weight as those produced back in 1851. During the 80s and 90s, heavy American-type (4-4-0) locomotives set some remarkable records and led the way in the race for powerful express engines.

On June 24, 1901, the Schenectady Locomotive Works became the American Locomotive Company through a merger with
seven other companies. These were boom days in transportation and in 1907 Alco set a production record by building 930 locomotives. Technical development of the steam locomotive was moving toward an all-time peak. Superheating had been proved a success. A locomotive superheater raises the temperature of the steam by passing it through loops of pipes which are exposed to the hot gases from the furnace. The superheater made it possible to raise the temperature of steam above that of saturation.

Another important locomotive development just after the turn of the century was that of the “articulated” locomotive. This type has two sets of driving wheels connected by a joint and providing great tractive force. The wheels in each group are driven by a separate pair of cylinders. Articulated locomotives are known as the Mallet type, named for the inventor of the most popular design used in the United States. Advantages of the Mallet for pulling heavy trains can readily be seen as compared with the conventional rigid wheelbase with a single group of driving wheels.

Mallet types built by Alco include the 0-6-6-0, 2-6-6-2, 4-6-6-4, 2-8-8-2 and the top (Continued to page 246)
End of an Era

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development of this type—the giant 4-8-8-4. The latter, better known as Big Boy, was built during the last decade for mountain hauls. The Big-Boy type is the world's largest steam locomotive and weighs 604 tons. It has sixteen 68-inch drive wheels, can produce 7000 horsepower and hauls a mile-long freight train at 60 m.p.h. When Big Boy takes a drink he fills his boiler to capacity with 24,000 gallons of water.

Among the locomotive improvements from 1900 to World War I were the automatic stoker, the Walschaert valve gear, power-operated reverse gears, multiple throttle, booster engine on the trailing truck, cross-compound air pumps and many others. During this period the boiler pressure remained standard at about 200 pounds. (This was to be increased to 300 in the 1930s). The Walschaert gear is an improved system for opening and closing valves to extract full work from steam.

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Over the years two general classifications of steam locomotives had been developed—passenger and freight. The most popular types in recent years have been the 4-6-2 (Pacific), 4-6-4, 4-8-4, and 4-8-2 (Mountain). Earlier types were the 4-4-0 (American), 4-4-2 (Atlantic) and the 4-6-0 (Ten-Wheeled). All of these types are still in service, many on branch lines. The principal freight types have either four or five pairs of coupled driving wheels with the lead and trailing trucks equipped with either one or two pairs of wheels. They include the 2-8-2 (Mikado), 2-8-4, 4-8-4, 2-10-2, 4-10-2 and the 2-10-4. During recent years the freight requirements have been speeded up to such an extent that many passenger and freight locomotives of similar types are used interchangeably. This is particularly true of the Mallets ranging from two sets of four driving wheels to two sets of 10.

Alco distinguished itself during World War I by promptly filling government contracts. After the war came the first rumblings of diesel talk throughout the locomotive industry. Was this an innovation or the possible harbinger of a new era in railroad transportation? Whatever it was, Alco wanted a part of it and in 1924 the plant turned out its first diesel-powered locomotive—the first commercially successful diesel built in the U. S. It is still in service as a switcher.

But while diesels were in their infancy Alco continued to build and improve on steam locomotives. A streamlined locomotive named Hiawatha was built for the Chicago, Milwaukee, St. Paul & Pacific Railroad. It was the 4-4-2 type and has a sustained speed of 100 m.p.h. with a top speed of 120 m.p.h.

When the U. S. entered World War II Alco was ready to do its part. The plant covered 112 busy acres and was ready to gear production to an all-time high. The peak in steam production was reached in 1944 when 1354 locomotives were built. In addition to more than 2000 steam and diesel-electrics, the plant’s war production included 150 boilers for Liberty ships, hundreds of M-3 and M-4 tanks, tank destroyers, big guns and scores of other items ranging from turret rollers for battleships to diaphragm forgings for Navy torpedoes. Alco also built the big M-36 tanks called Sluggers which knocked out German Tiger tanks and helped turn the tide in the Battle of the Bulge. The Navy and War departments honored the company by awarding the Navy E with star and the joint Army and Navy E with two stars.

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Now at the dawn of its second century, Alco is in the throes of diesel-electric production and at the same time alert to the fact that this type of locomotive may one day be outmoded like steam. Extensive research is going ahead on application of the gas turbine, and even atomic power is considered a possibility.

However, steam-locomotive fans will not be deprived of seeing their favorite iron horses in action overnight. At present in the U.S. there exists a total of 110,000,000 locomotive horsepower. This horsepower is composed of only 7,000,000 diesel, 3,000,000 electric and 100,000,000 steam. It is estimated that by 1955 this picture will be changed to the extent of 30,000,000 diesel-electric locomotive horsepower.

Despite this upsurge of diesel popularity the chances are that 50 years from now a few steam locomotives will still be chugging along somewhere in the U.S.A. The steam fans will see to that!