

Maine Ref 316
Manufacture

Important - Historical

LOMBARD

TRACTOR  TRUCK

COMBARD

MAINE STATE LIBRARY

THE LOMBARD AUTO TRACTOR-TRUCK

The *Lombard Auto Tractor-Truck* first patents were issued in 1901, the latest was applied for in 1916. We call special attention to this significant fact -- it means that almost fifteen years of tireless effort has been the means of producing a thoroughly tried *tractor* and *truck* in a combination from which there has been eliminated the weaknesses and faults in construction found in many of the new imitations which have been offered to the public, but which they have been unable to eliminate or have not had the long practical experience necessary to overcome. About forty of our gasoline machines were given *three years' practical tests* in the lumber woods and on bare ground and snow and on different classes of work *before* being offered in the markets of the world.

Lombard machinery is known all over the world -- Lombard Water Wheel Regulators are in use in every big water plant in the country -- Lombard machinery is found in nearly every pulp mill -- there never has been a Lombard invention that has not been a mechanical and commercial success, and the *Lombard Auto Tractor-Truck* is like the rest.

Patents, United States,	May 21, 1901
Dominion of Canada,	July 16, 1901
United States,	May 21, 1907
Dominion of Canada,	Nov. 19, 1907

Other patents pending

LOMBARD TRACTION ENGINE CO., Waterville, Maine



OUR AUTO TRACTOR-TRUCK

weighs $9\frac{1}{2}$ tons, and still the weight per square inch of bearing surface on ground is less than that of a horse's hoof.

When doing tractor work, it will carry from three to five tons on its own body and pull thirty to fifty tons behind it, this being controlled by the kind of roads, grades, etc.

As a truck on good roads the machine has the carrying capacity of a five to seven ton truck, and in places which would be impassable for a truck and on bad roads, across fields, etc., double the load of truck can be carried where the truck could not operate at all.

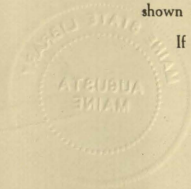
Having a speed of six miles per hour on high, with big loads on and behind, it is easy to see why actual daily tonnage delivered is greater than that of a truck. Does this not mean that *one* of our machines is equal to at least *two* of the slow speed tractors some are still using.

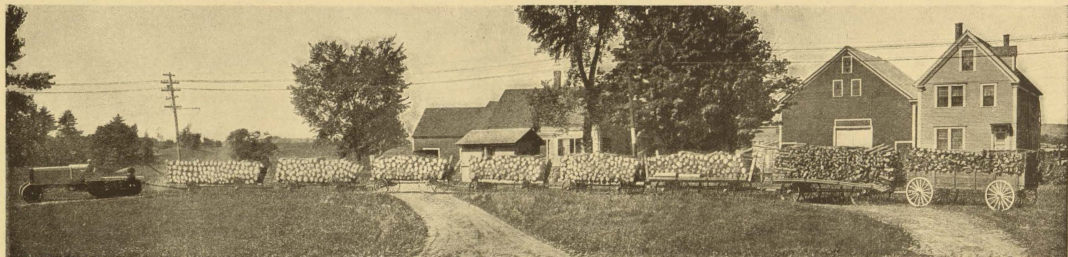
This combination of a tractor and a motor truck has three speeds -- two, four and six miles per hour -- which every one must admit is a most *important* improvement over the tractors that can only haul trailers at two and three-quarters to three miles per hour.

Think what it means to own a tractor of 100 h.p. that will carry *five tons on its own body*. This is an advantage, since in slippery mud on steep grades, if the road is so heavy that the treads start to slip, you only have to put a ton or two on the platform of the machine to give it additional traction, which will enable it to pull a load that a tractor, having only its own weight to give it traction, could not move.

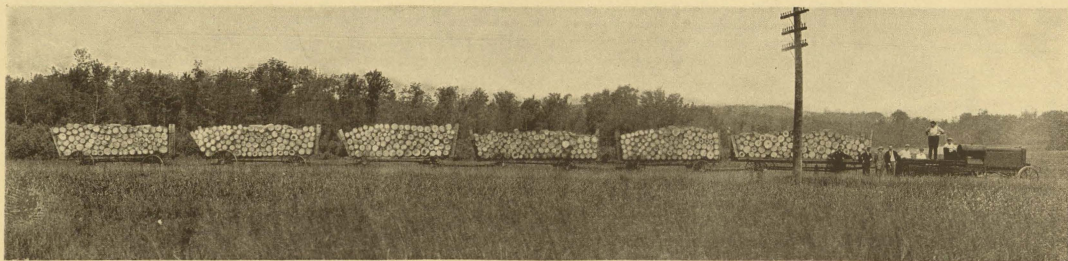
We have hauled twelve tons up a 24 per cent. grade on a slippery clay hill where the clay was so sticky that when uncoupling the tractor from the trailers, the trailers would not roll down hill even one inch on this 24 per cent. grade, as shown in photograph No. 2.

If you buy the *Lombard* you can work *every day in the year in mud, snow*, as well as on good roads.





100 h. p. Lombard hauling *eight* loaded trailers at 6 miles per hour



The Lombard 100 h. p. will pull a *larger load than any machine of its weight* in the market

EXTRACT FROM LETTER OF ONE OF OUR CUSTOMERS

J. S. BARRON,

221 West Broadway, New York City.

Dear Sir:

I have your letter of the 1st inst. making inquiry concerning Lombard Auto-Tractor.

In January, 1914, Mr. Lombard sent five of these machines here for a tryout (hauling lumber). I had **nine million feet** of spruce and cedar logs to be hauled. A distance of $2\frac{1}{2}$ miles. On one side of the river, there was a very rough road with a steep descent to the river with a very abrupt turn near the middle of it, and in addition there was a steady upgrade for nearly a mile. Mr. Lombard took the contract to do the hauling by the thousand feet. I had the option to buy the machines or any of them. It worked out just that way. **I bought all the machines.**

I could not possibly have put enough horses on the road to have hauled these logs in time. The machines work to perfection as they took these grades with a **full load without a hitch**. Loaded behind horses, ten pair of heavy horses could not take the load one of these machines would take at each trip.

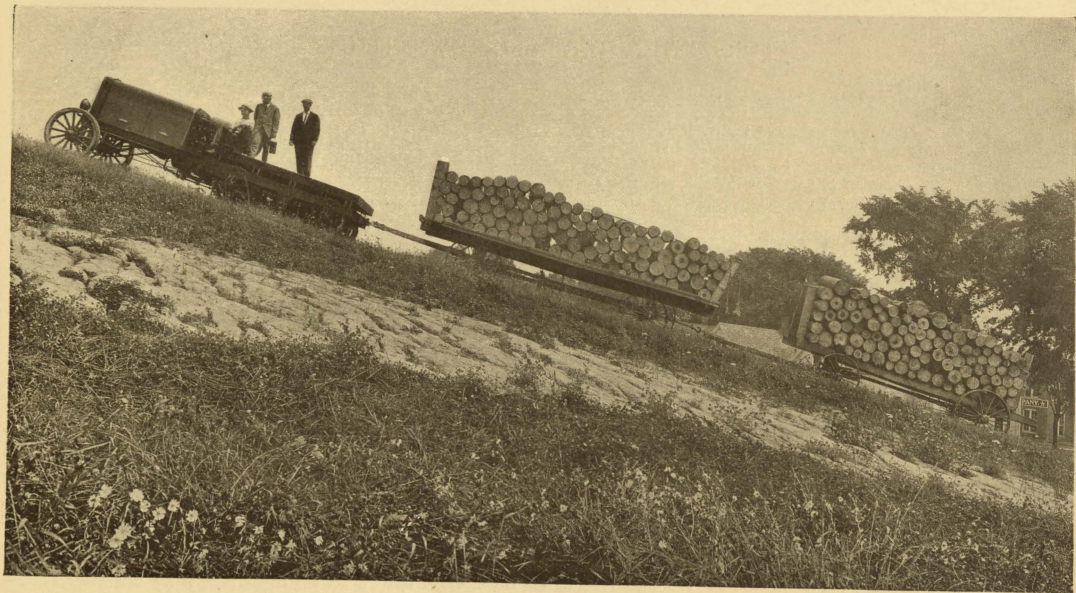
They will go over a **very poor road**, and make a **good road out of it**.

On one of my operations, the logs are being hauled over a seven mile road with grades **that teams could not go over at all**. It makes **accessible** places that are **inaccessible to teams**, and makes possible a **profitable** operation with long hauls which the length of the haul would make **unprofitable** or **impossible** with horses.

I have given these machines every kind of test and I am thoroughly satisfied.

Yours truly,

A. E. HAMMOND.



Pulling twelve tons up a 24% grade on slippery clay hill in demonstration to one of the foreign governments which has since purchased a large number of them as the result of their wonderful performance here and abroad

FOR CONTRACTOR'S AND TOWNSHIP USE

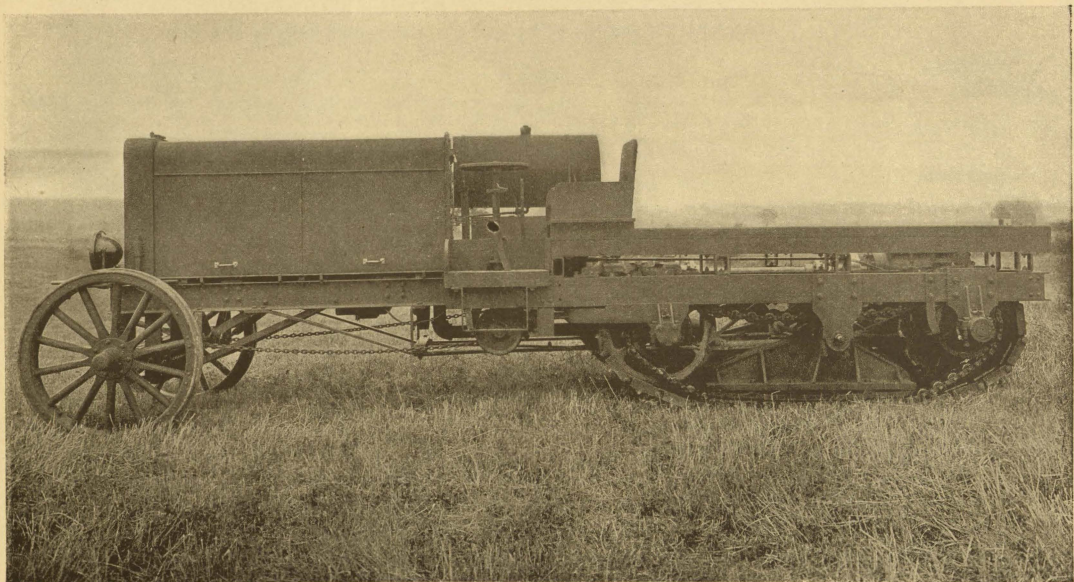
For contractor's and township use this machine is unequalled. Instead of using the motor truck with its big expense of upkeep he has a machine that does away with his steam-traction engine and which will *at least double* the number of trips per day that he can make with the steam machine or other type of gas tractors. This means saving in fuel, etc., and he is *absolutely sure* of delivering his load at the job and on time — no getting stalled on bad roads that trailers or wagons can be hauled through. For hauling two or three heavy road graders or as a snap team for loading four-wheel scrapers and handling scarifiers and work of this kind, only a contractor and town superintendent that has had the usual troubles with steam tractors and motor trucks can appreciate this machine.

The average motor truck enjoys comparatively easy operating conditions compared with a tractor, and trucks have not proved a success where they have attempted to infringe on the uses of the tractor, making necessary *two machines* for the two different classes of work. *We have combined the two* — think what this means to you and the difference in the expense of upkeep with *no rubber tires to replace* and the other expenses that go with the motor truck run at a high enough speed necessary to make it profitable.

Before purchasing a tractor or truck elsewhere you should have the best available practical mechanical engineer look over our 100 h.p. machines. Where it will cost a contractor 30 cents a yard to haul crushed stone with one of our machines, it will cost \$1.50 with horses, and where it will cost 30 cents a yard with horses, it will cost from 5 to 7 cents with our *Tractor-Truck*. This gives an idea of the profits that can be earned through its use.

The constant demand among tractor users has been for maximum power and higher speed, but until the *Lombard* 100 h. p. machine was put on the market the great power of a tractor has never been combined with a speed almost equal to that of a truck. This has been impossible because the treads of other makes would give out and not function at the high speed of six miles per hour. The *Lombard* has and will function and stand up even at a speed of *twenty miles per hour*, this speed being sometimes attained when coasting down steep grades on lumber operations with a heavy load of logs behind pushing the machine down grade.

This machine has special advantages for use in sections where there are numerous small bridges, as the weight of the machine is distributed over a great surface owing to the large bearing surface of the treads, and the steady running motor eliminates the usual vibration. For use on city streets and good roads we can furnish treads that will not injure pavement or the best of roads.



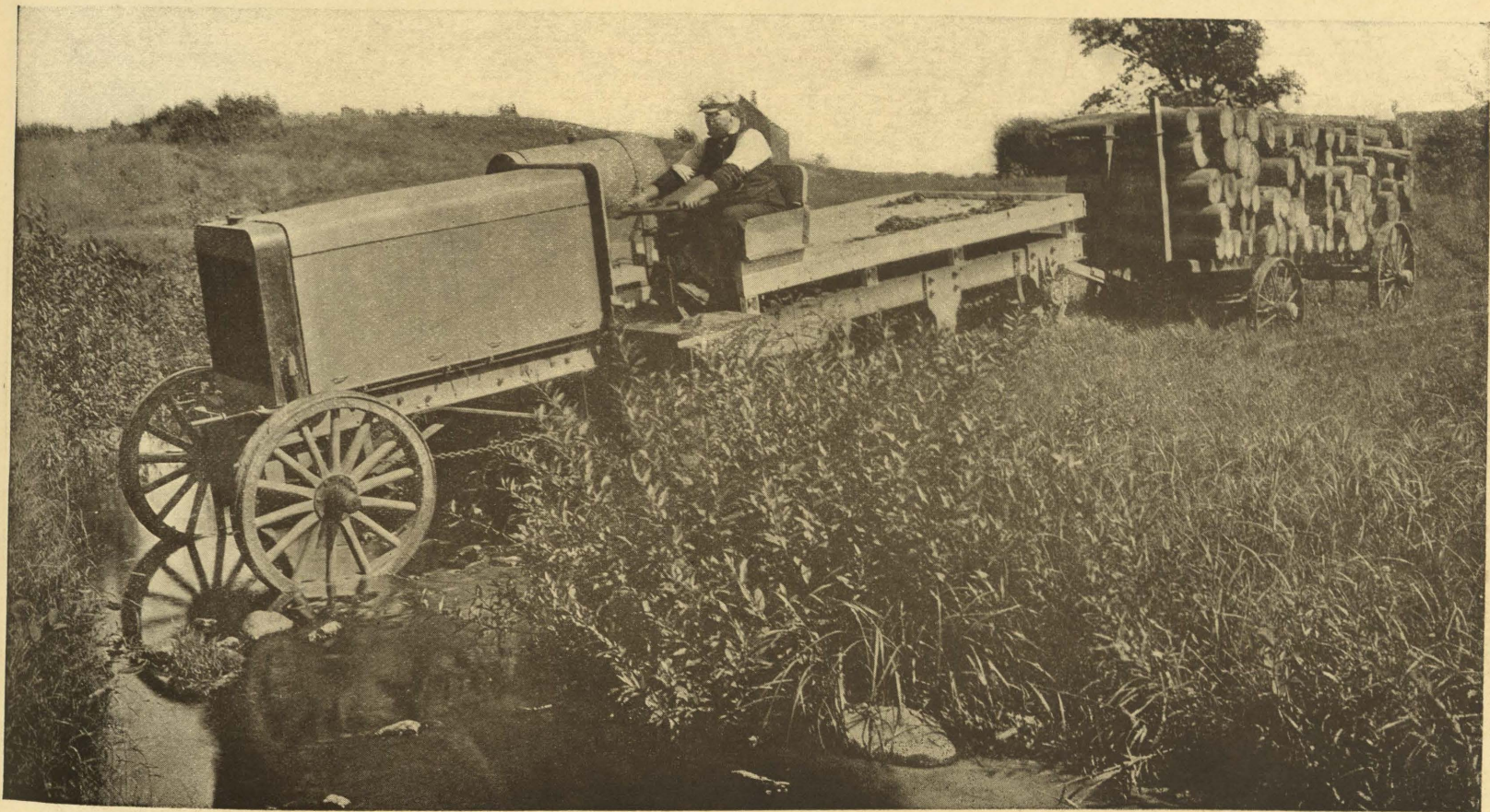
Lombard 100 h. p. Auto Tractor Truck which carries 5 to 7 tons on its own platform. 100 h. p. with motor running 1000 r. p. m. or 130 h. p. motor running at 1400 r. p. m. 1400 r. p. m. is not excessive speed for continuous work.

IMPORTANT ADVANTAGES FOUND IN NO OTHER MAKE BUT THE LOMBARD

1. Greater draw-bar pull and actual pulling power than that of any other tractor of its weight.
2. A creeping tread which ***never has to be oiled or greased***, this most important feature found ***only*** in our machine.
3. A tread which ***never*** clogs and which usually wears from two to four years and under favorable conditions several years longer.
4. A carrying platform which will carry five tons and more and which can be extended out a foot or two beyond the treads where light but bulky material is to be carried.
5. ***The only tractor truck in the market which has had seven years actual working tests.***
6. Only years of ***actual*** use enable a manufacturer to develop and overcome all the faults in a machine.
7. All the advantages of a ***tractor*** with carrying capacity and ***almost the speed of a truck.***

The following six photographs show the Lombard going cross country, and how it can and does travel where there are no roads. In many parts of the United States and in other countries there are sections a long distance from any railroad and where there are practically no roads, in these places the Lombard is invaluable as their use make possible the development of properties that otherwise might not be able to market their product through lack of means to ship their product to market.

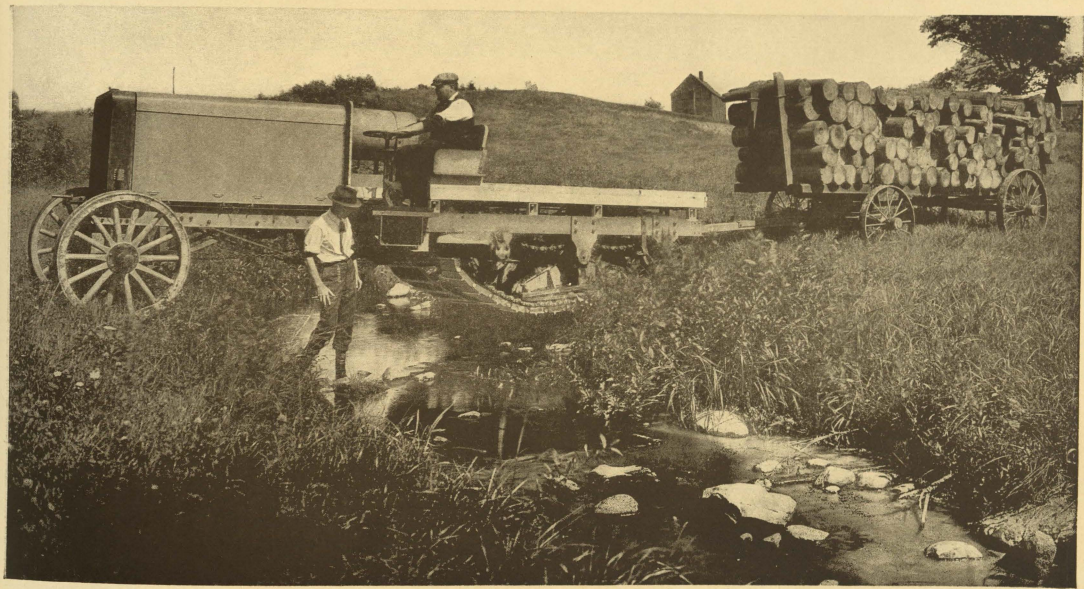
We have crossed ditches six feet wide and four feet deep, with straight up and down banks. The efficiency of this type of machine for crossing bad country has been proved by this type in crossing shell craters and ditches on the battlefields of Europe.



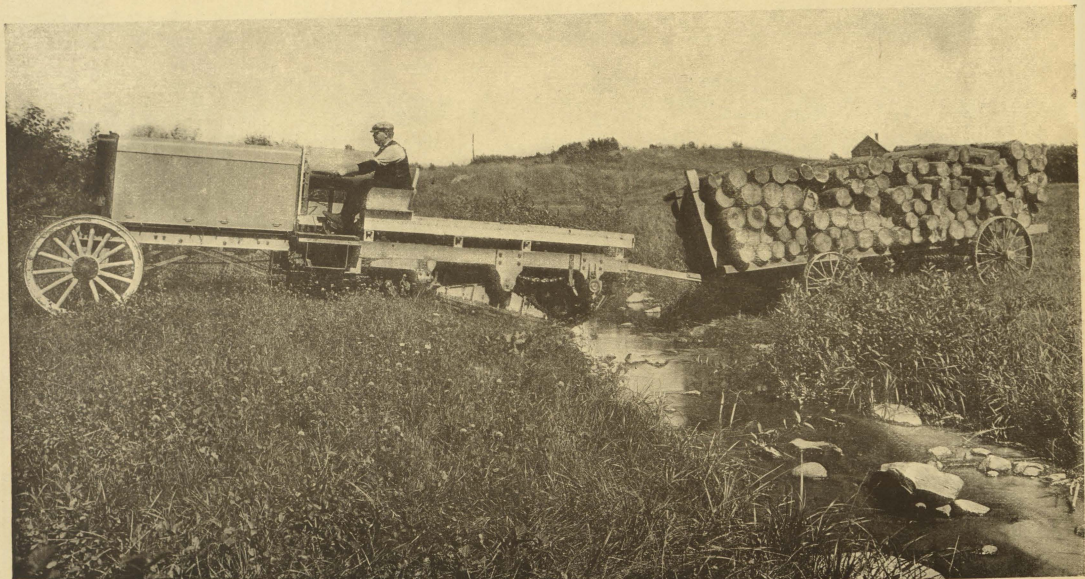
Entering a brook is easy, getting across and out is another matter



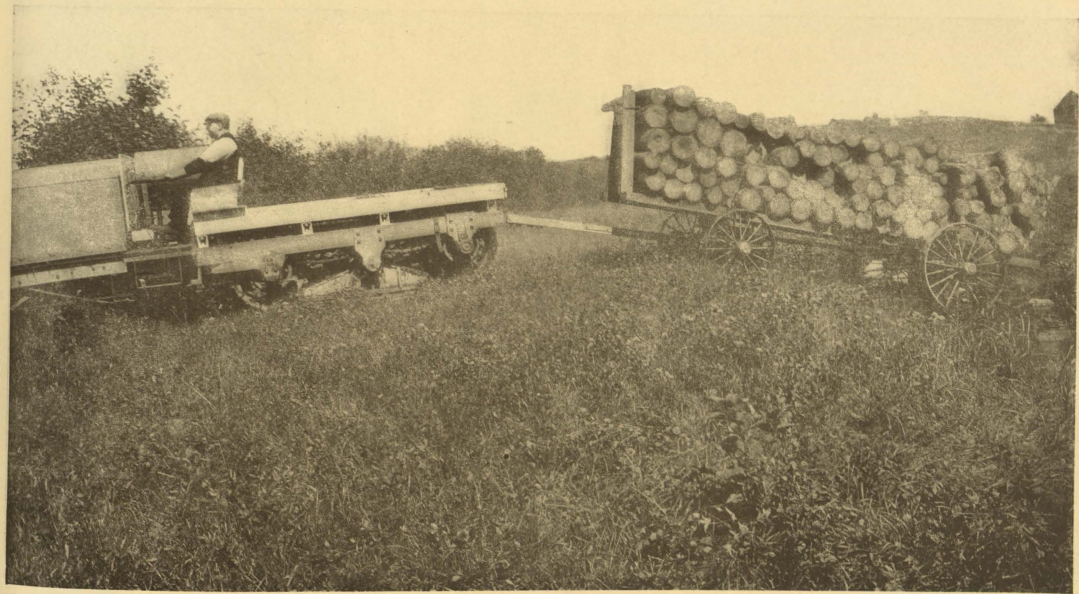
For cross-country work with heavy loads the Lombard has no equal, it will go where trailers cannot be hauled without turning over



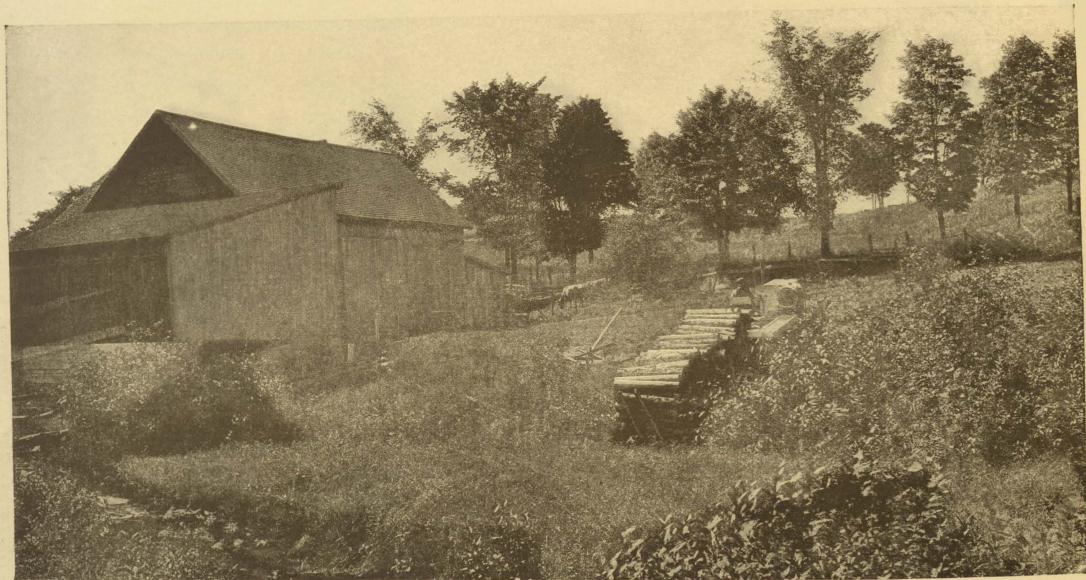
Note the height and width the machine is spanning and that only a small part of the tread has bearing on the bank, but it holds, there is no slip to this tread in difficult places



This one trailer is a light load for a Lombard but the farmer owning the land would not permit a string of them to cross as the ground was soft and the trailer only having 3 inch tires, cut the fields to pieces Note that the platform is level even while the machine is climbing the bank



On long hauls where fuel is difficult to obtain it can be carried on platform of machine in sufficient quantities to travel eight to ten days



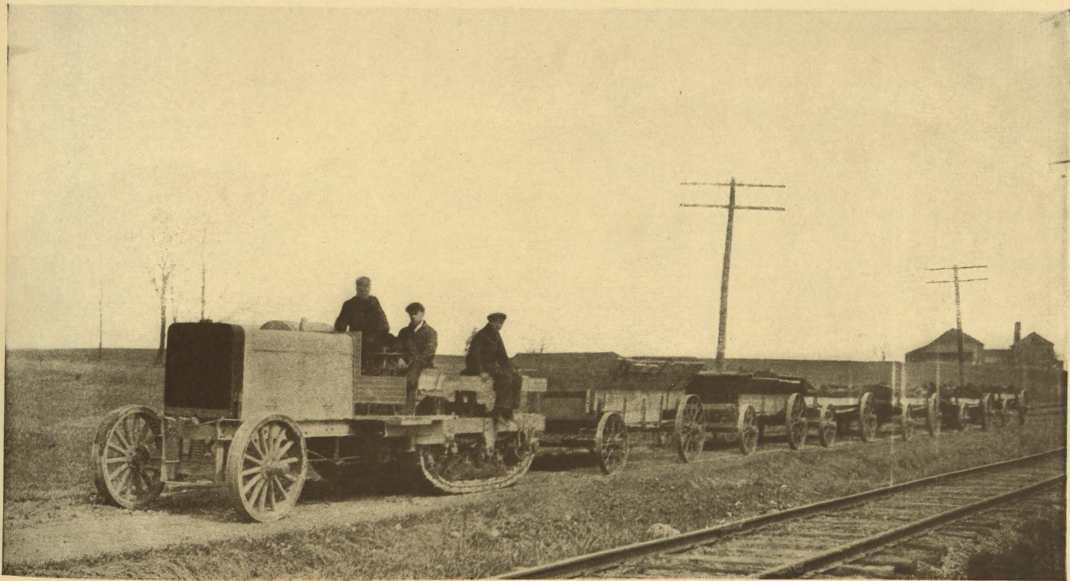
After having crossed brook, shown on lower part of photo, note the depth of hole it has gone through, you cannot see the trailer wheels at all but can see the top of the load of logs. These views give you the nearest to a moving picture that we can produce in a catalogue



41 ton load on 16% grade, this shows it on the grade and the following photo completes it



41 ton load on top of 16% grade; note that the grade at top is so steep that the fifth and sixth trailers are not in sight
The load you can haul varies according to the road conditions, trailers used, etc.



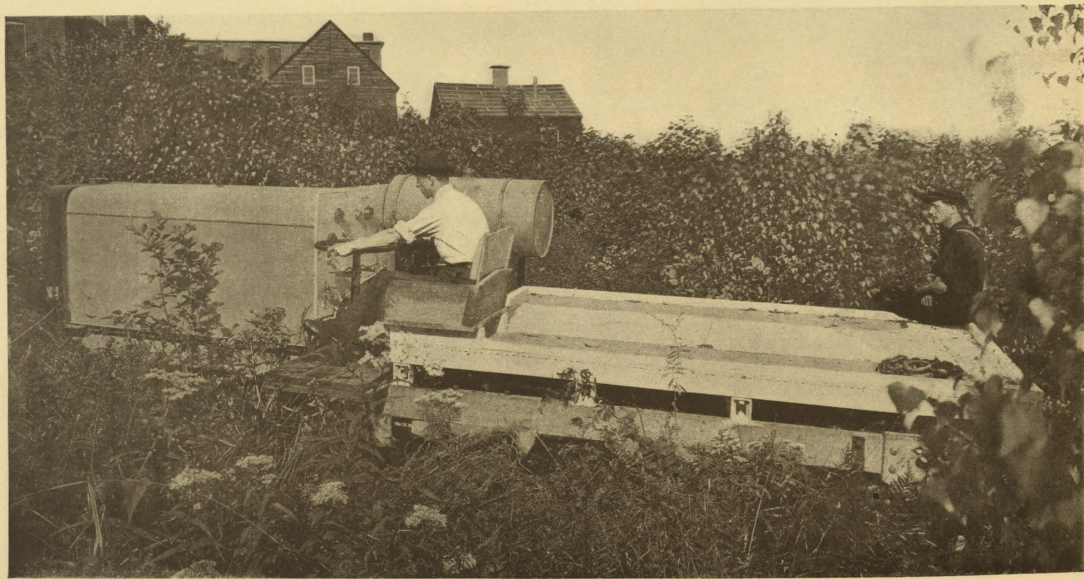
100 h. p. Lombard hauling 41 ton load at six miles per hour. Load is scrap iron



Hauling contractors trailers, loaded with steel, 30 ton load through mud. For railroad building and construction work of all kinds it has no equal



100 h. p. Lombard going through jungle and dense brush, small trees, etc., in places a team of horses could not travel at all. In the lumber woods and jungle country this feature is invaluable, you do not have to wait until snow comes to haul in supplies to your camps or mills if you use wheel trailers .



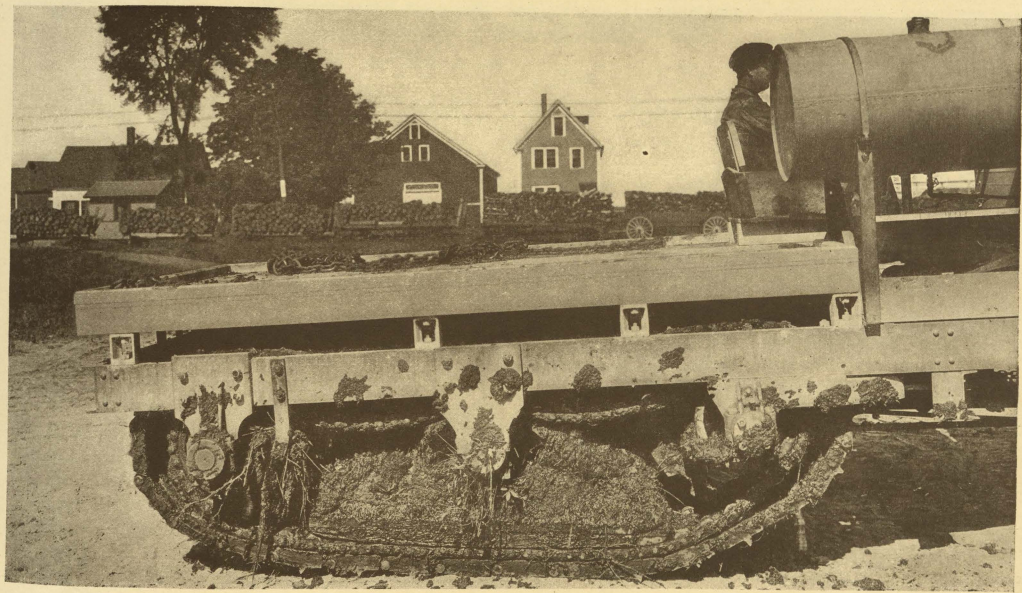
The Lombard will haul and *deliver* loads in places inaccessible to other types of tractors and trucks, and in addition will plow and do all similar work on large farms where the acreage is great enough to warrant the use of a large machine



You do not need a bridge to cross brooks and mud holes or through snow and ice nor do you have to wait for favorable weather to operate. Every day is the same to a Lombard.



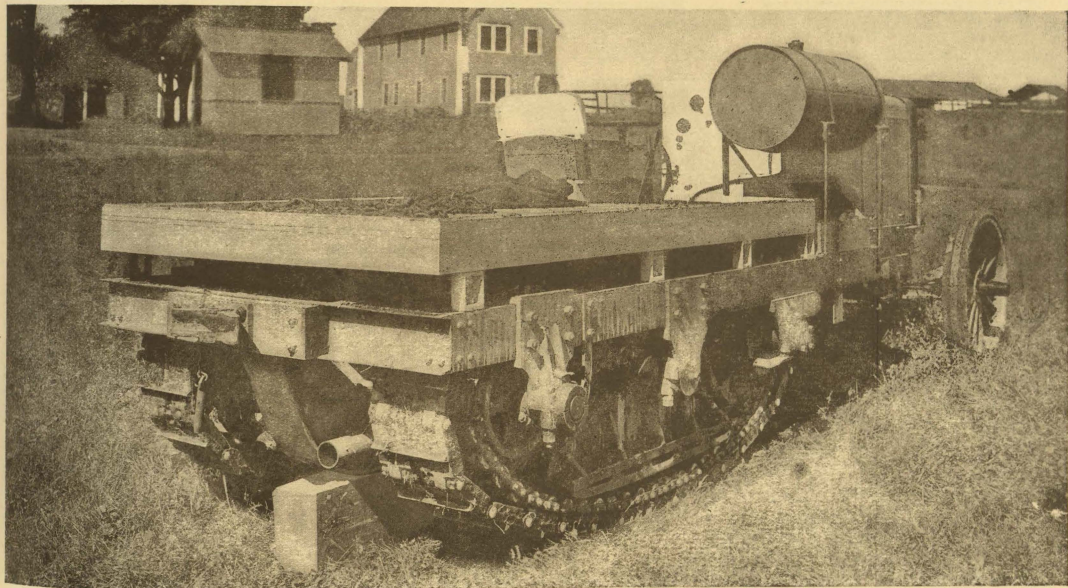
100 h. p. Lombard with sled runners instead of wheels on front going through 20 inches of water and 8 inches of ice.
Notice the ice being pushed up ahead of it. Nothing stops it



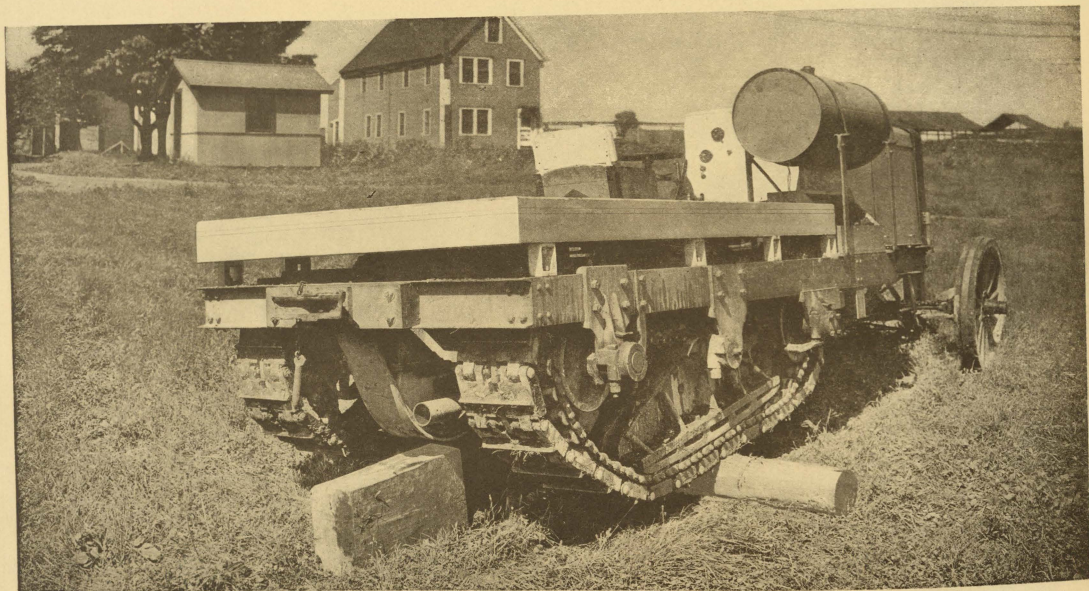
After working in a swamp for some time, with every part thoroughly coated with mud, the machine came out as shown. Mud, snow or other mean conditions are all alike to us. *The Lombard patented tread never clogs or fails to function.*



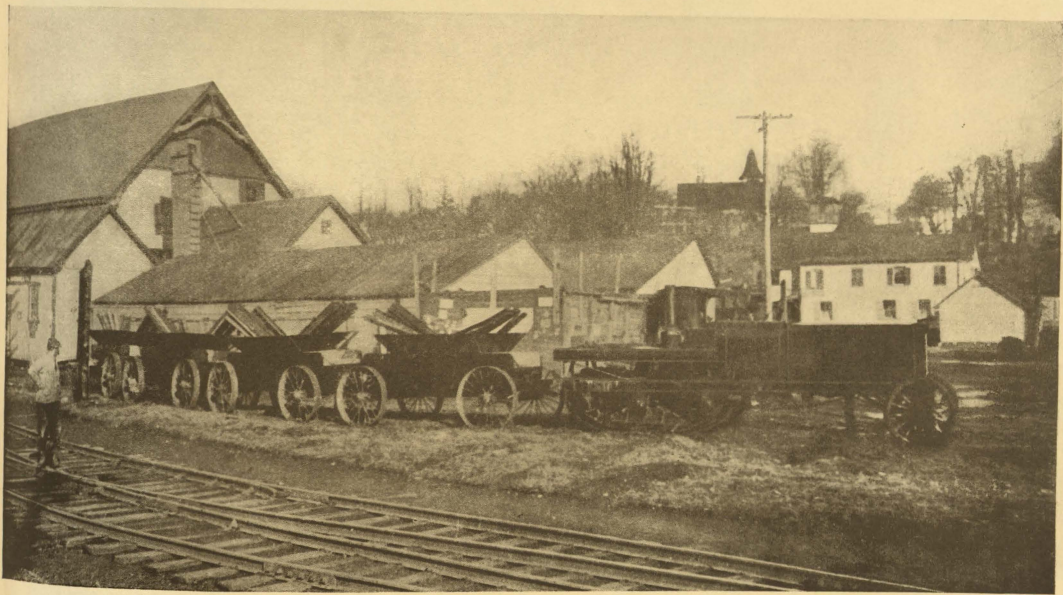
Through jungle and the worst kinds of thickets the Lombard will make a road. In opening up and clearing new land the machine saves its cost in a few months use. Such high grade materials are used in its construction that we get but few repair part orders



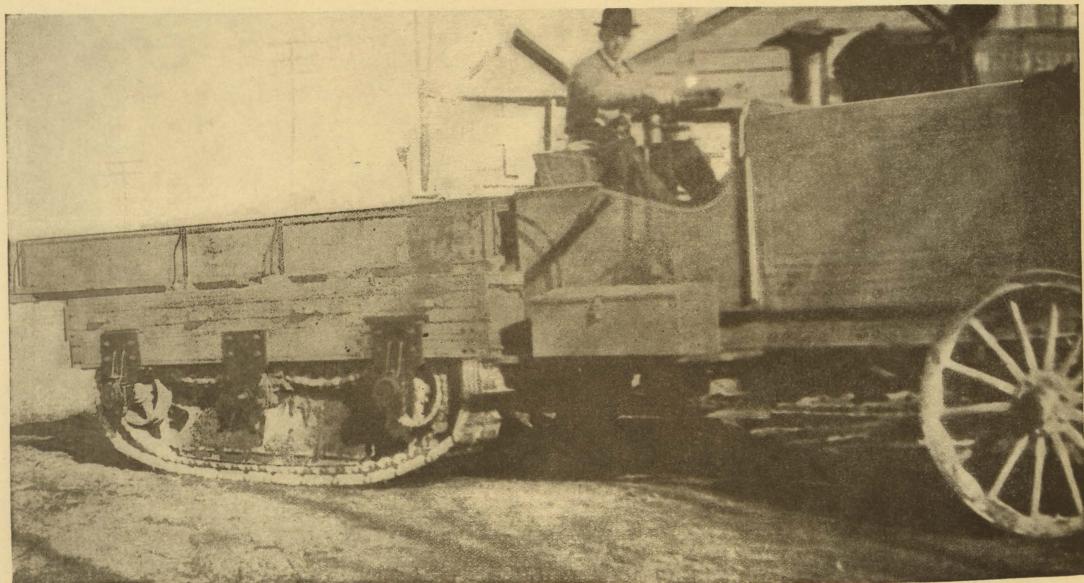
You can never "hang up" a Lombard. Notice the entire weight of the machine is resting on block in the rear, the tread hangs slack, showing there is no weight on it. See next page



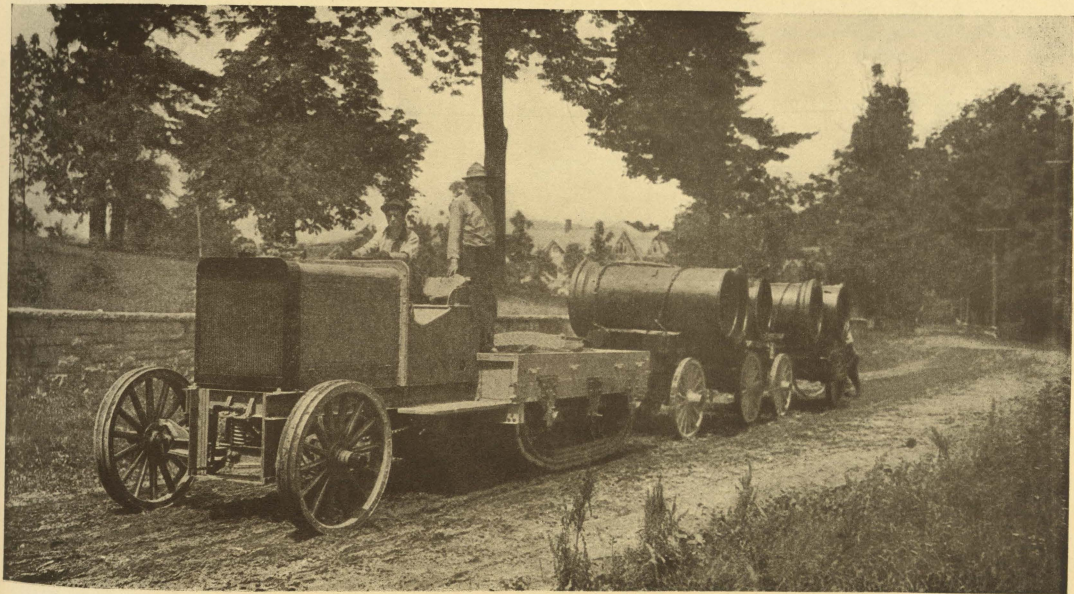
If ever hung up on an obstruction it is only necessary to throw a piece of lumber or a large rock under the front end of tread and the machine will walk off the obstruction, as shown in this photo. Simple but effective. You do not have to lose any time; it only takes a minute to throw a rock under the front of the tread



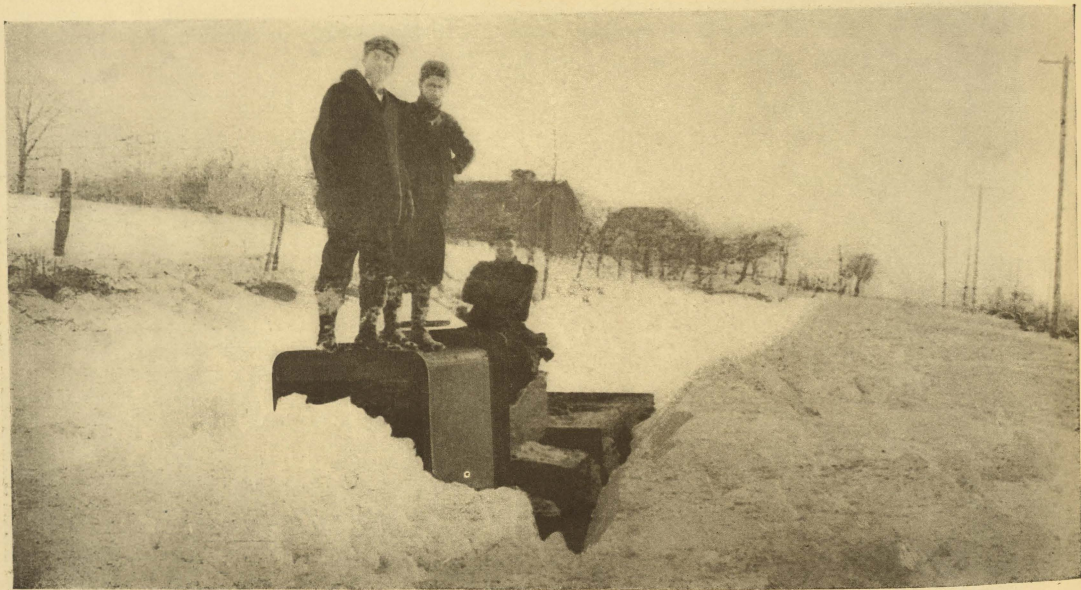
Hauling a string of trailers, the Lombard will turn any corner the trailers can trail around



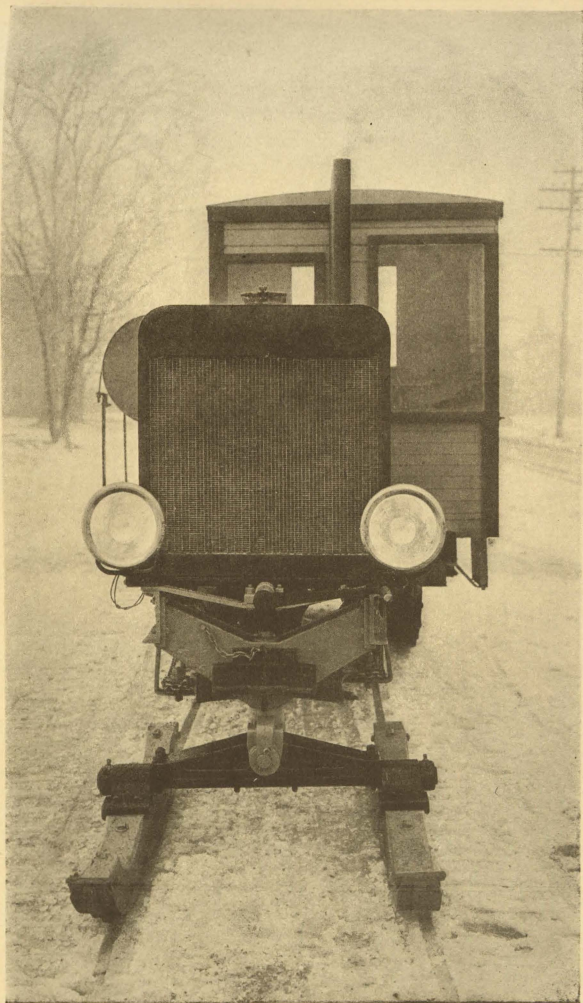
This shows a temporary, removable body with ton and a half of wet sand as load. You can put on any style of body you require and carry 3 to 5 ton load on its own platform. We have the largest platform carrying space of any tractor in the market



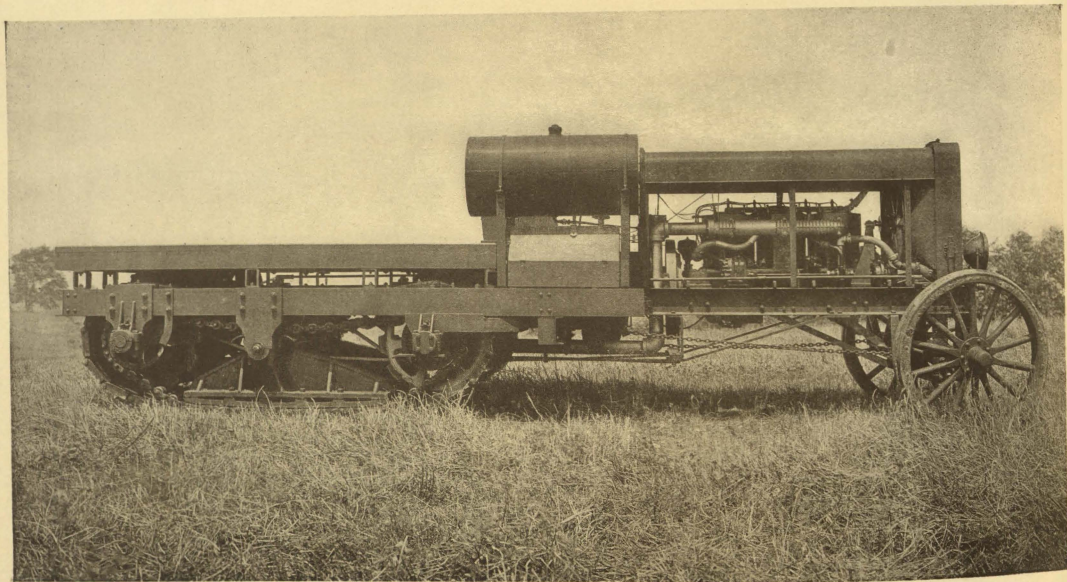
Hauling, at 6 miles per hour, pipe weighing two tons each to the length on ordinary farm wagens, this is a small load but farm wagons do not trail properly and this was the largest load that would trail through the gate posts on farm wagons where it had to be delivered



Without snow plow on the front, this machine opened up roads from Yorktown Heights to Peekskill, going through drifts 5 feet deep as is shown in photograph. There is no other machine, that we have heard of, that will do it



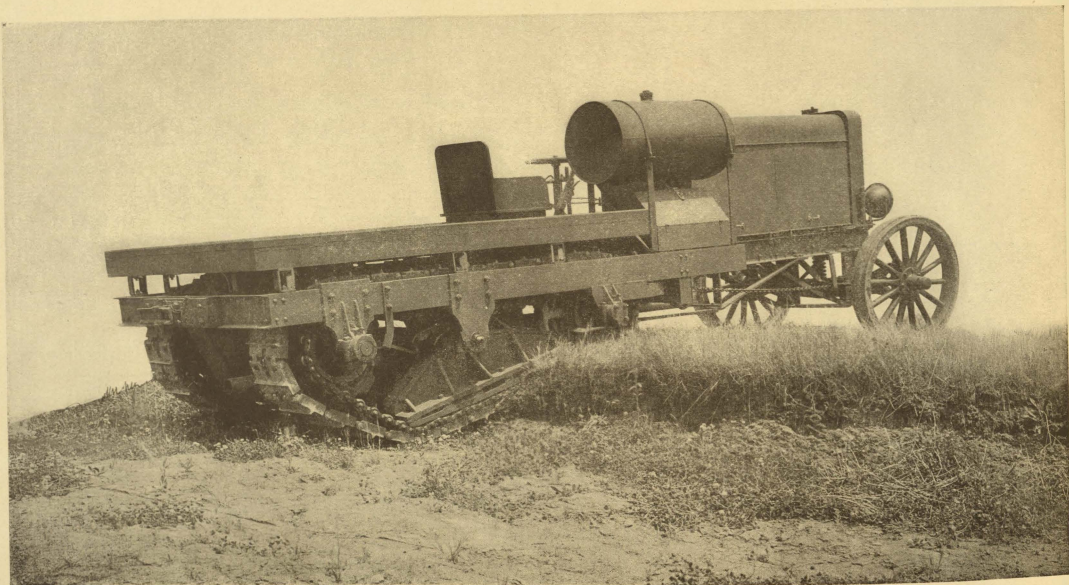
Showing a special cab and the 100 h. p. Lombard equipped with sled runners instead of wheels for winter work ; equipped this way they will go through four and five foot snow drifts



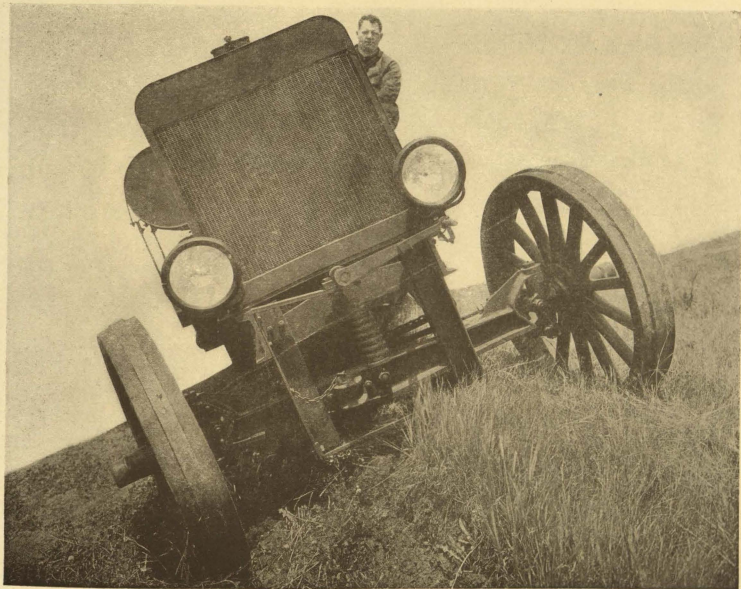
Showing motor installation, tank, tool box, etc. Compare this with the big, clumsy tractors you have seen.



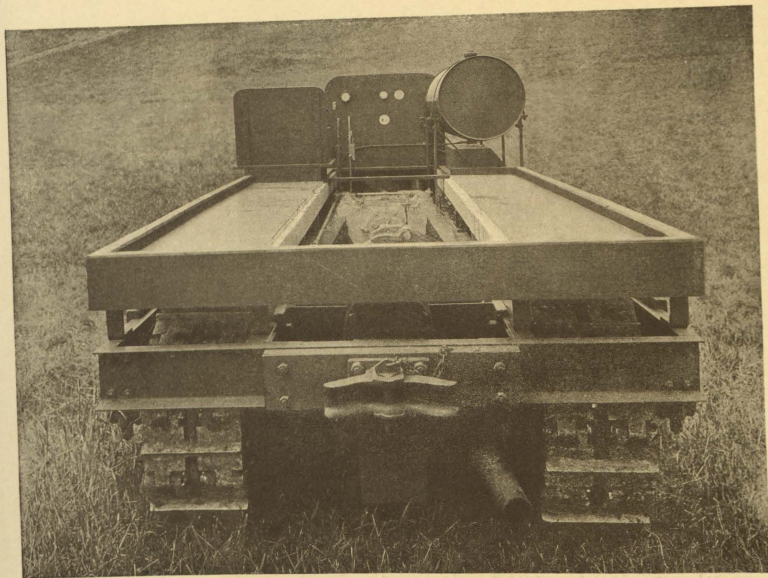
The Lombard is one machine in which the tread parts function properly on side hill work.



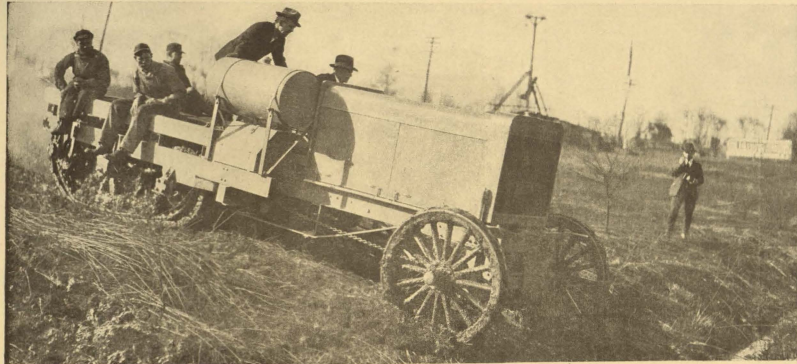
In climbing a bank or obstruction it does not affect the position of the platform except as to the general slope



The same idea of great strength and flexibility shown in this view is carried out in the entire construction of our machines

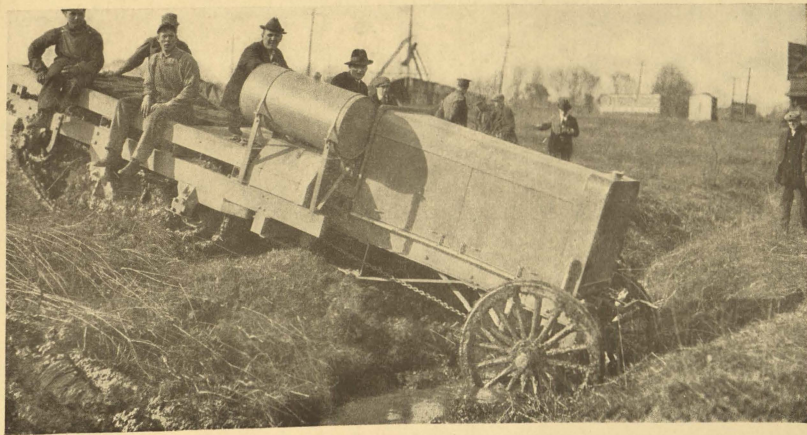


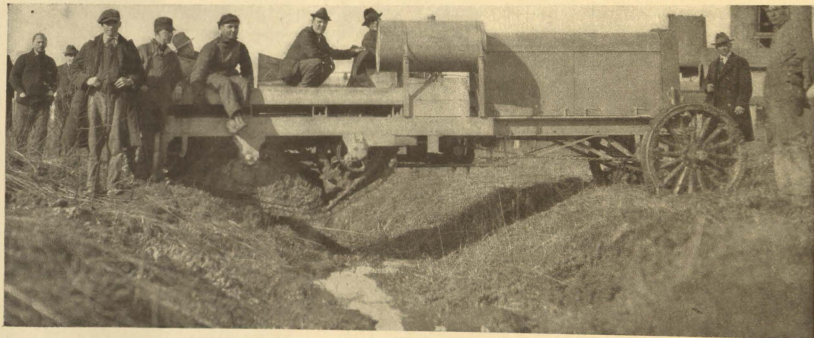
The self cleaning treads, covered by the Lombard patents, are clearly shown in this view, also that all parts are easily reached by taking up the trap doors of the floor or from the outside



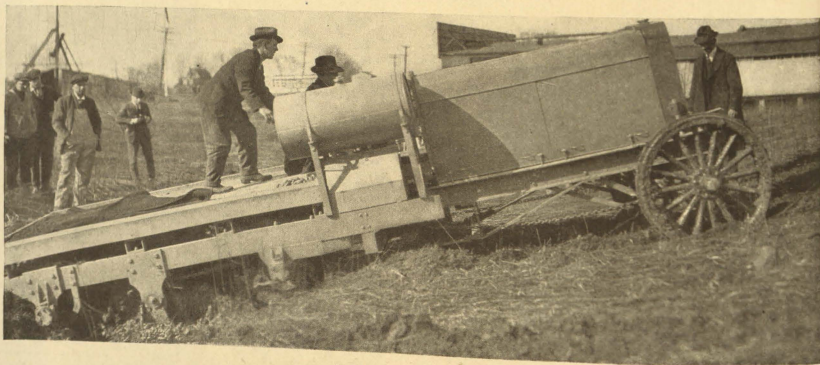
These 4 views show crossing of a ditch, 14 feet wide, 5½ ft. deep

On level ground the top of the radiator is six feet from the ground; notice how much higher the rear of the machine is

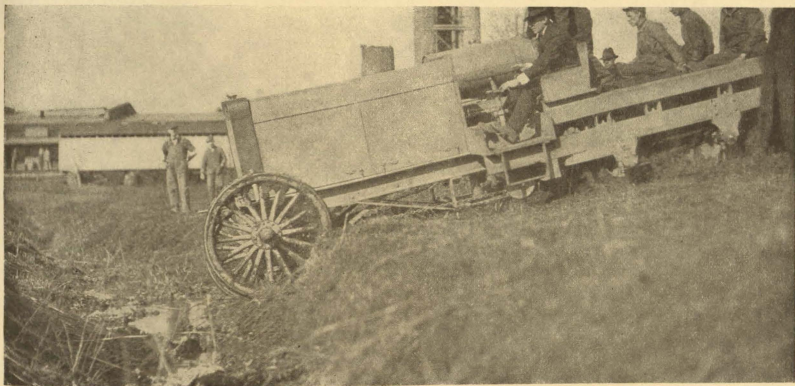




Spanning the ditch after front wheels
are out

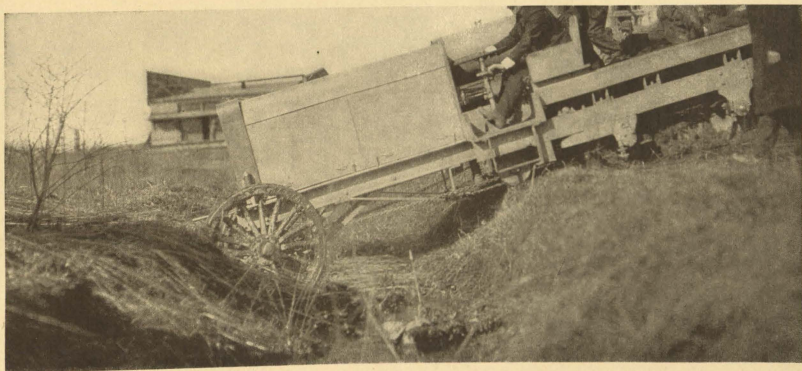


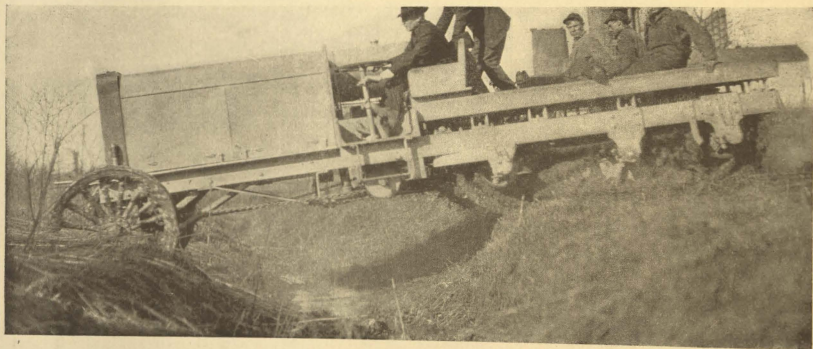
Rear end of machine coming out of
the ditch which is full of soft mud



Crossing the big ditch at another point
to show that it was not an accident
the first time

Showing front wheel buried in the
mud of opposite bank

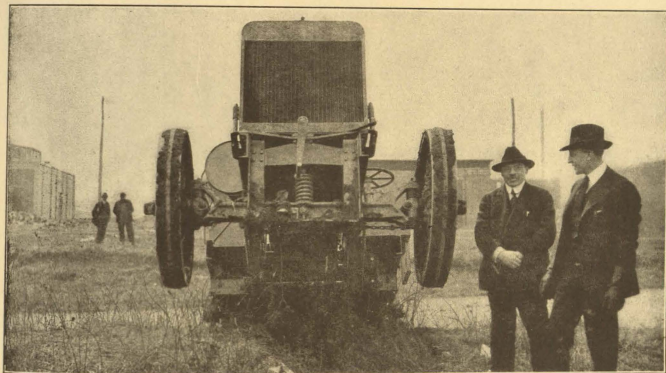




Bridging the ditch

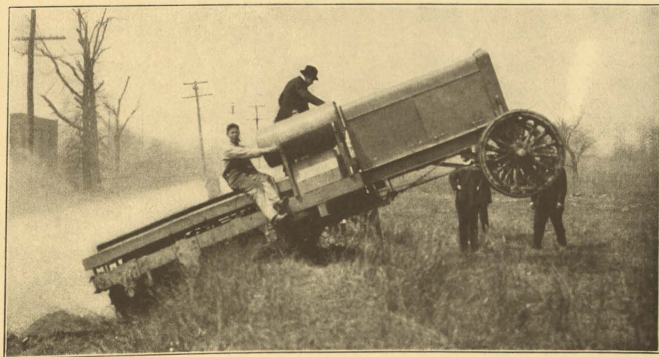


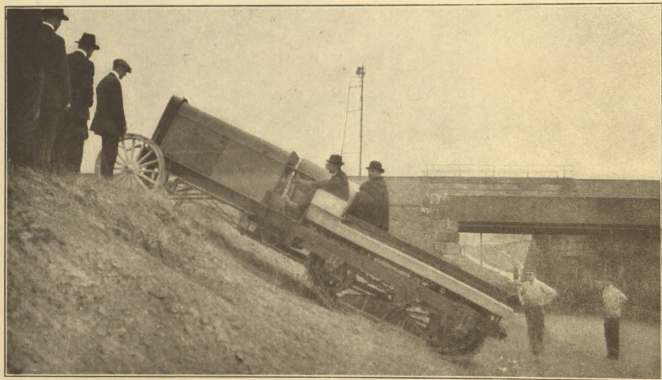
Rear of the machine coming out
of the ditch



This shows the power of our brake, note that the brake is set and the operator has left the machine, which is being held in position by the brake on this steep grade

Showing 100 h. p. machine climbing a bank so steep as to raise the front wheels as shown—This machine will climb most anywhere





Climbing a 50 per cent. embankment—what other tractor truck will do it?

Note how the machine crosses small ditches without even knowing they are there



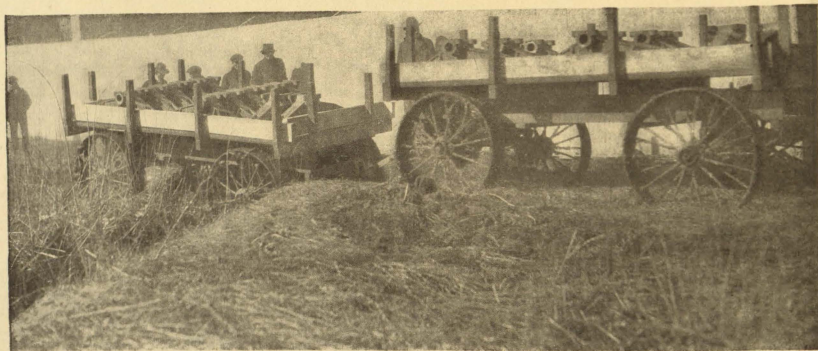


Machine with 3 trailers, each loaded
with 5 tons of cast iron

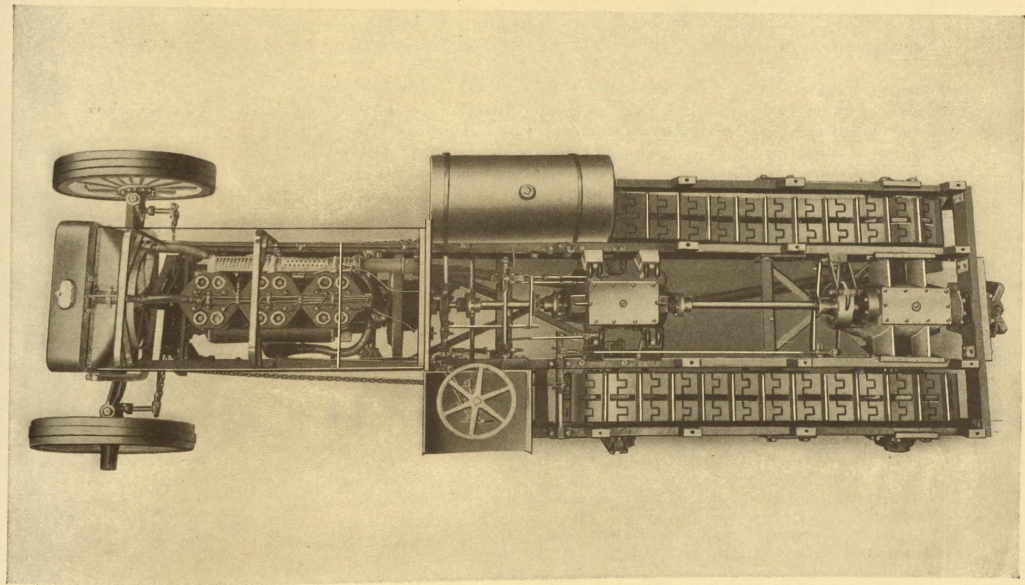
Tractor crossing a ditch 3 feet deep
and 4 feet wide with 3 loaded
trailers back of it



These views do not show stunts,
but that the machine will when
necessary go into and haul a
load through places where even
horses could not pull it.



Most any machine will haul a fair load on good roads, but it takes real power to haul the same load cross-country
and at the speed the Lombard will handle it



Note the simple, strong construction which is up to date in design and in all other respects

DETAIL SPECIFICATIONS 100 H. P. LOMBARD AUTO TRACTOR-TRUCK

CAPACITY, AS A TRUCK 5 TONS, AS A TRACTOR ON LOW SPEED 30 TO 50 TONS DEPENDING
ON THE ROADS AND GRADES

Power. Horse Power guaranteed 100 at 1000 r. p. m.

Speeds. Forward in low, 2 m. p. h. Forward intermediate, 4 m. p. h. Forward high, 6 m. p. h. Reverse, 2 miles per hour

Motor. 6 cylinder, 4 cycle, cast in pairs of special selected grade of grey iron, bore $5\frac{3}{4}$, Stroke 7.

Radiator of square type with water capacity of 15 gallons of size that insures proper cooling.

Fan. 24 inches run at a speed which with size of the radiator used absolutely insures proper cooling.

Pump. A centrifugal pump of sufficient size is used to provide positive circulation, pumping 40 gallons per minute.

Carburetor. Automatic float feed, with heater attachment.

Ignition. By magneto with coil and switch for selecting batteries for starting.

Lubrication of Motor. Positive force feed to every working part through covered passages, starts and stops with motor.

Motor Control. Hand throttle with governor.

Gasolene Tank. Heavy galvanized tank of 65 gallons capacity, gravity feed.

Clutch. Special design, dry plate multiple disc, which permits gradual engagement, specially adapted for picking up heavy loads.

Transmission. Special ball bearing extra heavy dental clutch type, selective, with three speeds forward and reverse.

Brakes. Positive acting external hand and foot operated and transmission U brake.

Differential. Heavy gear type.

Final Drive. Worm gear, direct on high.

Springs. Owing to three point suspension type of construction, but two springs are required which are located on front axle, one within the other.

Steering gear. Bevel gear type.

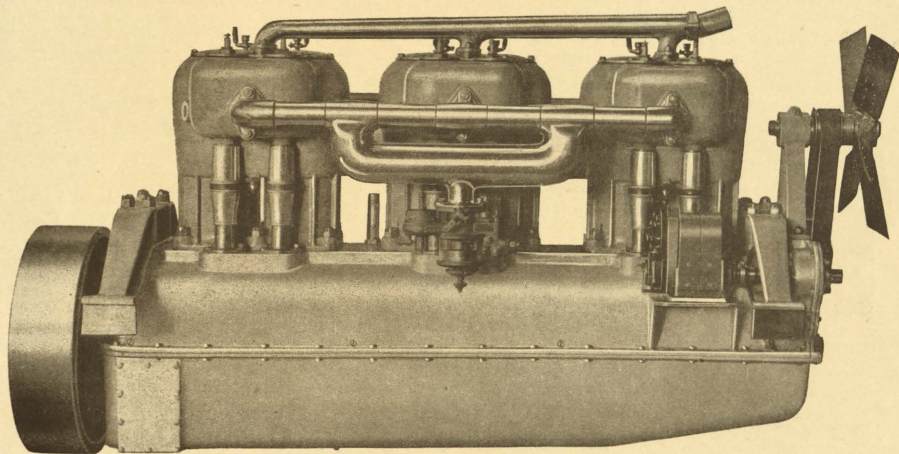
Main Frame. 7 inches special rolled steel with sections rigidly trussed with steel sub frame.

Platform. Back of driver's seat, 68 inches (can be extended if desired). Length, 104 inches.

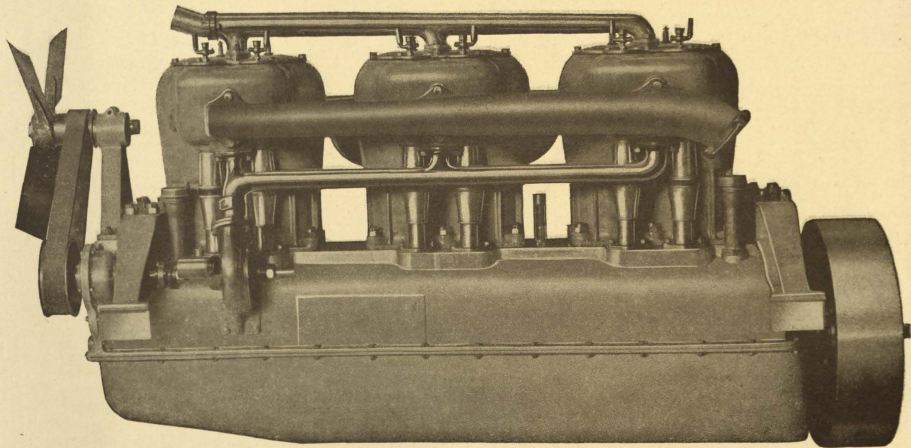
Length of machine (over all) 256 inches. Width of machine (over all) 86 inches.

Clearance. (height) 77 inches.

Weight. About 19,000 lbs.



Six cylinder 100 H. P. motor of highest grade material and workmanship



Built of special materials and designed for tractor use

MOTOR SPECIFICATIONS

CYLINDERS—Cylinders are vertical, water cooled, cast in pairs of the finest grey iron, close grained. The valve chamber, water jacket and cylinder heads are cast integral, the cylinder heads being reinforced by cross ribs. The cylinder and valve passages are entirely water jacketed, and the water inlet is situated directly underneath the exhaust valves. The inlet and exhaust valves are situated on the opposite sides and are interchangeable. The top plate is of bronze, highly polished and forms the outlet through which the water passes to the radiator. All castings are carefully pickled and cleaned before being machined. Cylinders are first bored, then reamed, and after annealing are ground accurately to size. They are then subjected to a high water pressure to insure against the slightest leak or imperfection.

PISTONS—Are made of the same grade and quality of cast iron as the cylinders and are pickled before being machined. They are carefully turned and ground to exact size and are slightly tapered, being .003 less on the upper end to allow for expansion. The wrist pin lugs are provided with webs. Each piston is fitted with three rings of semi-steel and is also provided with four oil grooves. The piston rings are ground on the face and two sides and fit accurately into the grooves. A wide groove is cut into the piston in line with the piston pin which collects the oil and leads it to the piston pin bearing.

The wrist pin is of hollow steel carefully ground and hardened and is ingeniously fastened to the connecting rod by means of a bolt, thus giving a wider bearing surface.

CONNECTING RODS—Are of the I-Beam Section, drop forged of 40% Carbon Steel, heat treated and are very strong and fitted with babbit lined bronze bushings on the crank shaft end. These bearings are extra long and are adjustable by means of shims. The cap is fastened to the rod by four Chrome Vanadium Steel bolts.

CRANK SHAFT—The crank shaft is made of Chrome Nickel Steel heat treated, with a tensile strength of 120,000 pounds per square inch. They are carefully pickled and ground

to exact size on all bearings. The fly wheel flange is forged integral with the crank shaft. Flanges are also forged integral on both sides of the rear bearing to take up end thrust from the clutch.

CAM SHAFT—The cam shafts are made of 40% Carbon Steel forgings, with cams integral with the shaft. The cams are machined, heat treated and hardened. They are then accurately ground to master cams.

PUSH RODS—The push rods are of hardened steel of large diameter and have an adjusting screw, case hardened. The rollers and pins are made of tool steel, hardened. Push rod guides are of phosphor bronze and are fastened to crank case by means of studs and lock washers. Push rods and valve springs are entirely enclosed by an aluminum housing. This housing is split in the center and is held in place by means of a spring and can readily be removed.

VALVES—Valves are of 3/4% Nickel Steel, or Tungsten Steel if ordered. Valve springs are held in place by means of beveled split bushings and are easily removed. The guides are of cast iron and are very long.

CRANK CASE—The upper half is made of a single special aluminum alloy casting, is light and at the same time very rigid, being reinforced by cross ribs. A breather is fastened to each end of crank case. These breathers are used for the replenishment of oil and are located in close proximity to the oil gauge. Crank shaft bearings are supported by massive webs extending through the entire depth of case, thus insuring extreme rigidity. These bearings are held in place by through bolts and are entirely independent of the lower crank case. Bolts for holding down cylinders are supplied with a collar which holds them in place and permits the removal of the cylinders without taking off the lower crank case. All gears are encased in an oil tight compartment at the end of the crank case and the removal of cover exposes all gears. From this end the cam shafts can be removed as well as the idler gear and the water pump and magneto gears. The lower half has the oil reservoir and is securely bolted to upper case and is also

of cast aluminum. The entire crank case is machined with great care and is absolutely oil proof. A drain plug is located on bottom of oil reservoir.

GEARS—Timing gears are cut helically and have a wide face. They are lubricated by means of a duct bored through the idler shaft and also by means of a duct leading directly to the oil pump. They are of machine steel, semi-steel and drop forged carbon steel.

LUBRICATION—Oil is pumped by means of a gear pump located on the outside of the lower crank case and driven by spiral gears from the cam shaft. It is forced to a main duct cast integral with the crank case and from there distributed by means of ducts cast in the web, to the main bearings. From here it is forced through a hollow crank shaft to the connecting rod bearings, and thus a constant stream of oil is forced over each bearing when motor is started. A fine wire gauze strainer is fitted to the opening of the oil pump to prevent grit or sand getting into the bearings. A sufficient amount of oil is thrown off by the connecting rods to thoroughly oil the pistons and cam shaft, both of which are provided with oil pockets. An oil gauge extending to the level of the crank case and located on the exhaust side of the engine, indicates, by means of a float and ball, the exact amount of oil contained in the reservoir. Distinct marks on the glass gauge show the high and low mark, and if the oil is maintained between these two levels, no burnt oil is emitted, nor is there any danger of cutting the bearings. We are especially proud of this system and it vastly increases the life of the motor.

WATER CIRCULATION—The water pump is of bronze and of ample size. Water inlet and outlet manifolds are one solid casting with no joints to open. They are securely held in place by studs and lock washers and the joints have "Permanite" gaskets. The increase in the size of the pipes is carefully proportioned to the amount of water flowing through them at the various points. The ball bearing fan is supported by an adjustable bracket. It is driven by means of a belt and pulley from the pump shaft. The fan is made of one piece steel stamping. The spider and hub are made of pressed steel. It is also supplied with a grease cup.

IGNITION—Magneto shaft is driven by separate gear on inlet side of motor through Oldham coupling. The magneto seat is located on a bracket and is adaptable to any make of magneto.

BEARINGS—All the main and connecting rod bearings are made of bronze lined with Fahrig Metal. They are provided with grooves to insure perfect lubrication. All other bearings are of phosphor bronze and have oil pockets and grooves. They are all of ample size. The crank and connecting rod bearings are split and have copper shims. All of the bearings are broached and then carefully scraped to a perfect bearing.

EXHAUST MANIFOLDS—Are made of cast iron and have a gradual taper. They are fastened by means of studs and lock washers and are provided with copper covered asbestos gaskets.

IN GENERAL—All bolts and studs are of the A. L. A. M. Standard, the large bolts have castle nuts which are secured by cotter pins. Studs and smaller bolts have lock washers. All of our work is of the most accurate and all parts are machined and ground to gauges. The gears are cut on an imported hobbing machine and are absolutely noiseless. All parts must pass through the hand of an inspector after each operation and all material not up to standard is rejected. After the motor is assembled it is run on a belt, put on the testing block, run on its own power and given the most severe test running idle. It is then coupled to a hydraulic testing machine and tested as to its power and efficiency.

Besides the Scleroscope test of all our steels are tested micrographically, thus insuring the proper heat treatment of same.

The cylinders are finished in a Battleship Gray Enamel and as all the bronze work is highly polished the motors are extremely handsome. The crank cases are filed and scraped to a smooth surface, which is therefore easily kept clean. We have equipped our plant with the latest machinery adapted for the manufacture of gasoline motors, irrespective of price, and we believe we have the best equipped shop devoted entirely to the Gasoline Engine trade exclusively.

OPERATION OF THE LOMBARD DRY FRICTION MULTIPLE DISC CLUTCH

Clutch is operated as follows:

The means of tightening or increasing the friction is that of a cam and gear mechanism, operated by racks X-25, integral with sleeve X-11, which is controlled by spring X-35.

To engage clutch, the spring X-35 forces sleeve X-11 forward toward friction facings X-27 and turns gear X-14, which, by means of the cam, which is in and is part of gear X-14, which will operate against the stationary pressure cams X-28, setting up a pressure against the friction plate facings X-27.

This pressure is applied directly against the center of the friction plate facings X-27, which gives broad surfaces.

ADJUSTMENT AND CARE OF CLUTCH.

1. Throw out Clutch and keep out while making adjustments.
2. Take out Key X-29 from cover X-12.
3. Place spanner wrench in holes X-57 in X-55 and turn to right one notch or as many notches as is necessary to take up the wear and still leave free release. Make allowance enough between X-55 and X-24 to permit X-11 to move freely; $\frac{1}{8}$ " to $\frac{1}{2}$ " will be the proper space between X-55 and X-24.

IMPORTANT. Never allow collar X-24 to come in contact with X-55.

If safety collar X-24 is allowed to come in contact with plate X-55, the spring pressure cannot act on friction facings X-27 and thus damage friction plates X-20.

To lubricate properly, keep trunnion housing grease cup X-49 well filled. Grease sleeve X-11 by removing screw in plate X-55. A non-fluid oil is recommended for this part, and Grade "K-No. 000," made by the New York and New Jersey Lubricant Co., 165 Broadway, New York City, has been found most satisfactory. For X-11 Grade "A-No. 00" should be used.

When motor is being overhauled, take Clutch apart, as per instructions, and clean all parts. Then use Grade "K-No. 000" to re-oil same, including ball bearings X-39, cam gears X-14 and racks X-25. All of these should be packed full with grease "K-No. 000."

TO TAKE CLUTCH APART.

1. Release Clutch and put a wooden block between X-55 and X-24, thus releasing spring pressure, and keep blocks in position until Clutch is all together again.

2. Take off the cover X-12.

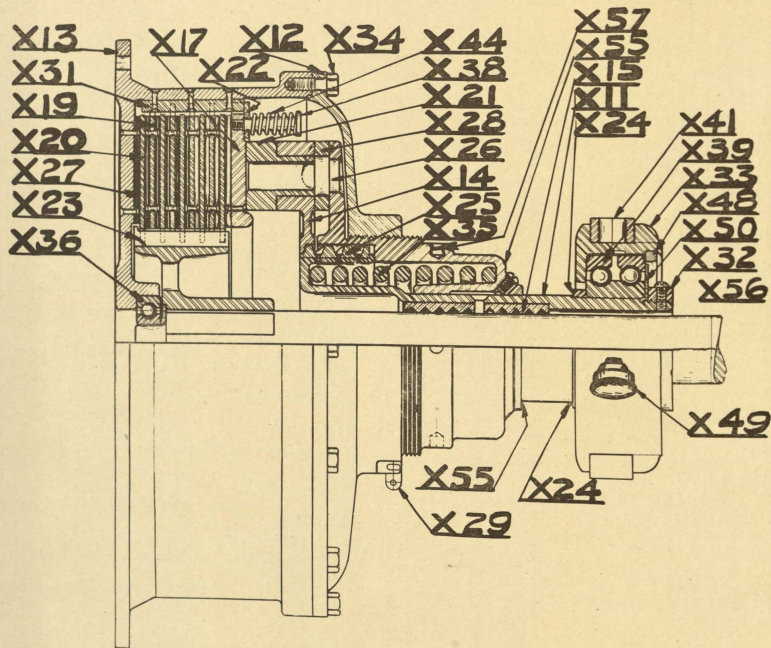
3. Take out plate pack by lifting out core.

IMPORTANT. When putting Clutch together be positive that the keys are in pressure plate (X-17) slots and that the first tooth in each worm gear (X-14) is in mesh with the first tooth of rack (X-25).

DESCRIPTION OF CLUTCH.

A heavy duty special Dry Friction Multiple Disc Clutch of broad friction surfaces, heavy pressure and low initial spring pressure, which, with reasonable care in handling, will pick up its load smoothly and positively.

During the first few weeks of operation the clutch will require adjusting until worked in. If the clutch slips, make adjustment immediately as described above.



TO PREPARE TRACTOR FOR OPERATION

1. Fill the Radiator with clean water which is as free from all impurities as possible. When the motor is hot, never pour in cold water when the water system is empty or nearly so.
2. Fill the Gasolene Tank, always pouring the gasoline through a chamois skin to take out any water, dirt or other impurities. The Tank holds 65 gallons.
3. Turn on the gasolene by opening the Shut Off Valve located under the bottom of the Gasolene Tank.
4. See that Change Speed Level is in neutral position.
5. It is not necessary to set hand brake except when on a steep grade. The brake will under almost any condition hold any load the tractor can pull. Be sure all parts of machine requiring grease or oil are supplied with same.
6. Fill the oil wells on each axle both on the outside and inside of the axle bearings on the frame. To reach the inside oil wells remove the center floor covers in the middle of the platform and the inside oil wells can be reached with the oil can.
7. Turn down all grease cups on all parts about two or three turns after first opening them to make sure they are full of grease.
8. About once a week put some heavy grease on front axle guides and at top and bottom of the axle springs.
9. Do not put any grease or oil on the treads, rolls, or roller chain.
10. Oil the gear shifting lever shafts and all the working parts on them, also the brake lever and all the working parts on it about once a week.
11. About twice a month remove the threaded grease plug in the outer end of shaft which holds the runner shoe in place. This is done by loosening up the lock nut and screwing out the plug, then pack plug hole with heavy grease and replace threaded grease plug screwing it in about one-third of its length, then tighten the lock nut.
12. Once a week take out the plug on the side of worm gear case and see if oil begins to run out. If so replace plug as this shows there is sufficient oil in case. If oil does not run then remove the floor door and take off worm gear case cover and pour in about two gallons of best grade heavy gas cylinder oil, then replace cover.
13. Oils to be used should be of best grade obtainable. Good oil saves wear on bearings and other parts. The best oil is the cheapest in the end.
14. See clutch instructions for adjustment and care of the clutch.
15. Use any high grade gas engine oil in oiling worm gear case, put in about three gallons each time you refill.

INSTRUCTION FOR STARTING AND RUNNING MOTOR ON LOMBARD AUTO TRACTOR TRUCK, 100 HORSE POWER MOTOR

TO START MOTOR. Be sure radiator is filled with water, and also that there is gasoline in fuel tank. Fill the 5-gallon oil reservoir in lower oil pan of motor through one of the fillers with hinged cover located on either end of motor on exhaust side, first straining oil before filling reservoir when possible. The oil gauge located between the fourth and fifth cylinder shows amount of oil in reservoir, and care should be taken that reservoir is **not** filled above the highest level of the indicator. Next see that the spark lever is fully retarded. Advance throttle (on left hand side of steering post) about two notches from end of quadrant and push back spark lever on right hand side as far back as it will go. If engine is cold, prime cylinders through priming cups on top of each cylinder with gasoline, then turn on the switch on dash toward side marked B. Then crank motor by pressing in starting lever crank so that it will always engage ratchet on the crank shaft, and pulling the lever to the left always below the center of the shaft. If engine is very cold and has been primed a number of times and does not start easily, a small quantity of lubricating oil should be put into each cylinder through priming cups.

AFTER THE ENGINE STARTS. Do not let the engine race, retard the throttle when running idle. Turn switch to magneto side marked "M," advance the spark lever about half way, noting also from the oil pressure gauge on dashboard that the oil system is working properly. At 1,000 r.p.m. the gauge should register between 7 and 10 pounds. At lower speeds the pressure will be reduced slightly, depending on the speed of the motor. Be sure the water pump is working, by turning on one of the pet cocks on the side of the cylinder, to see if the water spurts out. To get full power of motor under load, advance spark lever to its pulling position and open throttle as far as it will go and full speed is developed.

CARBURETOR. There are two adjustments on the carburetor. The main or lower adjusting screw controls the gasoline supply from the float chamber and regulates the mixture through the whole driving range. Turning this screw (anti-clockwise or) to the left, raises the needle and gives more gas; (clockwise) to the right, less gas. If an entirely new adjustment is necessary, turn this screw (clockwise) to the right until needle just seats, then open three complete turns (to the left), which should give a mixture considerably rich. After starting and warming up the motor this

adjustment may be regulated as necessary for the best driving mixture. The gasoline for idle running is taken in above the throttle and controlled by dilution with air from the inside of the carburetor, as regulated by the upper adjusting screw, which should be between $\frac{1}{2}$ and $1\frac{1}{2}$ turns to the left, or anti-clockwise, to left from the seating position. After the motor is warm this may be regulated as necessary, turning to the right, or clockwise, for more gas, and to the left, or anti-clockwise, when less gas is required. Note that Idle Adjustment is effective only when throttle is nearly closed.

OILING SYSTEM. Our oiling system is entirely automatic, starts and stops with the motor, and accordingly requires no further attention from the operator other than keeping the oil sump itself full, and the indicator on the motor shows when the oil is running low. Our oiling system is known as the pressure feed type. The oil well is filled through the fillers provided for that purpose on the top of the crank case on the exhaust side of the engine. A gauge showing number of inches of oil that is in the reservoir is located on the top of the crank case between number four and five cylinders. After engine has been run for a few weeks, it is desirable to remove all oil from the reservoir. This can be accomplished by removing drain plug in bottom of oil well. Should the oil pressure drop below normal or gradually decrease, when indicator shows plenty of oil in well, this would indicate that the oil strainer is clogged and requires cleaning, which happens occasionally through dirt passing into the oil reservoir at the time of filling, as there is sometimes dirt and waste in the oil barrels. This cleaning can be done by removing the oil strainer which is located below the crank case in the center of the oil well. Wash same in gasoline and replace, making sure that the strainer fits properly in place. If the gasket between the case and strainer flange has been broken, a new gasket should be used. Under ordinary running conditions, oil should be drained off and fresh oil supplied at least every two weeks. Be sure to keep all lint, rags, waste, etc., out of the oil well and oil, as foreign matter clogs up the oil strainer very rapidly.

Don't use poor oil. Oil is cheaper than machinery. Use a good grade of motor cylinder oil. *Don't* run motor without oil in oil well.

Don't run motor under load when no pressure is showing on oil gauge.

Don't allow motor to run on batteries. Throw switch to position marked M for magneto as soon as motor starts.

Don't attempt to spin motor. Always pull towards the left with the lever below the center line of shaft.

Don't allow the motor to stand idle in freezing weather for any length of time without covering radiator to prevent freezing water in radiator and cylinder jacket. When letting motor stand all night or for a long time in cold weather, open the pet cock on bottom of radiator and the pet cocks on the sides of the cylinders on the water jackets and on water pump so that all the water will drain out, and when it stops running, turn the engine over a few times with the starting lever, thus pumping out any water remaining. Close pet cocks before refilling radiator when ready to start machine again.

INSTRUCTIONS FOR OPERATING TRACTOR-TRUCK

1. After motor is started and you are seated on machine, you should push the left hand lever on the steering wheel forward about $\frac{1}{2}$ inch, thus opening the throttle which speeds up the motor, then also advance the right hand lever on steering wheel to advance the spark.

2. Place your left foot on left hand foot pedal which throws out your clutch, push as far as it will go until shaft stops spinning, hold it there, then if you are starting a heavy load pull your gear shifting lever, which is in neutral, toward the seat as far as it will go to the left, thus placing it in position to throw into low gear which is done by pulling gear shifting lever back toward the rear of the machine which throws it into low gear, then let your clutch in slowly by releasing the pressure on the foot pedal and when the machine has started rolling the trailers or any load back of the machine, throw out your clutch by pushing your foot pedal forward and throw your gear shifting lever forward (do not grip the latch release on this lever when doing this as the release is only gripped when you wish to throw into reverse) into neutral, then push the lever sidewise away from you to the right and then forward, which places it in second speed from which you can throw it into high by throwing out the clutch and pulling lever back towards rear of machine as far as it will go.

3. To go into reverse, reverse the above mentioned movements and grip the latch grip on hand lever, gripping it with the lever and push the lever forward into reverse from neutral or low and then let the clutch in gradual until machine starts to move, then if you have any distance to go let it in full reverse.

4. In freezing weather it is always well where possible to keep the machine in a warm place or under cover at night. This makes it easier to start in the morning.

5. In **freezing weather** if you should leave your machine out all night, it is well to throw down two boards or timbers, or two or three flat stones, and run the machine up on to them before leaving it. This prevents the treads from becoming covered with ice which might cause slipping of treads when first starting in the morning, by resting on boards or any raised object you thus get full traction right at the start.

IMPORTANT

6. In *freezing weather and in snow work* it is important when machine has been in a *warm place* all night to throw down two timbers or planks and run the machine out of the building onto the planks, and let it stand there about fifteen minutes if possible to let the treads get as cold as the atmosphere is outside. If this is done snow and ice will not stick to the treads and build up as it sometimes will do if you run right out from a warm place into the snow before the treads have had a chance to cool. This applies to **any make of machine** with steel treads.

7. About once a week look over the cotter pins which hold the tread pins in place as a cotter pin might break off due to a flaw in material which occasionally cannot be avoided although the best grade of pin obtainable is used.

8. While it is not absolutely necessary that the tread and working parts be washed, it is well when it is possible to wash off the mud at the end of a day's work as a little care adds to the life of this machine the same as any other piece of machinery.

9. Go over all nuts and bolts on the machine occasionally to see that everything is tight, same as you would on any other piece of machinery.

Send us answers to the questions on this sheet, and we will tell you frankly whether our machine is the best in the market for your work, and show you why it is

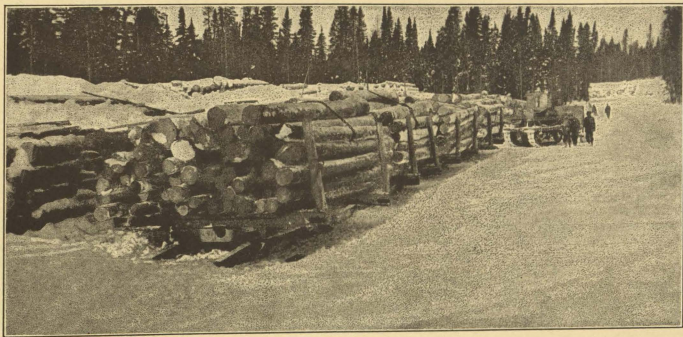
1. What kind of work are you doing on which you might use a tractor ?
2. How many tons of material do you have to haul per year ?
3. What is your longest haul to deliver your greatest amount of tonnage ?
4. Are you now using or have you used any other make of tractor ? If so give h. p. and make.
5. Approximately what is the steepest grade on your roads and in the places you would use the machine ?
6. What kind of roads are there in your section over which you would travel ?
7. Do you have any work you could or would like to carry on in the winter ?
8. What kind of soil are you operating in or on ?
9. What make, size, and kind of trailers have you to use back of the tractor ?
10. State means by which you are now doing work which you describe ?
11. If you wish to use tractor for plowing, state what kind of soil you have, the depth to which you wish to plow, and how many acres you plow in a season, also size of your fields to be plowed.
12. If you have used a tractor in the past give rated horse power, make, the number of plows you pulled with it in your soil, and the depth to which you plowed.

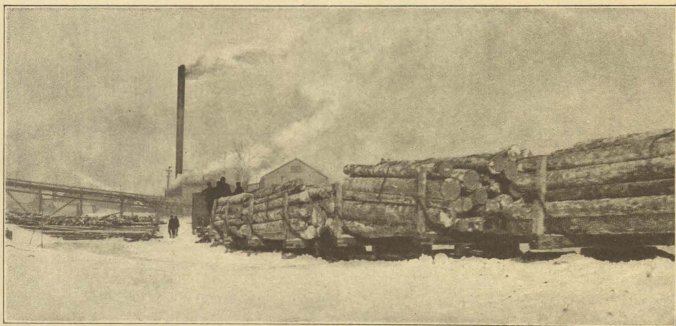


Hauling Lumber on Snow

For hauling in the winter the front wheels on the Lombard are replaced with sled runners, which enable you to retain perfect control of the machine even on glare ice.

Four big heavily loaded lumber sleds is about an average load for this machine, and, of course, where conditions are favorable, you can haul more. There are *more* Lombards used for *hauling lumber* than any other type of machine made.





The use of the Lombard enables you to haul logs a distance and in places where you could not handle them in *any other way at a profit.*

This view gives you an idea of the size of the load each sled handles. Write us and give details of your operation and we will tell you what a Lombard will save you.

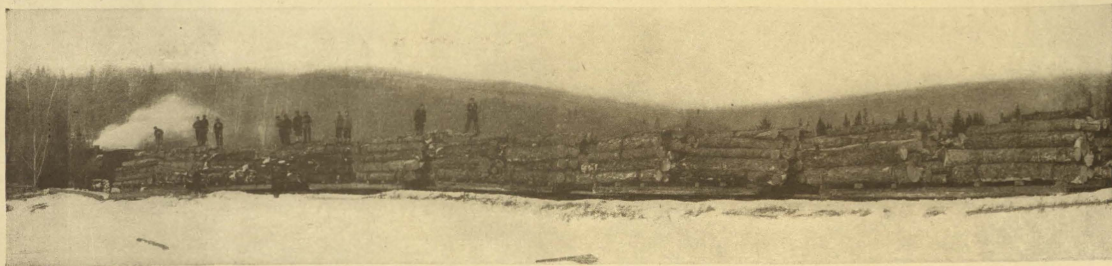




Lombard steam tractor hauling 250 tons ; we have handled 300 tons to the load where the grades were not too steep



Wherever lumber is handled in the snow belt, the Lombard is known



Tell us your conditions and we will show you how the Lombard will save you big money



This view shows machine hauling load of logs across a lake. Note some of the facts given on back of this sheet

ADGUSTA
MAINE

LOMBARD STEAM LAG BED TRACTOR

was the first successful machine of this type put on the market. This machine is used on big lumber operations or where there is big tonnage to be hauled in winter where the haul is long and where it is hard to obtain gasolene as fuel, as this machine burns wood, which can be secured in any lumber region easier than any other fuel as well as cheaper.

On some operations the gasolene machines are used for the shorter hauls and making up the trams for the steam machine by bringing the sleds out of the short feeder roads and making them into a train at the end of a long hauling road. These machines under favorable conditions will haul over three hundred tons.

Write us and state what your conditions are, giving us all details, and we will advise you frankly which of our machines, steam or gasolene, will give best results on your work.





