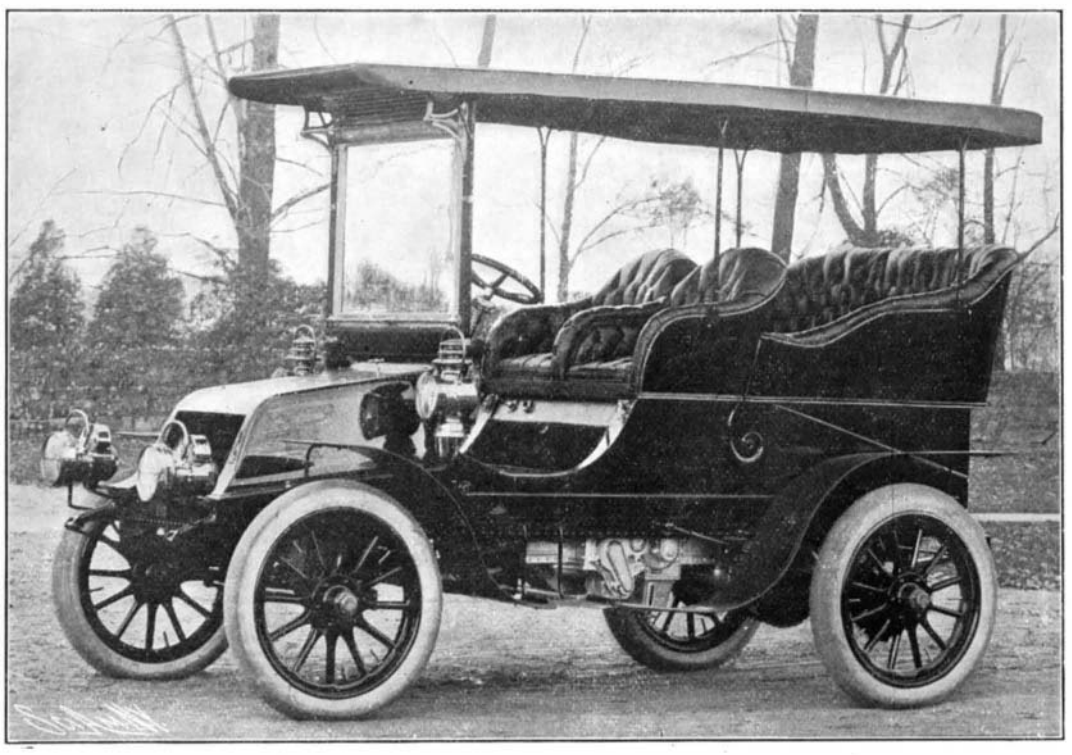
SOME 1904 TOURING CARS.

The new Packard "Voiture Legère," or light car, has been developed from the Packard racer, the "Gray Wolf," which covered a mile in 46 2-5 seconds recently on a Florida beach. The car weighs but 85 pounds per horse power developed by the motor. Its total weight is less than 1,900 pounds, and its four-cylinder motor is rated at 22 horse power. The machine is fitted with a combined three-speed transmission gear and differential on the rear axle, which causes its power plant to consist of but two units—the motor and the driving axle. Upon the high speed the drive is direct from engine to axle. So flexible is the engine control that the machine can be throttled down so as to reduce the speed of the car from 40 to 4 miles an hour, and when running at this latter speed on the high gear it may be kept describing a 30-foot circle as long as desired. The motor has four cylinders of 3⅛-inch bore and 5½-inch stroke. Both its inlet and exhaust valves are mechanically operated and interchangeable. The oil level in the crank case for splash lubrication is maintained by a gear-driven pump. Jump-spark ignition, with separate coils and a storage battery, is employed. A rotary gear pump, gear driven, circulates the cooling water, which is contained in a fan-cooled, cellular radiator and the piping. But one pint of water is evaporated in 80 miles, and 300 miles can be covered on a quart of oil, while on fairly good roads the gasoline consumption is as low as one gallon per 18 miles.



THE 1904 WINTON 20-HORSEPOWER TOURING CAR.

Ball bearings are used on the axle, wheels, and transmission. The flywheel clutch is of the expanding ring type. A worm-and-sector steering device is used. The brakes are of the expanding ring type (worked by a pedal) and band or clamping ring type (worked by a self-locking hand lever). They operate on drums on the hubs of the rear wheels. Both sets are double acting and capable of locking the rear wheels. The motor is controlled by a centrifugal governor, the action of which can be counteracted by a hand lever on a sector on the steering wheel. The spark-controlling handle is also placed here.

The wheel base of the car is 94 inches, and the tread standard. The wheels are shod with 4 x 34-inch detachable tires. The Packard three-point spring suspension is used.

The George N. Pierce Company has brought out for 1904 a new and commodious "King of the Belgians" touring car fitted with a 24-horsepower, four-cylinder motor having mechanically-operated inlet valves on one side of the cylinder head and exhaust valves on the other. The cylinders are separate and interchangeable. The motor is so constructed that the lower half of the crank case can be removed without disturbing the crank shaft or its bearings. The valve caps, also, are readily removable. A plunger pump, worked by an eccentric on the exhaust valve cam shaft, forces oil from the crank case to a reservoir on top of the cylinders. A pipe from this reservoir leads to the three crank shaft bearings and directs a continuous flow of oil upon them. The oil enters the hollow crank shaft through holes and flows along to the crank pins, where it passes out, lubricates the crank pin boxes, and is thrown up into the cylinders. The water-circulating pump is on an extension of the exhaust valve cam shaft. A cellular radiator is used. The bore and stroke of the motor cylinders are 3½ and 4¼ inches respectively, and its normal speed is 1,000 revolutions per minute. It is said to have developed 28.3 brake horse power under test. The car is fitted with a three-speed, sliding-gear transmission. Any speed from 6 to 45 miles an hour can be had on the high gear by means of the throttle, though the motor is controlled automatically by means of a governor. This is inclosed and fitted on the front end of the inlet valve cam shaft, which is prolonged so as to project beyond the front of the car and carry the contact box, thus making the latter very accessible. The motor and transmission are on a separate underframe, so that they cannot easily get out of alignment. The speed-change lever is on the steering column. The clutch must be disconnected before the gears can be shifted, and it cannot be thrown in till they are completely in mesh. The clutches and change gear levers are mounted on ball bearings, as are also the front and rear axles and the transmission gear. The car is fitted with a countershaft brake and with brakes on the rear wheel hubs. The weight of the machine is 2,400 pounds, its wheel base is 93 inches, and the tread is standard. The tires are 34 x 4 inches, detachable.

The 35-horsepower Peerless car is a striking-looking vehicle, the wheel base being unusually long—102 inches—while a low, rakish-looking bonnet, which covers and protects the motor and its accessory parts, occupies a full third of the length of the car. The 34-inch wood wheels are mounted on large ball bearings, and the tires are of the double-tube type, 4½ inches in diameter. The frame of this vehicle is of channel section pressed steel, the side girders tapering toward the ends and approaching each other in front, which allows extra clearance for steering.

The 35-horsepower motor is of the four-cylinder, vertical type, the cylinders being 4⅝ by 5½ inches each. They are cast in pairs, with integral combustion chambers and water jackets, and are securely bolted to a two-piece aluminium crank case, the lower half of which carries the motor supports. The inlet valves are mechanically operated in the usual way, but as they are on the opposite side of the motor to the exhaust valves, an extra half-time, or secondary, cam shaft is used. This shaft also drives a forced-feed lubricator and the ignition commutator. The exhaust-valve cam shaft carries an intermediate gear, which operates the circulating pump. This is mounted on the motor case at a point between the two pairs of cylinders, the whole being arranged in a very compact manner.

The cam shafts are mounted in removable bearings protected by light aluminium covers.

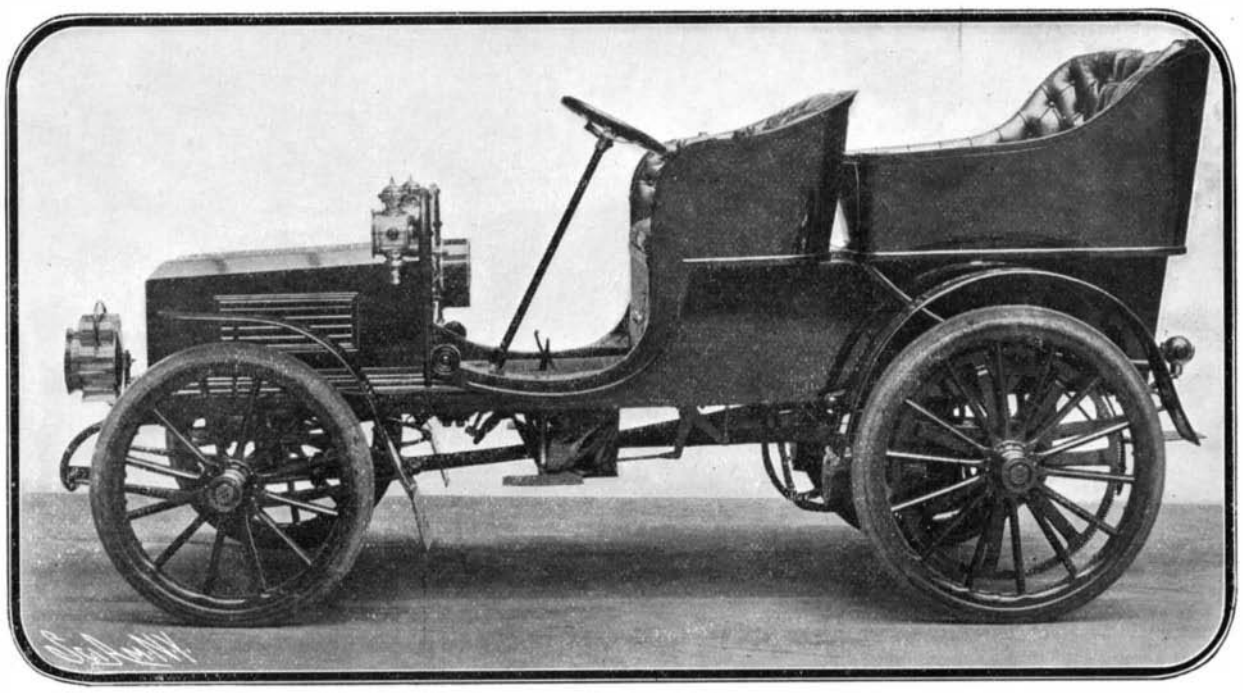
A double ignition system is employed on the 35-horsepower motor, a make-and-break low-tension system being fitted and used as accessory to the usual jump-spark system. The change from one to the other can be made from the seat of the car while it is in motion. The current is supplied by a storage battery.

The cylinders are lubricated by a belt-driven, adjustable, sight-feed lubricator, which is mounted on the dash of the vehicle, and which also supplies the crank-shaft bearings. Splash lubrication is depended on for oiling the wrist pins and cam shaft bearings. The speed of the motor is controlled by a throttle governor, the action of which is retarded at will by applying the foot to a small accelerator pedal. A cellular radiator is employed, and its effect is augmented by a motor-driven fan.

The transmission is of the sliding-gear type, that of the 35-horsepower car being designed for four forward speeds and a reverse. The various speed changes are made by a single lever moving in an H-shaped slot. The secondary shaft runs idle while the car is being driven on the high gear.

Oil for the transmission is fed to the primary and secondary shafts, from reservoirs below, by means of chain conveyors, and the gears run continuously in an oil bath. A flywheel cone clutch, leather-faced, which is self-contained and of standard Peerless design, is employed. The bearing surfaces are large, to prevent slipping when the car is in operation.

The car is driven by bevel gears, a universally jointed driving shaft transmitting the power from the secondary gear shaft to the rear axle, which carries the differential. The wearing surfaces of the universal joints are large, in order to withstand the wear to which they are necessarily subjected. The action of the vehicle springs is compensated for by means of a sliding sleeve or telescopic union. The transverse driving shaft, or rear axle proper, is carried in a tubular axle, and extends through the hubs of the rear wheels, which are driven through the medium of clutch plates, these connections allowing the required degree of flexibility. The wheels are mounted on the tubular axle and revolve on ball bearings. The object of this rear axle design is to relieve the driving axle of the weight of the vehicle and its passengers, a minor advantage being that the tubular axle can be arched if desired to form a truss. The inner ends of the driving axle are provided with universal joints to compensate for their angularity. The differential and bevel gears are protected by an aluminium case, the cover of which may be quickly removed. All bearings are packed with grease in sufficient quantity to lubricate the parts for several months.



THE WOODS ELECTRIC TONNEAU.

Three powerful brakes are provided, two of which operate on drums mounted on the rear wheels, and are actuated by a hand lever. The third brake, which is operated by a pedal, is applied on a drum mounted on the transmission shaft. The steering mechanism is interlocking. Ball bearings are used generously in the construction of the Peerless car.

There are so many features in common between the motor and other mechanism just described and that of the 24-horsepower Peerless car, that it will suffice to give a brief outline of the differences between them to convey an accurate impression of the design and construction of the smaller vehicle. On referring to the illustration of the 24-horsepower motor, it will be seen that the four cylinders are separate, instead

(*Continued on page 110.*)

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SOME 1904 TOURING CARS.

(*Continued from page 79.*)

of being cast in pairs, as are the cylinders of the 35-horsepower motor. This is the only radical difference between the two cars. The jump spark method of ignition only is employed in the smaller motor, and there are a number of changes and modifications in details. The wheel base of the car is 92 inches; the wheels are 34 inches in diameter, fitted with 4-inch double-tube tires. The transmission mechanism is designed for three forward speeds and a reverse.

The two models may be equipped with different styles of bodies, and several options in finishes and upholstering are offered.

The Elmore Manufacturing Company, of Clyde, Ohio, was one of the first firms, and is, we believe, still the only one, building automobiles with a two-cycle motor.

The 1904 type of motor is a single-cylinder, horizontal motor, of 7 horse power. Its normal speed is 800 R. P. M., and the bore and stroke are 4½ and 4 inches respectively. The motor is now lubricated by a pressure feed oiler that shuts off automatically when the engine stops. The two large oil cups for supplying oil to the cylinder and crank case, and the grease cups for the shaft bearings are no longer employed. The carbureter is attached to a pipe on one end of the crank case, and the spark plug can be seen projecting through the wall of the cylinder head. The transfer passage from the crank case to the cylinder is on top of the motor, and is fitted with a cover held down by six bolts. The exhaust pipe is seen below the motor, and the two water pipes are seen in the head and side of the cylinder jacket respectively. A pet cock in the cylinder head is used to determine whether the motor is firing.

The carbureter used with the Elmore motor has been specially designed for this type of engine, and is said to give a constant and unvarying mixture at all speeds. The air enters through holes near the bottom, and is drawn up past the spraying nozzle in such a way as to increase the suction in direct proportion to the speed of the motor. An auxiliary air-throttle is fitted, besides the regular throttle in the inlet pipe, with the result that the suction is practically the same, whether the motor is throttled or not. This makes it possible to run the motor at very slow speeds, and yet have it develop a reasonable amount of power.

The photograph of the tonneau car shows at a glance the method of hanging the motor upon two brackets beneath the side bars of the frame. On the other side of the motor there is a planetary gear transmission, giving two speeds and a reverse, and furnishing a direct drive to the rear axle on the high speed. The single lever shown at the side controls the speed change mechanism. The gasoline tank is seen under the seat, and the batteries and spark coil are in a box beneath the floor. The car is fitted with two brakes, one on the transmission gear, and the other acting on a double drum on the rear axle. Radiating coils are fitted at the front of the car, and the water is circulated by a positively-driven pump. The water tank is placed partially in the box in front. Roller bearings are used on the rear axle, and ball bearings on the front wheels. Three-inch tires of the detachable type are used on the 28-inch wheels, while the wheel base of the car is 70 inches, and the tread standard. Besides the tonneau machine shown, the company makes two other runabout models fitted with twin cylinder, vertical motors, and a three-speed planetary gear transmission. All three of these models are capable of 25 miles an hour.

The two-cylinder Royal tourist has a 16-horsepower vertical motor, which runs at a maximum speed of 1,300 R. P. M., and is capable of being throttled down as low as 250. The crank case is made of aluminium in order to reduce weight and add strength, and aluminium castings are used throughout wherever practicable. The inlet valves work automatically, and are accessible by simply removing three nuts and loosening a universal joint on the inlet pipe. The governor acts upon the throttle, and makes the action of the motor very flexible under all conditions. An improved cone clutch is used, with a universal connection between it and the change-gear case. The latter is of the three-speed and reverse, sliding gear type. It is inclosed in a dust-proof, oil-tight, aluminium crank case, with direct drive on the high speed through a driving shaft having two universal joints, to the bevel-gear drive on the rear axle. The rear axle is of very rigid construction, with roller bearings throughout and with a truss rod underneath. Both pedal-operated transmission and hand-operated wheel-hub brakes are fitted. It is impossible to change the speed gears without throwing out the clutch. The front wheels have roller bearings, with forward steering gear connection, operated by a very substantial steering gear of the wheel type. The frame is of the pressed-steel type, made from polished cold-rolled stock. It is mounted on very long 2-inch springs, forward and rear, that will insure easy and comfortable riding under all conditions. The wheels are equipped with 3½ by 34-inch heavy, detachable tires. The wheel base is 90 inches; the tread 56 inches. The spark regulator and throttle control are operated at the wheel, while the spark coils and forced-feed oiler are placed on the dash, within easy reach of the operator. The oiling device gives a positive feed to the motor, and all principal bearings of same, as well as the transmission gear. The latest type of cellular radiator with fan attachment is used, thus doing away with the auxiliary tank and unnecessary piping. The gasoline tank holds 15 gallons, and is located under the front seat of the body.

The body is a modified form of the "King of the Belgians" type, and is made entirely of aluminium. An oval, top-hinged hood of the latest type makes the motor at every point easy of access, and gives the car a long and very smart appearance. The complete car weighs less than 1,750 pounds, and is capable of speeds up to 40 miles an hour. It has a full equipment of gas and oil lamps, long-tube horn, and a full set of tools. A canopy top and side baskets will be furnished extra if desired.

The four-cylinder model develops 32 horse power, and, in detail of construction of the chassis, is an exact duplicate of the two-cylinder model, with the exception that two of the double-cylinder motors are placed side by side, with an extended aluminium crank case. The other parts of the chassis, including the transmission and axles, are constructed so that they may be used for the two or four-cylinder car. The latter machine weighs 2,000 pounds, and is capable of speeds up to 50 miles an hour.

The principal improvements in the mechanism of the 1904 Winton touring car are minor ones. Chief among them are improved clutches consisting of a beveled steel plate that presses into a similarly-beveled, hollowed-out portion of the bronze gear, and that is said to always hold, although it runs in oil; and a new pressure-feed oiling device with a small tank below the motor, from which the oil is pumped up by a cam-driven plunger pump, and flowed over all the bearings of the motor and transmission. The crank shaft has been enlarged, as well as several other parts which it was deemed prudent to strengthen somewhat. The addition of a handsome canopy top has done much to make the Winton a very attractive car, besides making it a thoroughly serviceable one in all kinds of weather.

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liness, the Woods Motor Vehicle Company, of Chicago, has brought out, as one of its latest models, an electric tonneau car of five electrical horse power. This has the superficial characteristics of the gasoline tonneau car, including the front bonnet and wheel steering, but in this case the bonnet covers half of the battery cells, and the motors are suspended below and in front of the rear axle, the armature pinions driving direct to external spur wheels bolted to the drive wheels. The remaining twenty cells of the forty-cell battery are under the front seat. The battery is of 160 ampere-hour capacity and is expected to drive the car 60 miles on one charge over asphalt or good macadam streets. The motors, of which there are two, are of 2½ horse power each. The controller gives four forward speeds (5, 10, 14, and 18 miles an hour) and one reverse. There are two brakes, one operated by the foot and the other by the controller hand lever.

The body, the tonneau portion of which is removable, is mounted on a Woods running gear extended to an 88-inch wheel base and fitted with 32-inch front and 36-inch rear wheels of artillery type. The wheels have steel hubs and are equipped with 2½-inch solid rubber tires. The tread is 56 inches. The seating capacity is four passengers and the operator, and the weight complete is 3,200 pounds.

Other new models offered by the Woods Company are the "Queen Victoria," an extension-front brougham, and an inside-operated brougham or physician's coupe. The distinguishing new features of these are the dividing of the battery so that half of the cells are carried over the front axle and the rest over the rear axle, thereby distributing the weight more evenly on the running gear, and the use of downwardly-curved horns at the front of the vehicle to connect with the springs.

Electrical Notes.

A new surface-contact system of electric traction as applied to railways was put on trial recently in America on a mile of experimental line on the Pennsylvania Railroad. Report states that a speed of 85 miles an hour was attained, and that in other respects the results were successful.

On the subject of paper insulation the American Steel and Wire Company has made extensive tests with paper-insulated wire and cables with results that are considered very important. As a consequence of these tests this paper insulation has been adopted for the New York underground system.

At the exhibition of motor cars in Paris the Ducommun 24-horsepower car has a motor fitted with automatic induction valves made in one piece, the valve ring and guide being formed in halves so fashioned that upon the valve and its seating being withdrawn from the valve-box the valve itself can be detached and quickly replaced.

The authorities in charge of the telephone service in Japan have decided to employ only girls, both for day and night duty, at the various exchanges. Men were formerly employed for night work, but this arrangement proved unsatisfactory. This branch of the service gives employment to 3,017 hands, of which number 1,129 are girls.

The total energy generated and used at the St. Louis Exhibition will be close upon 50,000 horse power. Over 80 per cent of the electric energy will be in 6,600-volt, three-phase, 25-cycle current. The largest unit will be an 8,000-horsepower steam turbine, and the next largest a 5,000-horsepower compound horizontal and vertical reciprocating steam engine.

At Baku, on the north side of the Caspian Sea, an electric power station has been erected for supplying power to the oil wells in that locality. There are 2,000 oil wells, scattered among a number of villages. These produced last year about 11,000,000 tons of oil. The central station has an output of 1,500 horse power, and is located near the shore of the sea, so that the water might be used for condensing. There are four tubular boilers, using as a combustible the waste product from the oil refineries. The station contains two 750-horsepower engines, having each three cylinders, and each driving a three-phase alternator which generates 6,500 volts at 100 cycles per second. Each alternator has its own switchboard. The transmission line extends eleven kilometers from Baku. At sub-stations the voltage is lowered by transformers to 1,100 and supplied to the motors, which have an output of between thirty and fifty horse power. This type of plant was adopted to diminish as much as possible all fire risks arising from the character of the work.—L'Electricien.

In 1885 the Vienna conference decided to use a tuning fork upon a sounding board, and actuated by an electromagnet, in order to obtain a longer period. At the time, attention was called to the fact that the magnetic field might change the pitch of the fork, and some attempts were made by various investigators to detect such an effect. Herr O. Kirstein has made a careful study of this matter, and by using two forks in tune when vibrating freely, he found that they were no longer in tune if one of the forks was actuated by an electromagnet. By selecting two forks not exactly in tune, and observing the beats, and then by changing the period of either one, he was able to determine the effect of the magnetic field. The following are his conclusions: If a tuning fork vibrates in a magnetic field in such a way that the lines of force are perpendicular to the plane of vibration, the pitch of the fork is raised. On the other hand, if the lines of force are parallel to the plane of vibration, the pitch is lowered. The change in pitch is directly proportional to the field strength. The effect of the magnetic field is only temporary. For a given field strength the decrease in the pitch is greater than the increase. If the plane of vibration of the fork lies at forty-five degrees to the lines of force, there is no change in the pitch.—Physikalische Zeitschrift.

A remarkable feat was achieved with the electrophone on the occasion of the British Prime Minister's recent speech at Sheffield. At the London premises of the Electrophone Company in Gerrard Street, receiving instruments were connected to the telephone wires provided by the National Telephone Company, which extended to the latter's switchboard, and there were connected to the Post Office trunk cable between London and Glasgow. This line was tapped at Sheffield, and at the building in which the speech was delivered six especially powerful transmitters were fitted at a distance of four feet from the speaker. At the London end of the wire the auditors, composed mostly of journalists, were provided with a double receiver, which was held against the ear. The distance between London and Sheffield is 220 miles, but so successful was the experiment, that notwithstanding the enormous distance, every word and sound in the building in which the speech was delivered were heard with such conspicuous clearness, that it sounded as if the speaker were in the receiving room. Not an inflection in his voice was lost, and even the pushing back of his chair as he rose to leave the platform was distinctly heard. One or two leader writers of the London papers actually penned their articles, while listening to the speech for the following morning's papers, which affords a very comprehensive idea of the success of the experiment. This is the first attempt to utilize the electrophone over such a great distance and it opens new possibilities for this instrument, since it is contended that there is no finality to the employment of the electrophone, success depending upon the utilization of sufficiently powerful transmitters.

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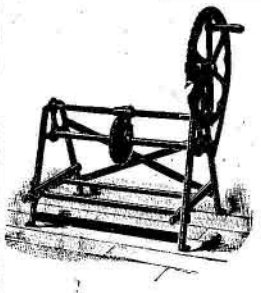
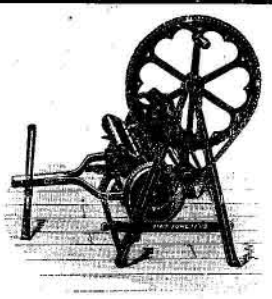
The Ideal Lawn Mower Grinder



This machine will grind a lawn mower perfectly in 15 minutes, and is destined to revolutionize the whole business. Greatly improved over old models, and is now perfection. Energetic men and boys make $10 per day using it. Nothing like it on the market. For prices, etc., address the manufacturers,

THE ROOT BROS. CO.
Plymouth, Ohio



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