



Kenneth Garner who built this fine Meccano Model.

# Remarkable Six-Wheeled Chassis

## A Splendid Opportunity for Model-Builders

THE severe conditions in which large-scale transport had to be carried out during the War led to a great concentration of attention upon the design of motor lorries. The result has been a rapid development in the

brakes while travelling at high speed on the level, the vehicle gave a remarkable demonstration in a gravel quarry, in the course of which it climbed heaps of loose gravel and sand with a gradient of fully 50 per cent., and worked its way into and out of holes 4 ft. in depth. This demonstration proved the special suitability of the machine for difficult sandy surfaces.

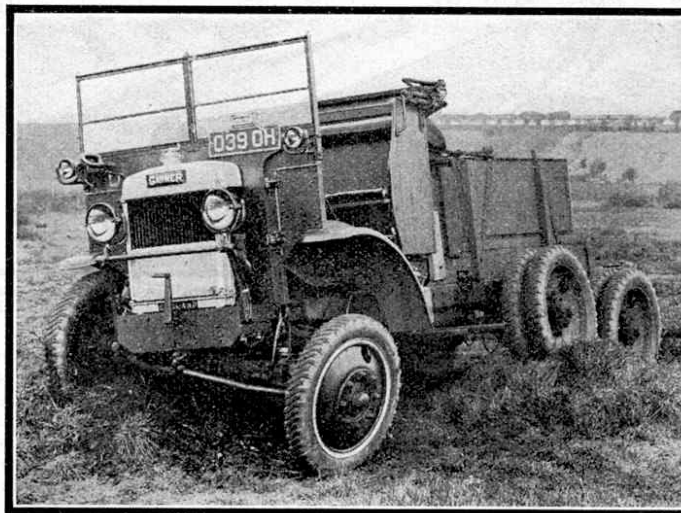
The frame length of the chassis is 15 ft. 6½ in. ; the

general efficiency of such vehicles, and during the past few years many interesting types have been produced. Among the most successful of recent commercial motor vehicles is the Garner rigid six-wheeled lorry. This incorporates the many excellent qualities of standard pattern, together with certain special features that render it useful for transport purposes over ordinary roads and the roughest ground alike.

A test of this Garner six-wheeler was carried out a short time ago over some of the roughest ground to be found in the British Isles, corrugated in places by ruts ranging from a foot to two feet in depth. This test showed that the chassis was capable of traversing the most uneven surface without difficulty ; while in hill-climbing ability and speed on the level it surpassed

many four-wheelers intended only for service on hard roads. In order to illustrate the adaptability of its wheels and axles to such unpromising conditions, the chassis was driven on low gear, in zigzag fashion, up a gradient of one in six, so that its three axles continually assumed different angles. A load of 30 cwt. was carried, and this was increased at certain points by half-a-dozen passengers. Yet in spite of this load the machine always appeared to have power in hand, and it completed the ascent with ease.

In addition to descending a hill with a gradient of one in 4½, and demonstrating the efficiency of its



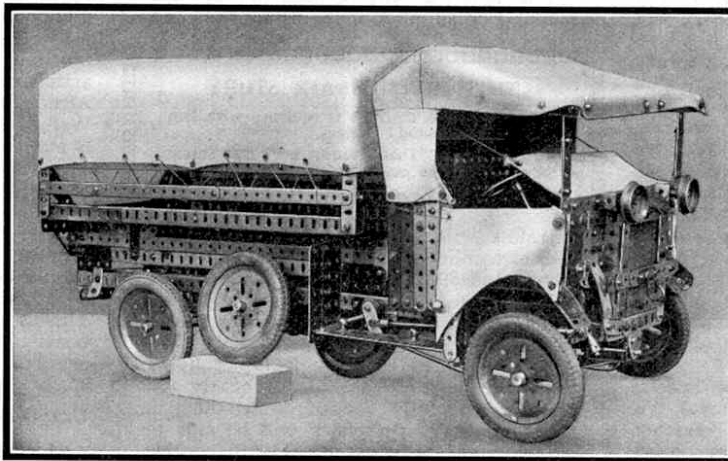
The Garner six-wheeled motor lorry. The photograph shows how the articulation of the axles enables the lorry to negotiate rough country.

distortion.

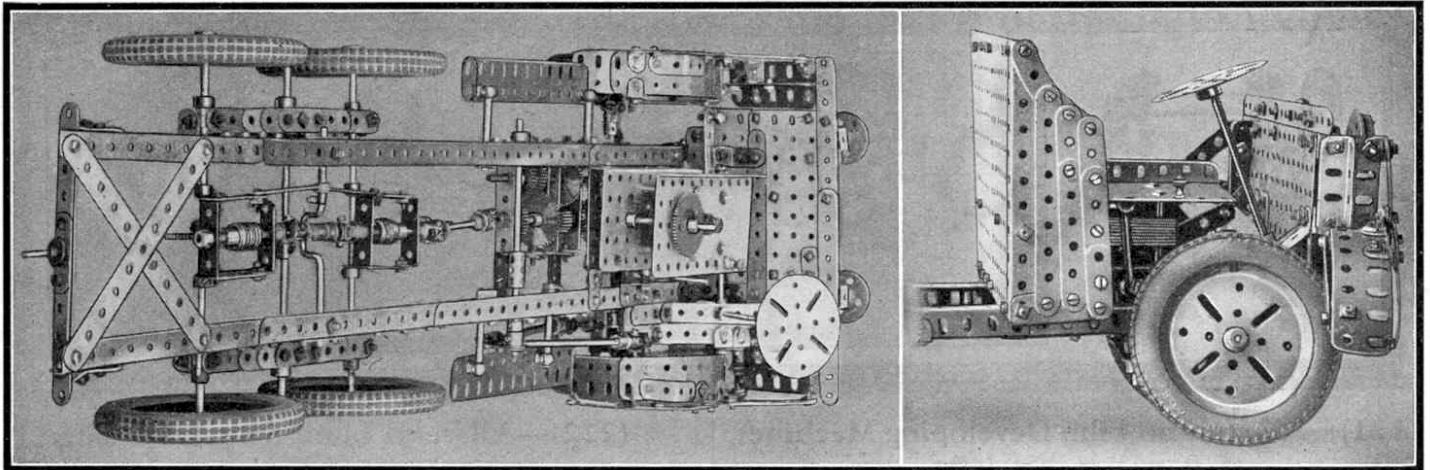
Considerable attention has been given to the matter of effective braking. Drums are provided for all four rear wheels, and in these work shoes 17 in. in diameter with a face width of 2½ in., one set being operated by

a pedal through a Dewandre servo, and the other controlled by a hand lever. The arrangement of the various controls is as follows. The main change-speed and brake levers are on the right ; the auxiliary change-speed control is at the left ; and, apart from the clutch and brake pedals, there is a slipper-type accelerator pedal. The ignition and throttle controls are mounted on the steering column below the wheel.

The front wheel wings are carried on a pair of vertical hinges, so that they can be swung forward to give accessibility to the engine. The hinges are designed also to permit of tilting in order to clear the wheels.



The model of the lorry built by Kenneth Garner. This splendid model incorporates all the main features of the actual vehicle, and is described in the accompanying article.



Further views of the model lorry. It is interesting to compare the photograph on the left with the chassis of the actual lorry shown below. The Garner patent front wing arrangement is well seen in the photograph on the right.

The arrangement of the back axles and suspension is on more or less orthodox lines. Between the axles the frame is joined by a pair of tubular cross-members, one above the other; and on the ends of the lower member are centrally pivoted double-inverted semi-elliptic springs on each side, their outer ends being pivoted to brackets on the axles. The two cross-tubes are joined by a pair of vertical members that form the anchorages of a pair of torque members attached to lugs cast on covers fitted to the housings of the driving shaft worms.

The bogie has two inverted semi-elliptic springs at each side, and a ball-jointed radius and torque rod stretches from the top cover of each of the driving worm casings to stout brackets connecting a tubular cross-member with the fulcrum member for the rear springs. The torque member attachments take the form of balls and sockets to afford the necessary flexibility. Excessive vertical and tilting movements of the axles are prevented by steel wire cable slings and rubber buffers held in brackets secured to the frame side members.

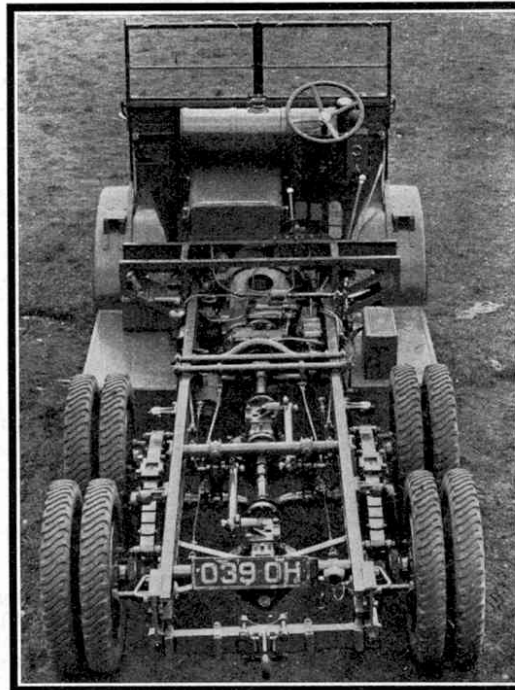
One of the most interesting features of the chassis is the arrangement of the front axle and springing to permit perfectly free axle movements without imposing twisting stresses on the frame. The axle is located by two long radius rods at the back, universally anchored to brackets fitted under the side frames, and joined by a tubular cross-member. These take the thrusts when the wheels meet obstacles while travelling forward. In addition, forward thrust on the axle is resisted by a third radius rod of wide V shape, secured at the centre by a ball and socket to the front end of the frame, and having its outer ends attached to the axle close to the steering pivots.

The front suspension comprises two quarter-elliptic springs, their inner ends held in a pivoted bracket, and their outer ends passing between rollers carried in brackets secured to the axle. These springs are

not parallel with the axle, but are inclined forward, thus increasing their length and flexibility. It will be seen that by this arrangement both the axle and the front radius rod articulate together with the springs to the limits imposed by the slings and rubber buffers already mentioned.

The steering box, which is of the cam and lever pattern, is mounted at the extreme front of the off-side frame member. In order to obviate road shocks as much as possible, the drop arm of the steering wheel is connected by a drag link about 4 ft. in length, carried back to an idle lever pivoted to the frame, from which a second rod is taken forward to the steering arm. The vehicle will turn in a circle 47 ft. 6 in. in diameter.

The Garner chassis affords a splendid subject for reproduction in Meccano. This will be apparent from the accompanying photographs of the fine scale model constructed by Kenneth Garner, son of Mr. Garner, of Garner Motors Ltd. Construction of this model was begun during the summer of 1928, at which time the technical staff of Garner Motors Ltd. were busily engaged in drawing up plans for their new production. The greater portion of the model, namely, the frame, bogie, and articulating front axle, was developed from the original drawings of the actual chassis. The model proved very helpful to the designers in assisting them to work out the general details, as it showed quite clearly a number of movements that it was not possible to convey clearly by drawings alone. The cab and



The Garner lorry chassis with the body removed, showing how the transmission to the second and third axles is carried by overhead Worm drive.

bodywork are built to scale, the measurements being based on the dimensions of actual vehicles in the Garner Works.

The model is driven by a six-volt Meccano Electric Motor, which is incorporated in the frame as a substitute for the orthodox engine. The gear-box gives two speeds forward, and reverse travelling is obtained by reversing the motor. The final drive to the second and third axles is transmitted by Worm gears. (Continued on page 251)

**Powerful Searchlight**—(Continued from page 211)

case of a battleship in action the searchlight is likely to come in for rough usage and a great deal of thought has been given to the problem of producing the most robust mechanism possible. A modern battleship searchlight is not only capable of withstanding the heavy vibration of gunfire, but even if hit by a shell the mirror is merely fractured and the efficiency of the beam is not seriously affected.

Another interesting type of searchlight is that used for the navigation of the Suez Canal. This gives a split beam with a dark space between. In this manner the sides of the canal are illuminated, but the light is not thrown upon on-coming vessels, so that pilots are not blinded by the glare. Searchlights are also used in fire brigade work for lighting when the usual sources of illumination have been extinguished.

**Six-Wheeled Chassis**—(Continued from page 225)

Steering is by means of Ackermann type linkage, and the change-speed lever for the gear-box is placed at the driver's left-hand side. The special Garner front wheel

encourage originality in this class of model-building, we have decided to offer prizes of £1-1s. for the best model of an articulated six-wheeled vehicle, of a similar type to the Garner lorry, submitted by Home and Overseas readers respectively. Prizes of

10/6 and 5/- respectively will be awarded to the two models that come next in order of merit in each Section, and in addition several Meccano Engineer's Pocket Books will be awarded in recognition of other good models.

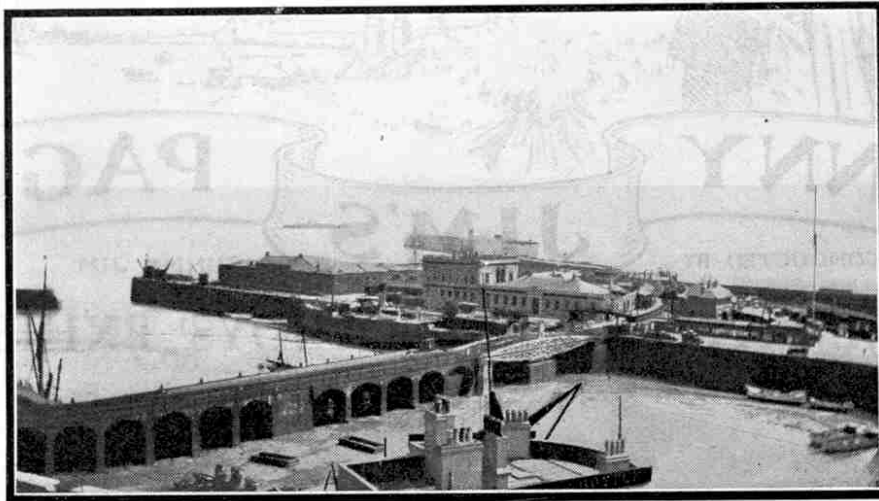
Competitors should note that actual models must not be sent. All that is required is a photograph and a brief description of the design and construction of the most important features of the model.

The age, name and address of the competitor must be written clearly on the back of all photographs or sheets of descriptive matter submitted,

and the envelopes should be addressed: "Garner Chassis Competition," Meccano Ltd., Old Swan, Liverpool. The entries from Home readers must reach headquarters not later than 30th May, 1931, and those from Overseas readers not later than 31st July, 1931.

It should be noted that photographs of the prize-winning models become the property of Meccano Ltd., but photographs of unsuccessful entries will be returned to the senders if desired, providing that a stamped addressed envelope of the necessary size is enclosed with the entry.

**A Famous Harbour**



View of Folkestone Harbour, showing the swing bridge that carries the railway to the harbour station. The bridge is 270 tons in weight, of which the swinging section accounts for 260 tons. It is supported on a central pier and the moving portion runs on roller bearings. The bridge is about 132 ft. in overall length and when open leaves two channels into the Old Harbour each 50 ft. in width.

articulation system is faithfully reproduced in the model, and it is interesting to note that, by incorporating two quarter-elliptical springs arranged in V formation and working in combination with a radius rod, a considerable difference in front wheel level is possible. The springs are centrally pivoted to the chassis and give free articulation of the front wheels within a limit of 1½ in.

The rear axle suspension consists of two inverted semi-elliptical springs built up from Strips of various lengths on each side of the frame; and these also incorporate the bogie mounting system. An important feature of this method of suspension is that the front wheels are mounted in practically the same position fore and aft as when the usual semi-elliptical spring system is provided; thereby reducing the total length of the chassis and wheelbase without reducing the available loading space. The body is of the "well" type, and is equipped with small hooks, to which a canvas covering may be attached. A hinged tailboard also is provided.

The model chassis is 2 ft. in length overall and 8 in. in width, the track width being 7 in. The overall measurements of the body are length 15½ in., width 8 in., and height 8 in.

Every part of the chassis consists of standard Meccano parts. The transmission incorporates several Universal Couplings in order to provide flexibility of the inner bogie axle for travelling over uneven ground. The six road wheels consist of 3 in. Pulleys fitted with 3 in. Meccano Dunlop Tyres, and these give to the model a very finished and realistic appearance.

There is no doubt that many readers will wish to construct for themselves a model chassis of a similar type. In order to

**New Meccano Part**

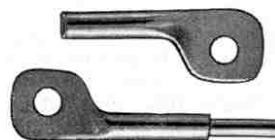
No. 173 Rail Adaptor, per pair 6d.

This new unit has been designed to enable Hornby Rails to be connected to rails built up from Meccano parts, such as Strips, Angle Girders, etc.

As shown in the accompanying illustration the Adaptor consists of a pair of connecting pieces, one fitted with a pin that is inserted in the socket of a standard Hornby Rail, and the other provided with

a socket to take the projecting pin on the Hornby Rail. The connecting pieces are fitted with perforated lugs that are pushed over the ends of the Strips or Girders forming the Meccano rails, and secured to them by means of bolts so that a rigid connection is made.

The Adaptor will be found very useful by constructors who have a supply of Meccano Strips, etc., and also of Hornby Rails, as they will now be able to employ both materials in the construction of track for Hornby locomotives or Meccano models.



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