

VM 548-2

PLYMOUTH

Gasoline Locomotives



MODEL ML6, 25 and 30-TON
and ML8, 30³⁵-TON



Bulletin ML

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MODEL ML6, 20, 25 and 30-TON
and ML8, 30-TON



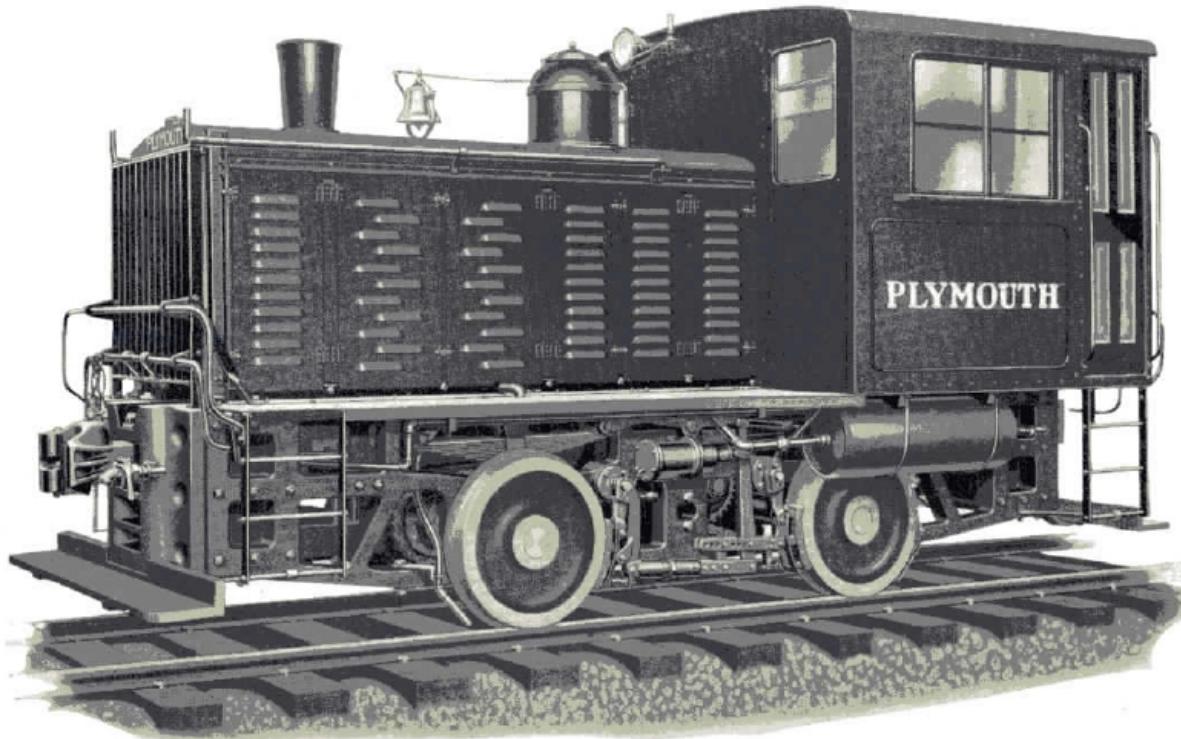
BULLETIN ML

Manufactured by
THE FATE-ROOT-HEATH CO.
Plymouth Locomotive Works
PLYMOUTH, OHIO, U. S. A.



Plymouth Gasoline Locomotive

Model ML6, Type 2, 20 and 25 Ton



View of 56½ inch (Standard) Gauge

THE Model ML6 20, 25 and 30-Ton and Model ML8 30-Ton Gasoline Locomotives are an outstanding achievement in industrial locomotive development. They embody many new and special features and mark a distinct advance in locomotive design and construction.

One of the outstanding features of these locomotives is that they are equipped with both *side* and *cross* equalizers, giving a true 3-point spring suspension. No matter how rough the track, these Locomotives will ride them with ease. The Springs are also exceptionally long and flexible, being 48" long by 4½" wide.

A new Frame, a three-bar steel type of special construction; new and larger clutch that is removable without moving the engine

or transmission; direct-driven air compressor and improved manifolding are a few of the many other improvements giving greater efficiency, accessibility and durability.

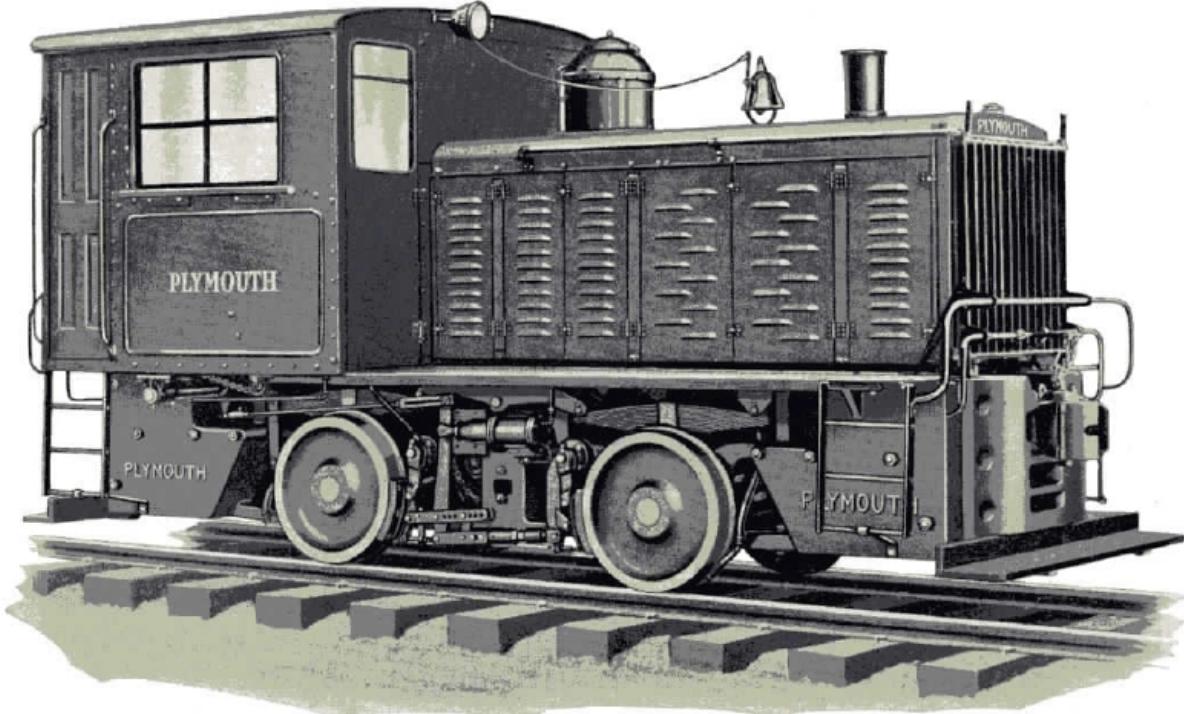
Another new and unusual feature is the *two* powerful 12-volt starters used on the engine, insuring easy starting even during the coldest weather.

These Models are especially adapted for railroad switching, heavy construction work, quarries, sand, gravel and clay plants, logging, mining and for general industrial haulage.

The ML8 30-Ton, equipped with LeRoi 8-cylinder "V" type 250 H.P. engine is an exceptionally powerful locomotive where speed, as well as heavy loads, is an important factor.

Plymouth Gasoline Locomotives

Models ML6, 30 Ton and ML8, 30 Ton



View of 56½ inch (Standard) Gauge

Wheels The Wheels are rolled steel, 33" diameter, 1920 A. R. A. road service tread and flange. Tread is 4½" wide, flange 1½" high and over-all width 5½".

The tread is 2½" thick, thus providing stock so the wheels can be trued several times should they become grooved or flat.

Steel Tired Wheels can be furnished at additional cost.

Brakes Two air brake cylinders, one on each side. Lever type of brake rigging, detachable brake shoes covering treads and flanges of all wheels. Hand wheel brake for emergencies.

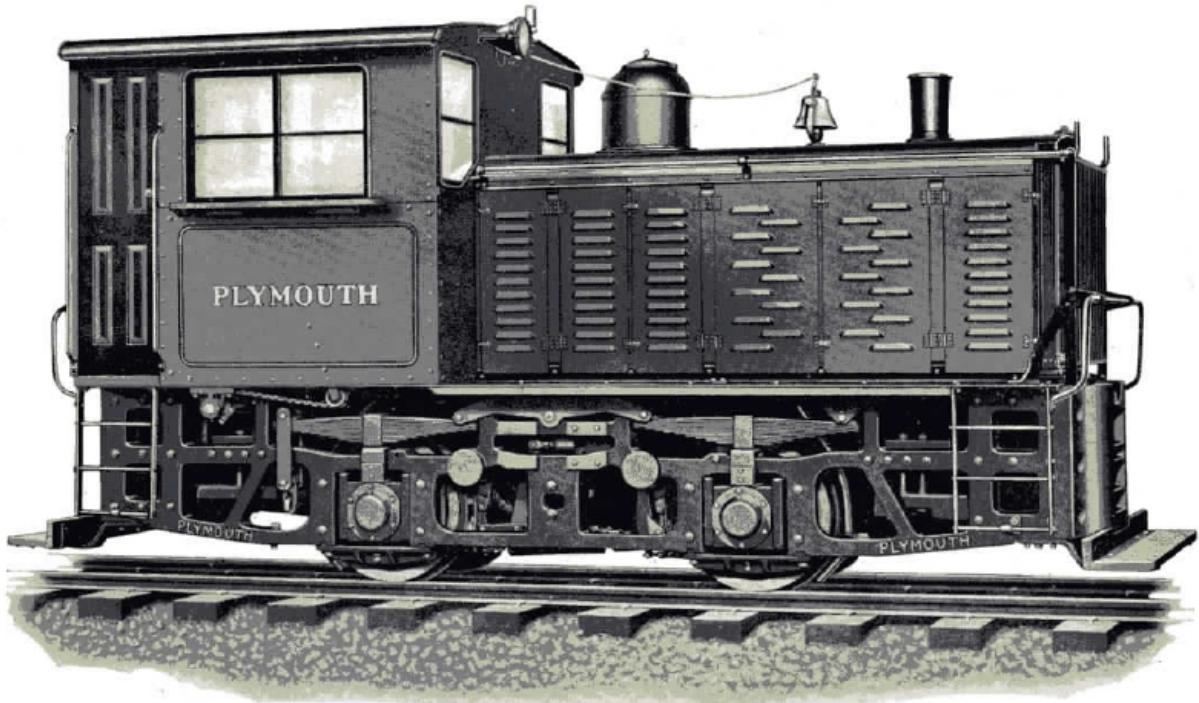
Westinghouse straight air, standard equipment. Westinghouse AMM system of straight and automatic air using one combined brake valve, or Westinghouse 14 EL system of straight and automatic air using two brake valves, furnished at additional cost.

Sanders A large sand dome, wood lined to prevent sweating, is mounted so the heat from the engine keeps the sand dry.

Air operated sand traps convey the sand from the dome to large steep-pitched pipes that deliver the sand to the rail close to the wheels.

Couplers Steel bumpers having four coupler pockets for link and pin couplers are regularly provided. The centers of these pockets are 18½", 24", 28½" and 32½" above top of the rail. We can furnish ¾ or full size A.R.A. couplers or any type of special couplers at any desired height.

Lubrication Lubrication of all bearings, aside from those on the engine and transmission, is provided by the Alemite System. This insures proper lubrication and guards against neglect of this highly important feature.



View of 36 inch Gauge

Cooling Modine sectional core single thickness and 30" six blade fan used to cool 6 cylinder engine. Capacity of cooling system 25 gallons. Modine sectional core double thickness and 36" eight blade fan used to cool 8 cylinder engine. Capacity of cooling system 30 gallons. Any of the cores can be removed without interfering with the others. The upper and lower tanks are cast separately of gray iron and carefully machined so that any part can be renewed. The radiator is protected against injury by a heavy steel guard in front.

Winter fronts for the radiator with the shutters operated by a lever in the cab, also a thermometer showing the engine temperature, furnished as special equipment.

Fuel An ample supply of fuel is provided for, through the 75 gallon supply tank. Gravity feed for the 6 cylinder engine. Pump for the 8 cylinder engine. Special screens are provided for preventing dirt or water from finding its way into the carburetor.

For using alcohol efficiently as fuel a special high compression cylinder head should

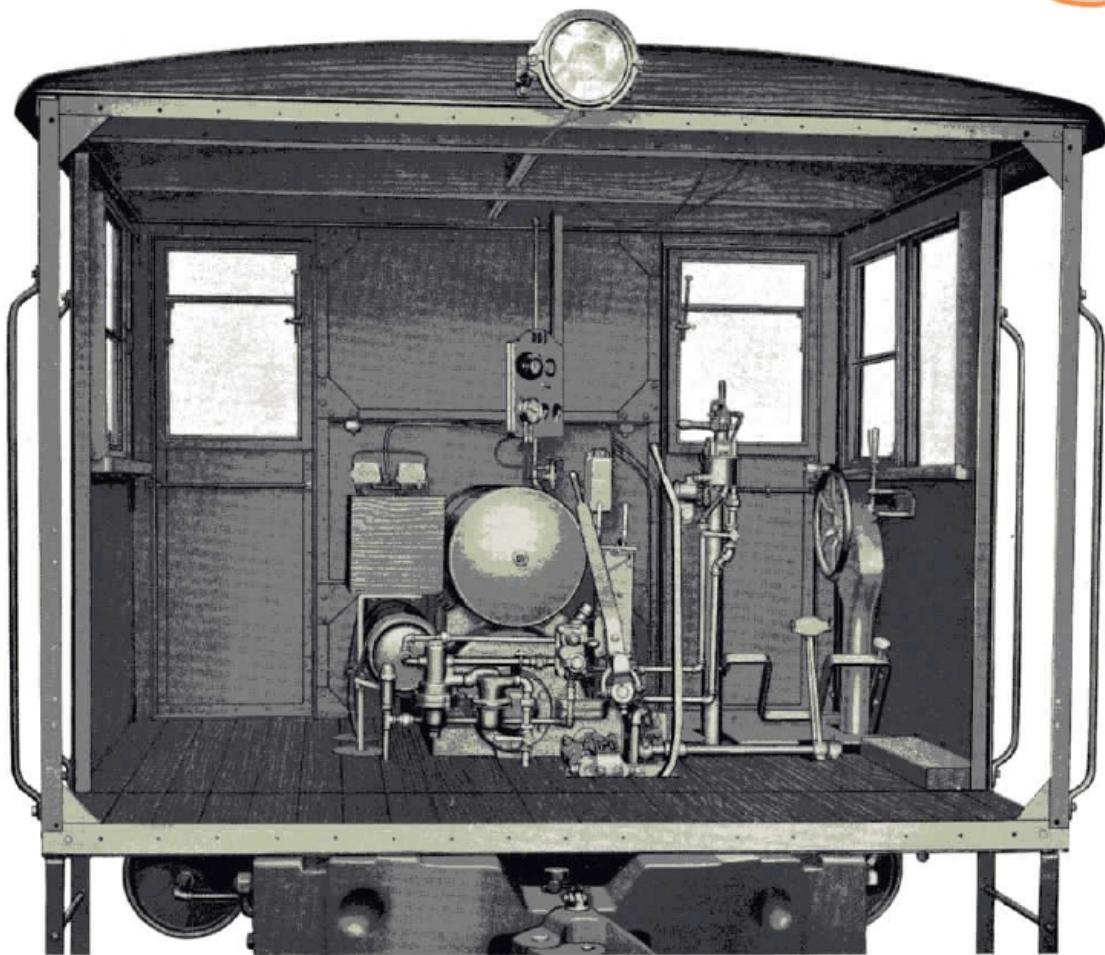
be used, carburetor changed, and timing advanced; 10% gasoline should be mixed with the fuel to prevent corrosion of the valves and cylinder walls.

Instrument Board Mounted so as to be easily seen by the operator. Located on this board are the ignition and lighting switches, ammeter, air gauge, primer, oil gauge, and a suitable lamp for lighting the gauges.

Equipment Electrical equipment consists of a large generator with voltage regulator, two powerful starters on the engine and a large storage battery. Regular equipment includes a front headlight, rear headlight, cab light, switch board light and trouble lamp and cord.

Special equipment to meet I.C.C. requirements including classification and marker lamps and head light dimmers can be furnished.

A splendid outfit of tools is furnished in a metal box which can be locked. Keys in duplicate for the cab door, tool chest, and ignition are sent by mail following shipment of Locomotive. Instruction books and repair lists are shipped in the tool box.



Interior View of Cab, Showing its Roominess and the Convenient Grouping of the Levers and Controls

Cab The large, roomy cab of steel construction is exceptionally well lighted by nine windows framed in steel sash. Five of these windows can be opened, and as the cab has four doors, excellent protection and ventilation can be had at any season. The large number of windows provide unobstructed vision in all directions.

Cabs are built wide to permit the operator to see alongside of cars, and in keeping with standard railroad practice the operator is seated at the right hand side. The seat is well upholstered and is designed so it can be quickly dropped so the operator can stand while running the Locomotive. The comfort of the operator has been carefully considered and all levers are conveniently placed and easily operated.

A cushioned arm rest is placed in the window beside the driver. Grab irons are

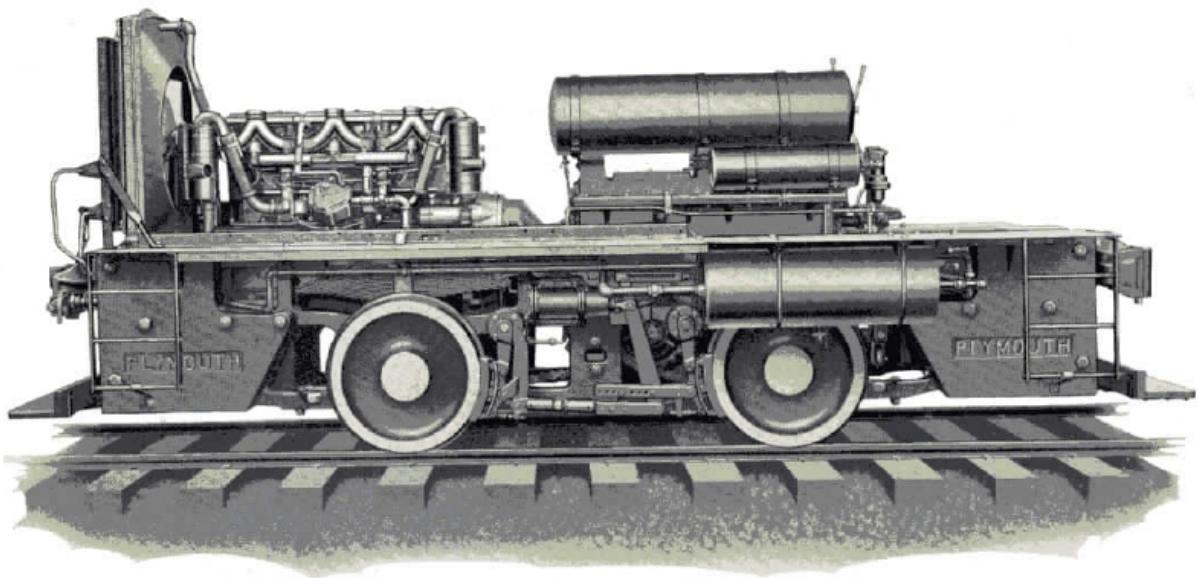
liberally used to provide safety. All doors and windows can be bolted or locked. A cab width of 9' 8" is standard for 56½" gauge, and 8' 0" is standard for 36" gauge, altho other sizes are built to meet special requirements.

Canopy The canopy enclosing the engine and part of the transmission is of all steel construction of ample strength. The top is in two sections: the rear section on which is mounted the sand dome and bell, and the front section which is easily removed when it is necessary to work on the engine. Each side consists of six hinged doors; these doors have louvers stamped in them to provide ventilation for the engine. The doors are also securely hinged, fastened by hinged hasps, and when opened provide easy access to all parts inside of the canopy.

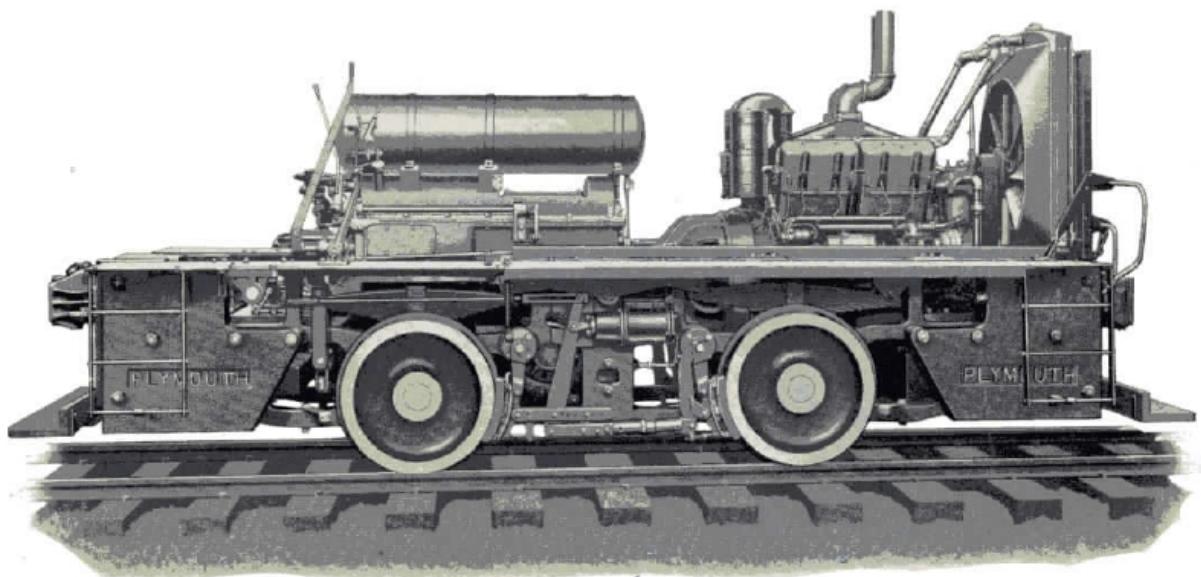


Partially Assembled Views

Showing Accessibility of Various Parts

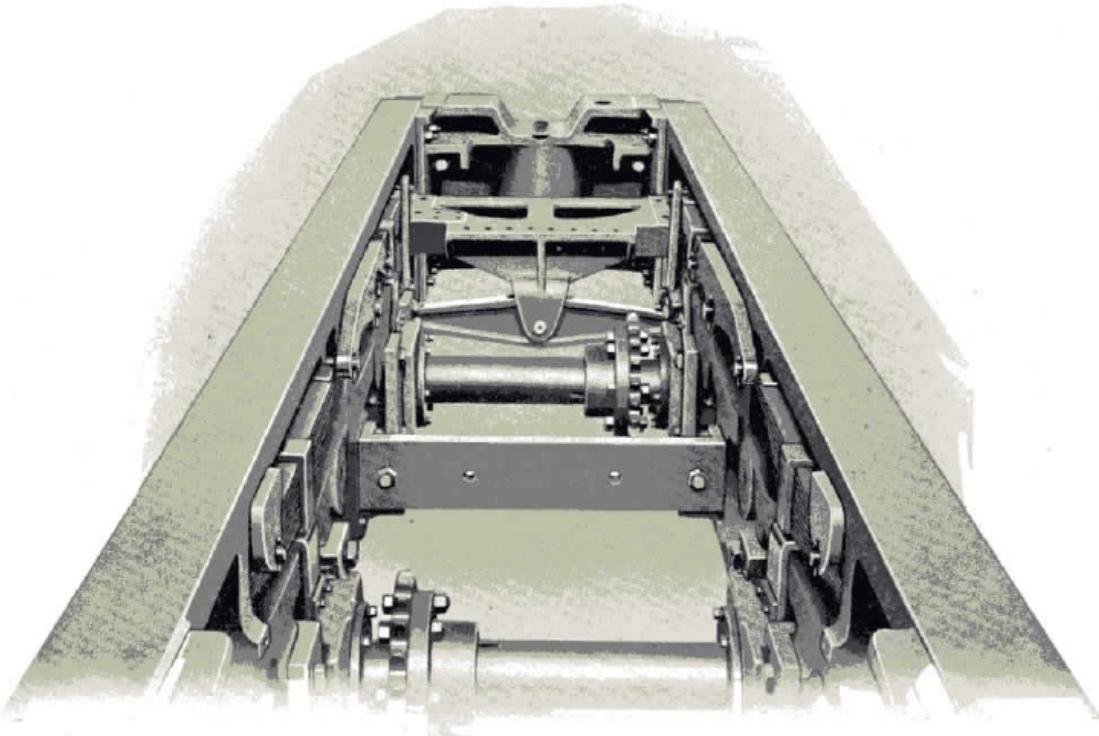


Model ML6, 25 and 30 Ton



Model ML8, 30 Ton 35 Ton

Side and Cross Equalization— a True 3-Point Spring Suspension



View of Chassis Showing Spring Suspension and Side and Cross Equalization

Springs Long flexible semi-elliptic springs, 48" long, 4½" wide, made of special alloy spring steel and oil tempered. These springs are mounted over each axle boxing and are connected with side equalizers and rear cross equalizer. This type of construction makes a true three-point spring suspension and assures very smooth riding of the Locomotive over rough and uneven track, reducing the chances of derailment to a minimum.

Axles The axles are of alloy steel, 6½" diameter, heat treated, with wheels and sprocket hubs pressed on. Axles are mounted on double Timken Tapered Roller Bearings.

Axle Boxings Each boxing is equipped with two large Timken Tapered Roller Bearings which are housed in a grease-tight, dirt-proof housing. These bearings take all end thrust and radial loads and will last the life of the Locomotive if greased occasionally.

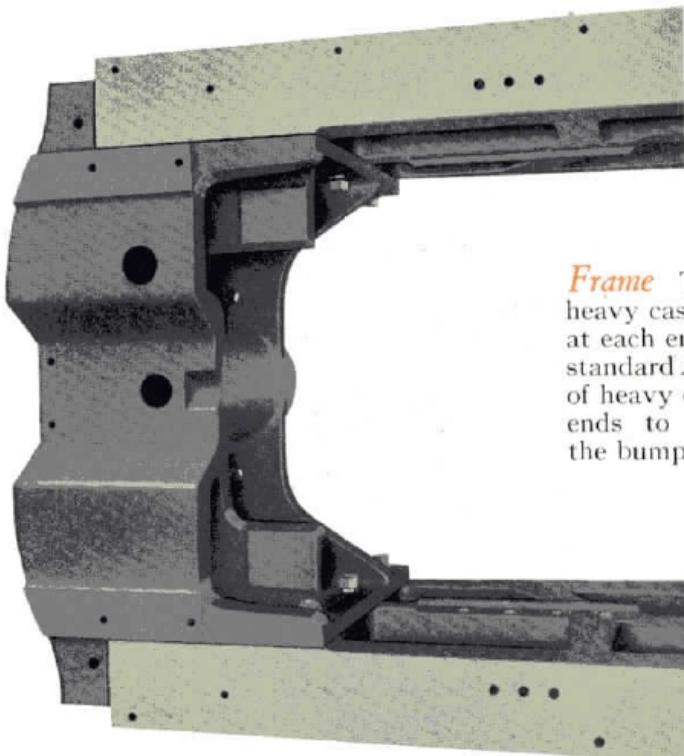
The boxings are retained in their proper position by chilled iron slides which are held to the frame by large bolts in slotted holes and backed by shims, thus providing easy and positive chain adjustment.

Sprockets Are of large diameter with cut teeth. Driving sprockets on the transmission are solid type. Driven sprockets are split plate type bolted to the sprocket hubs.

This design permits sprocket renewals without removing axles or wheels.



Plymouth Locomotives are Built on a Solid Frame



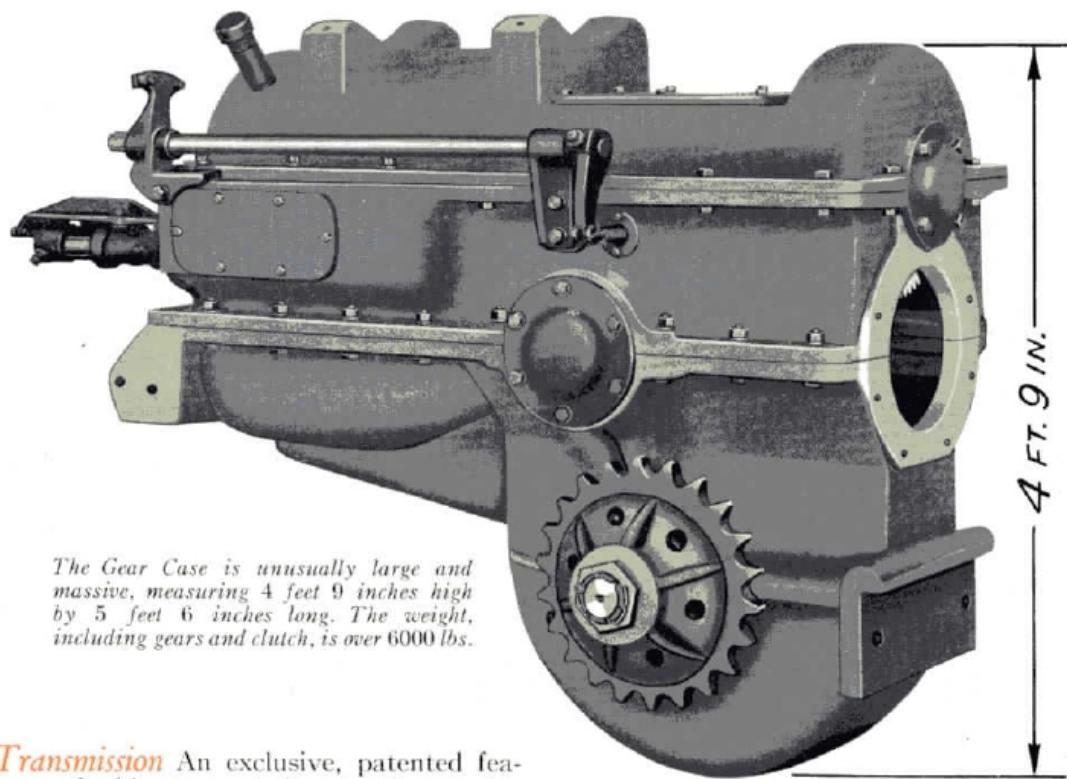
Frame The Frame is built up with four heavy cast-steel main sections. The bumpers at each end are recessed for coupler links and standard A. R. A. couplers; and the side frames of heavy open three-bar type, finished at the ends to bear against machined flanges on the bumpers.

Bumpers and Side Frames

The Bumpers and Side Frames are fastened together with drive-fitted bolts, and being held tightly against the flanges on the bumpers, all loads and shocks are taken by the frame as a whole, instead of the bolts which tie it together. The open bar type frame permits ready accessibility to all parts underneath the Locomotive.



Completely Assembled Patented Transmission



The Gear Case is unusually large and massive, measuring 4 feet 9 inches high by 5 feet 6 inches long. The weight, including gears and clutch, is over 6000 lbs.

Transmission An exclusive, patented feature of this transmission is the double reduction drive in the upper section of the gear case which provides for a wide range of speed between low and high, using gears of the best proportion.

A special feature is the reversing mechanism and final drive.

Forward and reverse is obtained by driving two large bevel gears with one pinion which rotates these gears in opposite directions. Between these large bevel gears and on the same shaft is a sliding pinion which can be moved sideways to engage internal teeth in one or the other of the large bevel gears, and as the sliding pinion meshes with the final driving gear, the direction of rotation of this gear is changed by sliding the pinion to one side or the other.

The use of the large final driving gear provides a suitable gear reduction, well proportioned gears and large driving sprockets, and places the final driving shaft near the same plane of the axles.

The gears throughout the transmission are of very wide face and large diameter, made of alloy steel, with cut and hardened teeth.

The sliding gears are made in pairs giving them long hubs which slide easily on the splined shafts.

The shafting is of high grade alloy steel, of ample size, and well supported by ball and roller bearings.

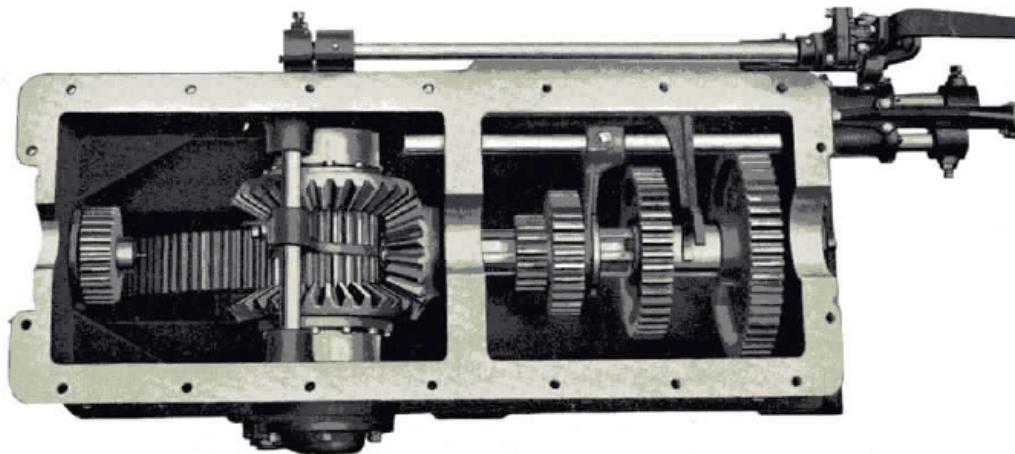
Lubrication for gears, bearings and shafting is provided for by running the gears in oil which is splashed to all interior parts of the transmission.

Chain Drive The driving sprockets on the transmission are mounted between the axles, and in the same plane as the axle centers. Chains are short, of heavy roller type. Large diameter sprockets, with very little variation in chain length, assures long chain life.



Partially Assembled Transmission

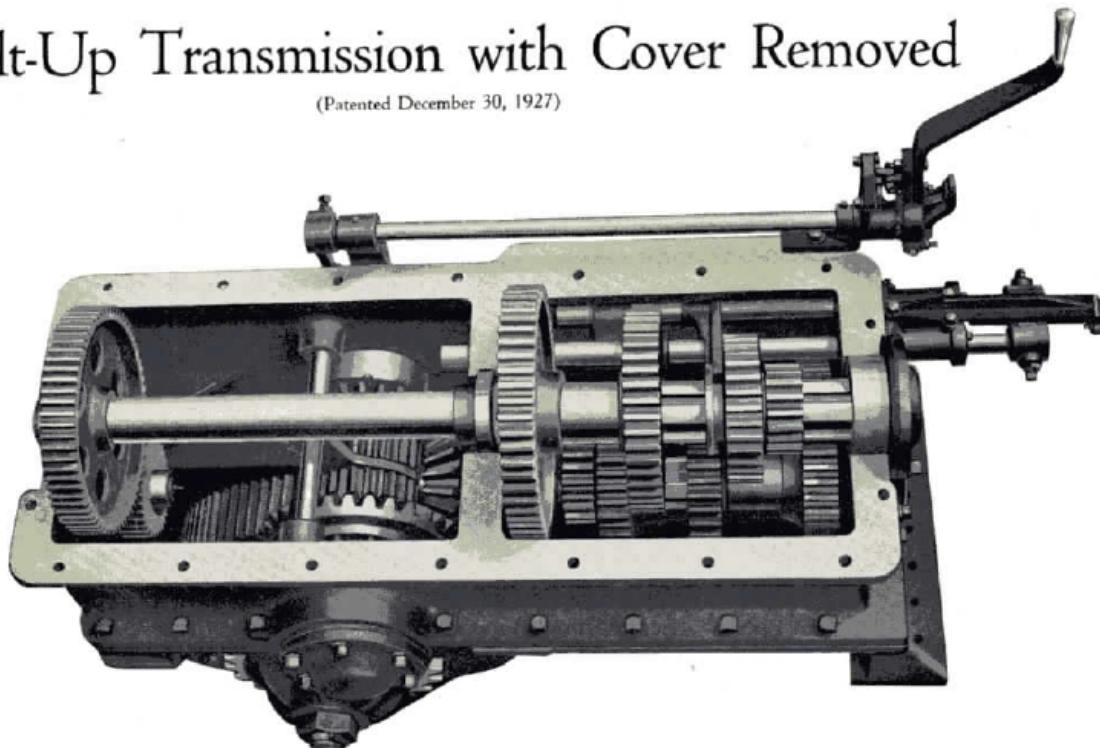
(Patented December 30, 1927)



*A portion of the massive final driving gear may be seen at the left.
This gear is 28½ inches in diameter by 5 inch face.*

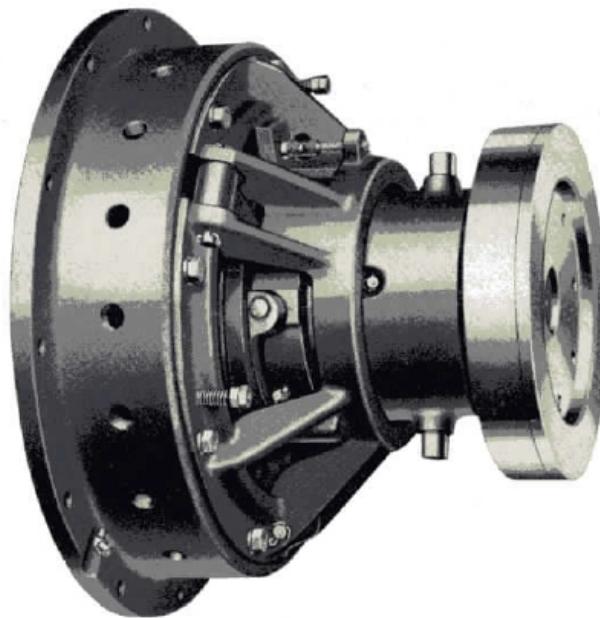
Built-Up Transmission with Cover Removed

(Patented December 30, 1927)



The gears in this transmission are 2½ inch to 5 inch face and of large diameter.

Clutch Assembly Complete



*Plymouth Clutch, 16 inches in diameter. 6 facings used for 6 cylinder engine; 8 facings for 8 cylinder.
Clutch is removable without moving engine or transmission.*

Clutch The Plymouth Clutch has been designed especially for locomotive service. It is built up in one compact unit, and may easily be removed for relining without disturbing any other part of the Locomotive.

The clutch is driven through special metal plates, each having eighteen driving teeth which engage with teeth in the driving drum on the engine flywheel. Between each of the driving plates are the steel driven plates, to which are riveted long wearing composition friction facings. Pressure for engaging the clutch is furnished by a heavy central spring and multiplied through three balanced levers, which bear against the adjusting ring and through that to the clutch plates.

Adjustments to take up wear in the plates or friction facings, is obtained by rotation of the threaded adjusting ring. This moves

in the outer threaded clutch plate, bringing the plates closer together. The adjusting ring is held in adjustment by a thumb operated indexing screw. The constant pressure of the long central spring automatically takes up clutch wear, making adjustment of the clutch seldom necessary.

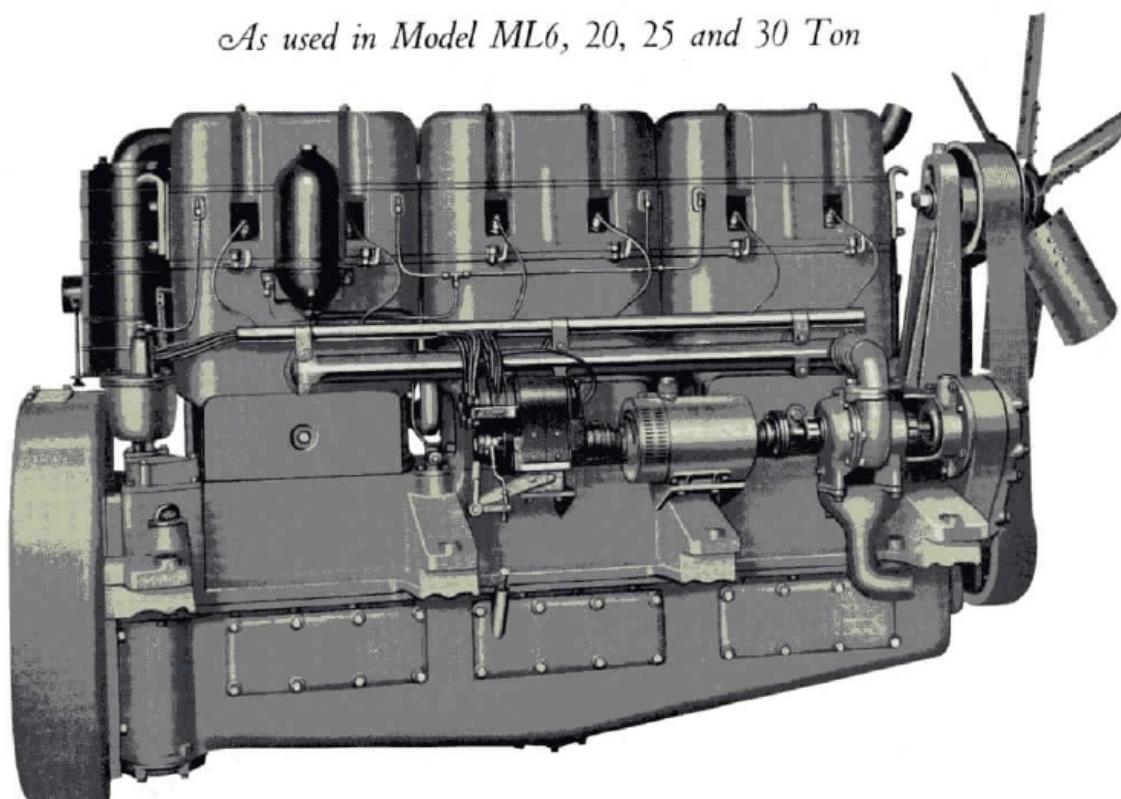
Positive cooling of the clutch plates is provided by air holes through the driven plates near the clutch hub, and there are holes drilled between each of the teeth in the driving drum.

This provides a strong circulation of air through the entire clutch, which removes heat and dust, insuring long life. Provision is made for lubricating the clutch pilot-bearing by a hole drilled through the clutch driving drum.



Le Roi Six Cylinder Engine Power Plant

As used in Model ML6, 20, 25 and 30 Ton



GENERAL INFORMATION

| | |
|-------------------------------|------------------------|
| No. of cylinders | 6 |
| Bore and stroke | 6 $\frac{3}{4}$ " x 7" |
| Max. H.P. at 1200 R.P.M. | 183 |
| Rated H.P. at 1000 R.P.M. | 175 |
| Piston displacement (cu. in.) | 1500 |
| Engine suspension | 8 point |

CYLINDERS — DETACHABLE

| | |
|----------|--------------------|
| Cast | In pairs |
| Material | Chrome nickel iron |
| Heads | Detachable |

VALVES

| | |
|----------|---------------------|
| Diameter | 2 $\frac{13}{16}$ " |
| Lift | 1 $\frac{13}{32}$ " |

CAMSHAFT

| | |
|--------------|------------------------------------|
| Location | In crank case |
| Bearings | Bronze |
| Drive | Helical gear, front end crank case |
| Cam follower | Roller type |

PISTON

| | |
|-----------------------------|---------------------------------------|
| Material | Alloy |
| Length | 8 $\frac{1}{2}$ " |
| Pin diameter and length | 1 $\frac{3}{4}$ " x 6 $\frac{1}{4}$ " |
| Bearing diameter and length | 1 $\frac{3}{4}$ " x 3" |
| No. rings per piston | 4 |

CONNECTING RODS

| | |
|-----------------------------|---------------------------------------|
| Material | Duralumin |
| Bearing diameter and length | 3 $\frac{1}{2}$ " x 3 $\frac{3}{4}$ " |

CRANKSHAFT — DROP FORGING

| | |
|---------------|---|
| Material | Chrome nickel steel |
| Main bearings | 4 |
| Type | Babbit, bronze backed |
| Diameter | 3 $\frac{3}{4}$ " |
| Lengths | Front 5 $\frac{1}{4}$ " Center 3 $\frac{3}{4}$ " Rear 5 $\frac{1}{4}$ " |

OILING SYSTEM

| | |
|--|-----------|
| Purolator Oil Filter | |
| Pressure to crankshaft bearings, connecting rod bearings, and rocker arms. | |
| Pump | Gear type |
| Location | Oil sump |
| Sump capacity | 8 gal. |

COOLING — CENTRIFUGAL PUMP

| | |
|----------------|---------------------------|
| Water capacity | 25 gal. |
| Fan | 30" — 6 blade belt driven |

CARBURETOR

2 — Stromberg UT4

IGNITION

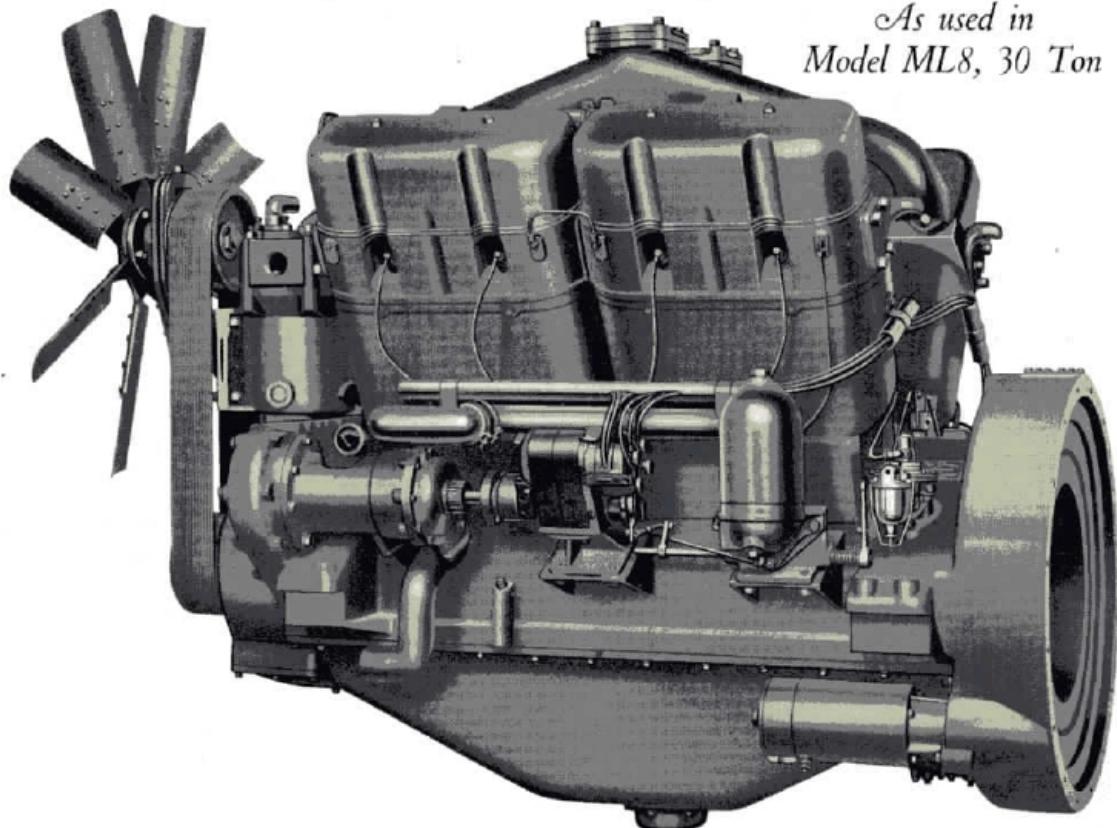
Robert Bosch twin spark magneto

GOVERNOR — BUILT-IN FLY BALL

Maximum governed speed 1000 R.P.M.

Le Roi Eight Cylinder Engine Power Plant

*As used in
Model ML8, 30 Ton*



GENERAL INFORMATION

| | |
|-------------------------------|-----------------------------|
| No. of cylinders | 8 |
| Bore and stroke | $6\frac{3}{4}'' \times 7''$ |
| Max. H.P. at 1200 R.P.M. | 265 |
| Rated H.P. at 1000 R.P.M. | 250 |
| Piston displacement (cu. in.) | 2004 |
| Engine suspension | 4 point |

CYLINDERS — DETACHABLE

| | |
|----------|--------------------|
| Cast. | In pairs |
| Material | Chrome nickel iron |
| Heads | Detachable |

VALVES

| | |
|----------|--------------------|
| Diameter | $2\frac{13}{16}''$ |
| Lift | $1\frac{3}{8}''$ |

CAMSHAFT

| | |
|--------------|------------------------------------|
| Location | In crank case |
| Bearings | Bronze |
| Drive | Helical gear, front end crank case |
| Cam follower | Roller type |

PISTON

| | |
|-----------------------------|--|
| Material | Ray Day Alloy |
| Length | $8\frac{3}{8}''$ |
| Pin diameter and length | $1\frac{3}{4}'' \times 6\frac{1}{4}''$ |
| Bearing diameter and length | $1\frac{3}{4}'' \times 3''$ |
| No. rings per piston | 4 |

CONNECTING RODS

| | |
|-----------------------------|--|
| Material | Chrome nickel steel |
| Bearing diameter and length | $3\frac{1}{2}'' \times 3\frac{3}{4}''$ |

CRANKSHAFT — DROP FORGING

| | |
|---------------|-----------------------|
| Material | Chrome nickel steel |
| Main bearings | 4 |
| Type | Babbit, bronze backed |
| Diameter | $3\frac{3}{4}''$ |
| Front | $5\frac{1}{4}''$ |
| Lengths | $3\frac{3}{4}''$ |
| Center | $5\frac{1}{4}''$ |
| Rear | $5\frac{1}{4}''$ |

OILING SYSTEM

| | |
|--|-----------|
| Purolator Oil Filter | |
| Pressure to crankshaft bearings, connecting rod bearings and rocker arms | |
| Pump | Gear type |
| Location | Oil Sump |
| Sump capacity | 8 gal. |

COOLING — CENTRIFUGAL PUMP

| | |
|----------------|---------------------------|
| Water capacity | 30 gal. |
| Fan | 36" — 8 blade belt driven |

CARBURETOR

Two Robert Bosch twin spark magneto

GOVERNOR — BUILT-IN FLY BALL

Maximum governed speed 1000 R.P.M.



Condensed Specifications

Model ML6 20 Ton, ML6 25 Ton, ML6 30 Ton and ML8 30 Ton Gasoline Locomotives

| Speeds | <i>Standard</i> | 2.6, 5.6, 9.7 and 15.6 M.P.H. | <i>Engine Speed</i> | 1,000 R.P.M. |
|----------------------------|--|--|--|---------------|
| | <i>Special</i> | 2.6, 5.6, 10.9 and 23.4 M.P.H. | <i>Engine Speed</i> | 1,000 R.P.M. |
| Tractive Force | All ML6 | 20,192 lbs. | ML8, 28,821 lbs. | at 2.6 M.P.H. |
| Draw Bar Pull | In pounds. | | | |
| Model | ML6-20 | ML6-25 | ML6-30 | ML8-30 |
| 2.6 M.P.H. on dry rail.. | 10,000 | 12,500 | 15,000 | 15,000 |
| 2.6 M.P.H. sanded rail. | 13,333 | 16,666 | 20,000 | 20,000 |
| 5.6 M.P.H..... | 9,373 | 9,373 | 9,373 | 13,387 |
| 9.7 M.P.H..... | 5,412 | 5,412 | 5,412 | 7,728 |
| 15.6 M.P.H..... | 3,365 | 3,365 | 3,365 | 4,807 |
| Special 3rd and 4th Speeds | | | | |
| 10.9 M.P.H..... | 4,816 | 4,816 | 4,816 | 6,882 |
| 23.4 M.P.H..... | 2,244 | 2,244 | 2,244 | 3,205 |
| Gauge | 36" | to 56½" | inclusive. Wheels outside of frame for 56½" gauge, inside of frame for other gauges. | |
| Wheel Base | 83½". | | | |
| Length | Over bumpers 19' 0". | With full size A.R.A. couplers, coupled length 21' 1". | | |
| Height | 10' 6". | | | |
| Width | 9' 7" for 56½" gauge. | 8' 0" for 36" gauge. | | |
| Couplers | Center of link and pin pockets in bumper 18½", 24", 28½" and 33½" above top of rail. Full size A.R.A. couplers 33½" above top of rail. ¾ size A.R.A. coupler heights to order. | | | |
| Frame | Three-Bar steel type of special design for mounting and equalizing semi-elliptic springs. Bumpers are of steel castings, very strong and rigidly attached to side frames. | | | |
| Engine | LeRoi RXIS 6 cylinder, 6¾" bore, 7" stroke, 175 H.P. at 1,000 R.P.M. used on ML6-20 Ton, ML6-25 Ton, ML6-30 Ton Locomotives. LeRoi RXVI 8 cylinder, V type, 6¾" bore, 7" stroke, 250 H.P. at 1,000 R.P.M. used on ML8-30 Ton Locomotive. | | | |
| Ignition | For the 6 cylinder engine, dual spark Robert Bosch high tension magneto. For the 8 cylinder engine two dual spark Robert Bosch magneto's are used. 64 Cu. Ft. displacement air compressors are built into each engine. | | | |
| Starters | Two powerful Leece-Neville 12-volt starters are used on each engine. | | | |
| Generator | 6" diameter 12-volt Leece-Neville generator used on the 6 cylinder engine. 7" diameter Leece-Neville on the 8 cylinder engine. Voltage regulation on both. | | | |
| Battery | Willard GHLR30, 140 Amp. hour with threaded rubber insulation. | | | |
| Carburetor | Two Stromberg UT4 used on the 6 cylinder engine. One Stromberg UT7 on the 8 cylinder engine. | | | |
| Air Cleaners | Two oil wetted air cleaners used on each engine. | | | |
| Governor | Built in flyball type. | | | |
| Cooling | Modine sectional core single thickness and 30" six blade fan used to cool 6 cylinder engine. Capacity of cooling system 25 gallons. Modine sectional core double thickness and 36" | | | |

eight blade fan used to cool 8 cylinder engine. Capacity of cooling system 30 gallons.

Clutch — Plymouth dry plate, 6 facings, 16" diameter, spring actuated used for the 6 cylinder engine.

A clutch with 8 facings 16" diameter of similar design is used for the 8 cylinder engine. Clutch is removable without moving engine or transmission.

Transmission — Plymouth patented, double reduction, 4 speed forward and reverse, 1 to 1 ratio drive by roller chain to each axle. Gears of alloy steel cut and hardened with faces 2½" to 5" wide and 6½" to 28½" diameter. All bearings either ball or Timken.

Gear Ratio — Between engine and axles. Standard speeds 37.7 to 1, 17.6 to 1, 10 to 1 and 6.3 to 1. Special speeds have the 3rd and 4th gear ratio 9 to 1 and 4.2 to 1.

Sprockets — Driving, 22 teeth made in one piece; driven, 22 teeth of split-plate type bolted to hubs on axles. 1045 S.A.E. steel, cut teeth.

Chains — Roller chain 2½" pitch of extra strong design.

Axles — Alloy steel, 6½" diameter, heat treated. Timken roller bearings in dust proof grease tight boxings.

Wheels — Rolled steel 33" diameter A.R.A. 1920 flange and tread. Tread 4½" wide, overall width 5½". Steel Tired Wheels can be furnished at extra cost.

Brakes — Two air brake cylinders, one on each side. Lever type of brake rigging, detachable brake shoes covering treads and flanges of all wheels. Hand wheel brake for emergencies. Westinghouse straight air, standard equipment. Westinghouse AMM system of straight and automatic air using one combined brake valve, or Westinghouse 14 EL system of straight and automatic air using two brake valves, furnished at extra cost.

Sanders — Sand to each wheel through air-operated sand valves under sand dome mounted on canopy roof.

Springs — Semi-elliptic 48" long, 4½" wide, side and cross equalized.

Fuel Tank — 75 gallon capacity. Gravity feed for the 6 cylinder engine. Pump for the 8 cylinder engine.

Fuel Consumption — Depends entirely upon the work to be done. Estimates will be made when working conditions are known.

Lubrication — All bearings outside of engine and gear case are equipped with Alemite fittings.

Lights — 2 head lights, one at each end, instrument board lights, cab light, and trouble lamp and cord. Where required to meet I.C.C. requirements, classification lamps, marker lamps and head light dimmers are supplied.

Signals — Air whistle and bell.

Tools — A metal box with necessary wrenches and tools are furnished.



Haulage Capacity Tables

Model ML6, 20, 25 and 30 Ton

Engine — LeRoi, Model RXIS, 6 cylinder, 6 $\frac{3}{4}$ " bore, 7" stroke, 175 H.P. at 1000 R.P.M.

Tractive Force — Engine power applied to rails, at 80% efficiency = 20192 lbs. at 2.6 M.P.H.

Model ML6, 20-Ton, Hauling Capacity in Tons of 2000 lbs. in addition to weight of locomotive, with standard speeds, without sand.

| Frictional Resistance per ton | Level | | | | Percent of Grade | | | |
|-------------------------------------|--------------|--------------|--------------|---------------|------------------|--------------|--------------|---------------|
| | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. |
| 10 lbs. | 1000 | 937 | 541 | 337 | 490 | 459 | 290 | 158 |
| 15 lbs. | 667 | 625 | 361 | 224 | 392 | 367 | 240 | 130 |
| 20 lbs. | 500 | 469 | 271 | 168 | 327 | 306 | 174 | 106 |
| 30 lbs. | 333 | 313 | 180 | 112 | 245 | 229 | 130 | 104 |
| 40 lbs. | 250 | 234 | 135 | 84 | 196 | 184 | 104 | 63 |
| | 100 | 93 | 54 | 33 | 49 | 45 | 29 | 15 |
| | 66 | 62 | 36 | 22 | 39 | 36 | 24 | 13 |
| | 50 | 46 | 27 | 16 | 32 | 30 | 17 | 10 |
| | 33 | 31 | 18 | 11 | 24 | 22 | 13 | 10 |
| | 25 | 23 | 13 | 8 | 19 | 18 | 10 | 6 |

Model ML6, 25-Ton, Hauling Capacity in Tons of 2000 lbs. in addition to weight of locomotive, with standard speeds, without sand.

| Frictional Resistance per ton | Level | | | | Percent of Grade | | | |
|-------------------------------------|--------------|--------------|--------------|---------------|------------------|--------------|--------------|---------------|
| | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. |
| 10 lbs. | 1250 | 937 | 541 | 337 | 613 | 456 | 258 | 156 |
| 15 lbs. | 833 | 625 | 361 | 224 | 392 | 367 | 240 | 130 |
| 20 lbs. | 628 | 469 | 271 | 168 | 308 | 304 | 175 | 104 |
| 30 lbs. | 417 | 313 | 180 | 112 | 245 | 229 | 130 | 103 |
| 40 lbs. | 313 | 234 | 135 | 84 | 196 | 184 | 104 | 63 |
| | 125 | 93 | 54 | 33 | 61 | 45 | 25 | 15 |
| | 83 | 62 | 36 | 22 | 39 | 36 | 24 | 13 |
| | 62 | 46 | 27 | 16 | 30 | 30 | 17 | 10 |
| | 41 | 31 | 18 | 11 | 24 | 22 | 13 | 10 |
| | 31 | 23 | 13 | 8 | 19 | 18 | 10 | 6 |

Model ML6, 30-Ton, Hauling Capacity in Tons of 2000 lbs. in addition to weight of locomotive, with standard speeds, without sand.

| Frictional Resistance per ton | Level | | | | Percent of Grade | | | |
|-------------------------------------|--------------|--------------|--------------|---------------|------------------|--------------|--------------|---------------|
| | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. |
| 10 lbs. | 1500 | 937 | 541 | 337 | 80 | 293 | 121 | 65 |
| 15 lbs. | 1000 | 625 | 361 | 224 | 111 | 251 | 100 | 55 |
| 20 lbs. | 750 | 469 | 271 | 168 | 490 | 360 | 170 | 90 |
| 30 lbs. | 500 | 313 | 180 | 112 | 368 | 227 | 128 | 77 |
| 40 lbs. | 375 | 234 | 135 | 84 | 294 | 182 | 102 | 61 |
| | 150 | 93 | 54 | 33 | 80 | 29 | 12 | 6 |
| | 100 | 62 | 36 | 22 | 111 | 25 | 10 | 5 |
| | 75 | 46 | 27 | 16 | 49 | 36 | 17 | 9 |
| | 50 | 31 | 18 | 11 | 24 | 14 | 7 | 4 |
| | 37 | 23 | 13 | 8 | 19 | 13 | 7 | 3 |

Model ML6, 20, 25 and 30-Ton, Hauling Capacity in Tons of 2000 lbs. in addition to weight of locomotive, with special speeds in third and fourth gear.

| Frictional Resistance Per Ton | Level | | | | Percent of Grade | | | |
|-------------------------------------|--------------|--------------|--------------|---------------|------------------|--------------|--------------|---------------|
| | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. | 2.6 M. P. H. | 3.0 M. P. H. | 9.7 M. P. H. | 15.0 M. P. H. |
| 10 lbs. | 482 | 224 | 226 | 97 | 141 | 55 | 98 | 34 |
| 15 lbs. | 321 | 150 | 181 | 78 | 120 | 50 | 87 | 30 |
| 20 lbs. | 241 | 112 | 151 | 65 | 105 | 41 | 78 | 21 |
| 30 lbs. | 161 | 75 | 113 | 49 | 74 | 33 | 65 | 15 |
| 40 lbs. | 120 | 56 | 90 | 39 | 70 | 27 | 56 | 12 |
| | 48 | 22 | 22 | 9 | 14 | 7 | 9 | 3 |
| | 32 | 15 | 18 | 7 | 12 | 6 | 8 | 2 |
| | 24 | 11 | 15 | 6 | 10 | 5 | 7 | 1 |
| | 16 | 7 | 11 | 4 | 7 | 4 | 5 | 1 |
| | 10 | 5 | 6 | 3 | 4 | 2 | 3 | 0.5 |



LOCO
SERIAL No 3924

Haulage Capacity Tables

ML8, 30 Ton

Engine — LeRoi, Model RXVI, 8 cylinder, $6\frac{3}{4}$ " bore, 7" stroke, 250 H.P. at 1000 R.P.M.
Tractive Force — Engine power applied to rails, at 80% efficiency = 28821 lbs. at 2.6 M.P.H.

Model ML8, 30 Ton, Hauling Capacity in Tons of 2000 lbs. in addition to weight of locomotive, with standard speeds, without sand.

| Frictional Resistance per ton | Level | | | | | Percent of Grade | | | | | | | | | | | | | | |
|-------------------------------------|--------------|--------------|--------------|---------------|--------------|------------------|--------------|---------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|----|
| | 2.6 M. P. H. | 5.6 M. P. H. | 0.7 M. P. H. | 15.6 M. P. H. | 2.0 M. P. H. | 5.6 M. P. H. | 0.7 M. P. H. | 16.0 M. P. H. | 2.0 M. P. H. | 5.6 M. P. H. | 0.7 M. P. H. | 15.6 M. P. H. | 2.0 M. P. H. | 5.6 M. P. H. | 0.7 M. P. H. | 15.6 M. P. H. | 2.0 M. P. H. | 5.6 M. P. H. | 0.7 M. P. H. | |
| 10 lbs. | 1500 | 1339 | 773 | 481 | 735 | 654 | 371 | 225 | 480 | 426 | 238 | 140 | 353 | 312 | 171 | 98 | 276 | 244 | 131 | 72 |
| 15 lbs. | 1000 | 892 | 515 | 320 | 588 | 523 | 297 | 180 | 411 | 365 | 204 | 120 | 311 | 278 | 152 | 87 | 261 | 222 | 119 | 66 |
| 20 lbs. | 750 | 669 | 386 | 240 | 400 | 436 | 248 | 150 | 360 | 310 | 178 | 105 | 282 | 250 | 137 | 78 | 230 | 203 | 109 | 60 |
| 30 lbs. | 500 | 446 | 258 | 160 | 303 | 327 | 186 | 113 | 288 | 256 | 143 | 84 | 235 | 208 | 114 | 65 | 197 | 174 | 93 | 52 |
| 40 lbs. | 375 | 335 | 193 | 120 | 291 | 262 | 149 | 90 | 240 | 213 | 119 | 70 | 201 | 178 | 98 | 56 | 173 | 152 | 82 | 45 |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

Hauling Capacity in Tons of 2000 lbs. in addition to weight of locomotive, with special speeds in third and fourth gear.

| Frictional Resistance per ton | 10.9 M. P. H. | | | | | 23.4 M. P. H. | | | | | 10.9 M. P. H. | | | | | 23.4 M. P. H. | | | | | 10.9 M. P. H. | | | | | 23.4 M. P. H. | | | | | |
|-------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-----|-----|-----|----|----|
| | 10.9 M. P. H. | 23.4 M. P. H. | | | | | |
| 10 lbs. | 682 | 320 | 326 | 145 | 207 | 87 | 148 | 58 | 113 | 40 | 276 | 224 | 131 | 72 | 225 | 198 | 104 | 55 | 189 | 166 | 50 | 153 | 79 | 40 | 133 | 116 | 55 | 227 | 109 | 43 | 17 |
| 15 lbs. | 455 | 213 | 261 | 116 | 178 | 74 | 132 | 51 | 102 | 36 | 261 | 222 | 119 | 66 | 262 | 183 | 96 | 50 | 176 | 155 | 79 | 40 | 133 | 116 | 55 | 225 | 109 | 43 | 17 | | |
| 20 lbs. | 341 | 160 | 217 | 97 | 156 | 65 | 119 | 31 | 91 | 23 | 230 | 203 | 109 | 60 | 193 | 170 | 89 | 47 | 165 | 145 | 74 | 38 | 126 | 110 | 53 | 24 | 100 | 87 | 40 | 15 | |
| 30 lbs. | 227 | 107 | 163 | 73 | 125 | 52 | 99 | 38 | 80 | 29 | 169 | 149 | 78 | 41 | 147 | 129 | 66 | 33 | 115 | 100 | 82 | 22 | 92 | 80 | 36 | 14 | 86 | 74 | 53 | 13 | |
| 40 lbs. | 171 | 80 | 131 | 58 | 104 | 43 | 85 | 33 | 70 | 25 | 150 | 132 | 66 | 37 | 132 | 116 | 59 | 30 | 105 | 92 | 44 | 20 | 86 | 74 | 53 | 13 | 86 | 74 | 53 | 13 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FRictional Resistances may be based on the following conditions:

Use 10 lbs. per ton, with extra good cars and track, no curves.

Use 15 lbs. per ton, with good cars and track, and no curves.

Use 20 lbs. per ton, with fair cars and track, and easy curves.

Use 30 lbs. with hard running cars, fair track, and curves.

Use 40 lbs. per ton for very poor cars and track, sharp curves.

Approximate Weight of Common Materials

| Materials | Lbs. per Cu. Yd. | Tons per Cu. Yd. | Materials | Lbs. per Cu. Yd. | Tons per Cu. Yd. |
|-------------------|---------------------|---------------------|------------|---------------------|---------------------|
| CEMENT | 2565 | 1.28 | FIRE CLAY | 3500 | 1.75 |
| CLAY—DRY | 1700 | .85 | GRAVEL—DRY | 2400 | 1.2 |
| CLAY—WET | 2900 | 1.45 | GRAVEL—WET | 3100 | 1.55 |
| CRUSHED STONE | 2700 | 1.35 | SAND—DRY | 2600 | 1.3 |
| EARTH—DRY & LOOSE | 2000 | 1.00 | SAND—WET | 3300 | 1.65 |

Average Weight of Contractors' Cars

| Capacity Yards | Dump | Gauge | Type | Weight | Capacity Yards | Dump | Gauge | Type | Weight |
|-------------------|------|--------|--------------|--------|-------------------|--------|-------|-----------|--------|
| 10 | HAND | 56 1/2 | Wood & Steel | 14,500 | 2 | HAND | 30 | All Wood | 2,800 |
| 8 | HAND | 36 | Wood & Steel | 17,000 | 1 1/2 | HAND | 24 | All Wood | 2,000 |
| 6 | HAND | 56 1/2 | Wood & Steel | 11,900 | 1 1/2 | HAND | 24 | All Steel | 2,700 |
| 5 | HAND | 36 | Wood & Steel | 6,900 | 1 | HAND | 24 | All Steel | 1,700 |
| 4 | HAND | 36 | Wood & Steel | 6,700 | 18 cu. ft. | ROCKER | 18 | All Steel | 975 |
| 4 | HAND | 36 | All Steel | 6,900 | 27 cu. ft. | ROCKER | 24 | All Steel | 1,100 |
| 4 | HAND | 36 | All Wood | 6,000 | 40 cu. ft. | ROCKER | 30 | All Steel | 1,645 |
| 3 | HAND | 36 | All Wood | 4,900 | | | | | |



Model ML6, 25-Ton, Standard Gauge Plymouth Locomotive at the Plant of Christ-Craft Corporation, Builders of Speed Boats, Algonac, Mich.

This Company writes: "Our 25-Ton Plymouth has given perfect performance, and we might say the same about our smaller locomotive which we purchased from you two or three years ago.

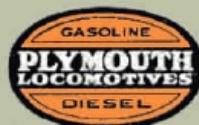
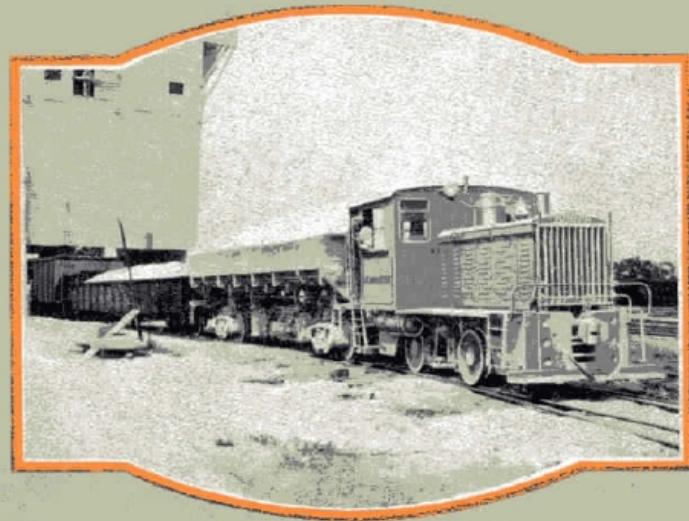
"If your entire production has as little service problems as these two locomotives have given us you certainly are in an enviable position."



One of the Two Model ML6, 25-Ton, 36-inch Gauge, Plymouth Locomotives at No. 4 Quarry of Wagner Quarries Company, Sandusky, Ohio

This Company also owns an ML6, 30-ton, standard gauge Plymouth. They write: "Our two 25-ton Plymouths replaced three 21-ton Steam Loco-

motives and produce one-fifth more tonnage. The repairs on track are also much less because of the easier riding qualities of the Plymouths."



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