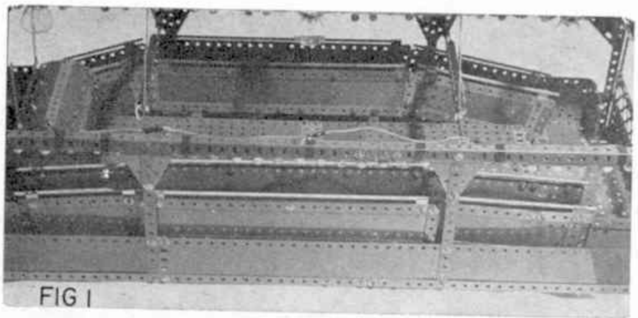


Fig. 1. A simple two-stage " Cake-walk ". Each platform is in three sections with slide bearings at each end and two hinged " breaks " on the walks.

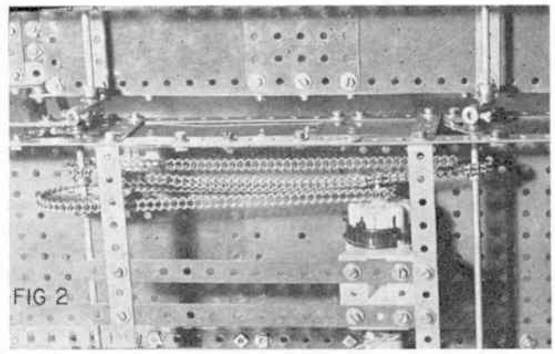


Fig. 2. The simple chain drive to the cranks under each oscillating platform in the " Cake-walk ". The crank rods extend to both platforms, but the Couplings forming the crank webs are off-set at either end.

MECCANO CONSTRUCTORS GUIDE by B. N. Love

Part 9: Fairground Machinery

HAMPSTEAD HEATH ON A BANK HOLIDAY, or any similar location, draws tremendous crowds to the traditional Fair which travels all over the countryside. The Public, as a whole, are fascinated if not spellbound by the huge fairground machines in motion and are always ready to place themselves at the mercy of these mechanical monsters to have their insides shaken unmercifully. Some excellent fairground models have been published in Meccano Magazine from time to time, with comprehensive descriptions of the special mechanisms required to produce the compound motions of such exciting machines as the " Octopus " or the " Satellite " and the fairground is a rich source for other Meccano modelling ideas. Mechanisms abound from the simplest oscillating or rotary motions to the complex compound motions, so that the enthusiast can work his way through the available fairground " rides " according to the parts at his disposal.

A great favourite of our forebears, young and old alike, was the " Cake-walk "—a pair of reciprocating platforms which were negotiated by the " walkers " with many a hysterical shriek from Victorian sporting ladies who ventured upon it. Its popularity survives to this day and is a simple subject to model in Meccano. Fig. 1 shows the general arrangement of the " walks " which are raised platforms, side by side, driven from below by a reciprocating mechanism that rocks the two sides of the Cake-walk in opposite directions—just to make the " walkers " ever more giddy as both walks

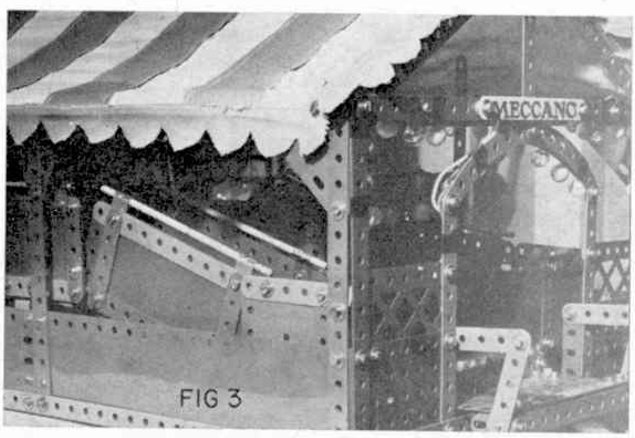


Fig. 3. A gay striped canopy and attractive entrance give added realism to fairground models. Note the " break " in the first cake-walk platform which occurs just before the attachment of the cranks from below.

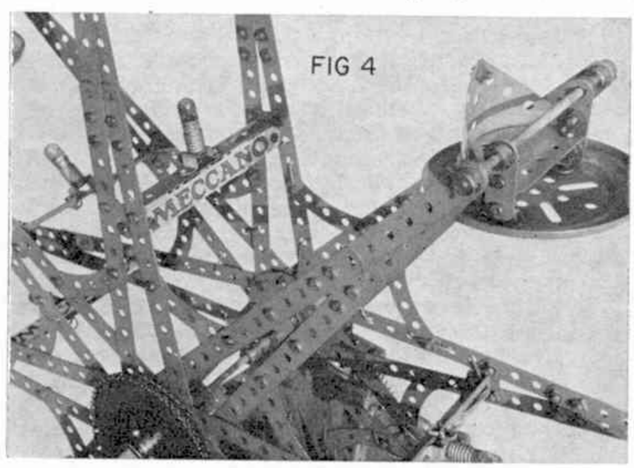


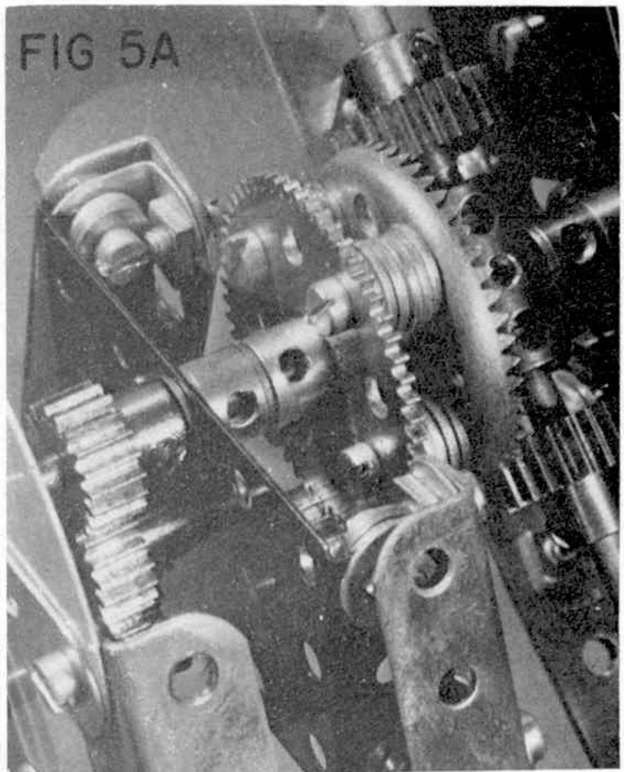
Fig. 4. A simple arrangement for the arms and passenger cars of an open Ferris Wheel.

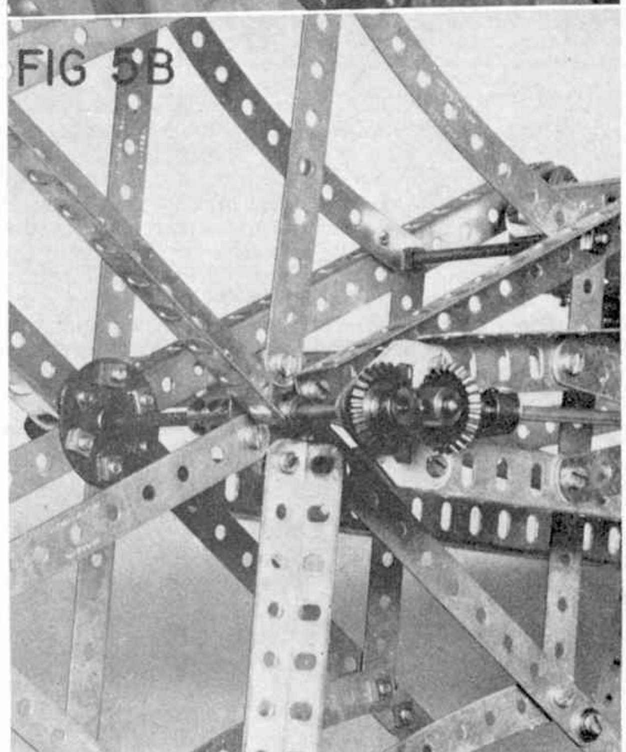
need to be negotiated before the exit platform is reached. Fig. 2 shows the simple arrangement of the mechanism which is driven through chain-drive and cranks by a 3-12 volt D.C. Motor with 6-ratio Gear Box. Although simple in principle, the Cake-walk is an attractive model and, when fitted with lights, a gay canopy of striped material, entrance steps and a pay-box, it has all the realistic flair of the genuine article.

The Showman's aim is to thrill and delight his customers or to exploit their human weaknesses for financial gain—according to one's point of view, but his machinery has remained basically simple for more than a hundred years. The simple Ferris Wheel is always well patronised, being an ideal 'stomach displacer' as the passengers ride through a great arc on its periphery, and this is another simple machine to model in Meccano. Various lengths of Perforated Strips, from 7½ in. upwards, are the most usual components for the wheel spokes, Face Plates forming central hubs to which the radial spokes are attached. A separation by 4½ in. Double Angle Strips would give satisfactory porportions to a wheel of about 20 in. diameter and this will accommodate eight passenger cars, or "cupolas", quite nicely. Fig. 4 shows one of the many variations of passenger cars suitable for Ferris Wheels, but these can be made in a variety of ways with some thought given to exploiting the more interesting shapes which present themselves in the range of Meccano parts.

An interesting development of the Ferris Wheel is the replacement of the main wheel with a rotating boom which carries a separate and smaller Ferris Wheel at each end. By arranging drives both to the boom and the wheels and selecting appropriate gear relationships, some very interesting geometrical paths are traced out by the unfortunate fairground devotee as he is hurled through equilateral triangles and other uncomfortable loci in a vertical plane, much akin to to those provided by the "Whip" at ground level. Fig. 5 shows a simple epicyclic gear mounted at the boom centre of such a contra-rotating "Double Ferris Wheel" which passes on the drive to the outer wheels in one of the geometrical paths outlined above. The 1½ in. Contrate Wheel is bolted to the 57-teeth Gear Wheel, both of which are free to revolve on the main central shaft, this shaft not only turning the main boom, but also passing motion to the Contrate Wheel via the ½ in. Pinion train shown. The 25-teeth Pinions meshing with the Contrate Wheel pass on the motion to the two separate wheels in the correct phase to give the desired locus of travel for each passenger car.

Very strong Ferris Wheels of large diameters can be built from standard Meccano parts if the enthusiast is in a position to command a large collection of parts. Axle Rods joined by Couplings provide spokes which can build up a 6 ft. diameter wheel of elegant proportions. By using hub cheeks made of 3 in. Sprocket Wheels, to which 3½ in. Gear Rings are bolted in spaced pairs, a 32-spoke hub is quite easily constructed. The Axle Rods forming wheel spokes are fitted with Strip Couplings which are, in turn, fastened by Meccano Hinges to the peripheral holes of the Gear Ring. This hinge arrangement allows all of the spokes to be doubled up by using two hinges at one hub anchoring point and allowing for one spoke to go straight out to the rim of the Ferris wheel, or to be slightly angled to give a 'dished' construction, while the inside spoke from the same hinge root goes across at a greater angle to meet the wheel rim on the far side. This gives very strong bracing to the wheel and is the method employed on demonstration models





Upper : Fig. 5a. A simple, but effective epicyclic drive for contra-rotating Double Ferris Wheels.

Lower : Fig. 5b. The Bevel drive to the individual wheels on the rotating boom of a Double Ferris Wheel. This drive is taken from the ¾ in. Pinions shown in Fig. 5a.

Fig. 6. Giant Ferris Wheels of 6 ft. diameter and more can be built by liberal use of Rods and Couplings. Heavy hub sections are constructed from 3 in. Sprocket Wheels and $3\frac{1}{2}$ in. Gear Rings. Note the built-up central shaft reinforced with long Screwed Rods which runs in "square" bearings as described in the text.

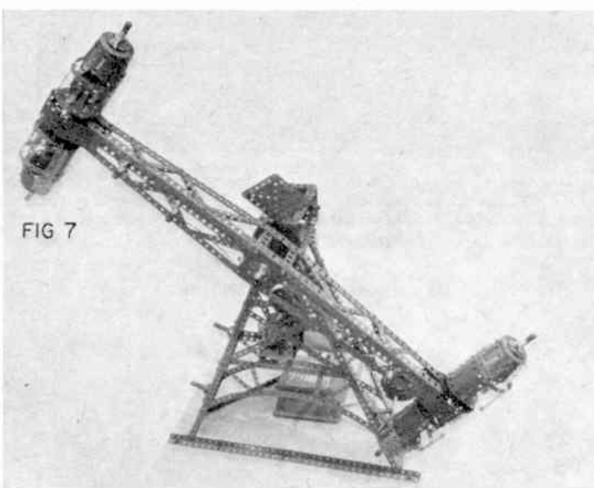


Fig. 7. Whirling "Torpedoes" make a fascinating display model with revolving aerocars driven through simple gearing.

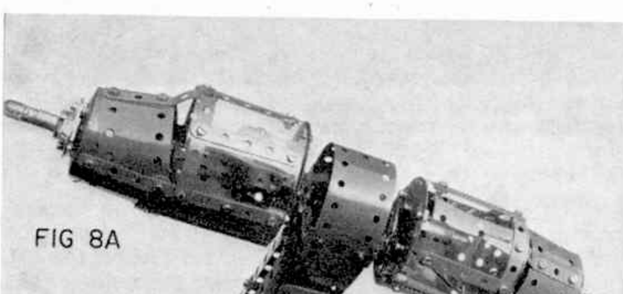


Fig. 8a. A pair of cars from the "Torpedoes" fitted back to back on the same shaft. Passenger seats and "navigation" lights add to the realism.

which have to run for long periods in exhibitions. Fig. 6 shows a portion of such a wheel.

As a diversion from the contra-rotating Double Ferris Wheel, the rotating boom has been put to good use in an even more fiendish piece of machinery in the shape of the "Torpedoes". This makes a fascinating Meccano model and requires quite simple gearing. The general arrangement of the passenger cars is shown at the boom end in Fig. 8a. Apart from rotation of the main boom, each passenger car revolves on its own axis, thus imparting a helix, or screw-form locus in a circular orbit to the passenger. This type of machinery can have the boom supported between large 'A' frames but the overhang, or cantilever form shown is quite common and is often designed in this manner so that the vertical plane in which the boom rotates can also be given a tilting motion just to add to the thrills.

While the section of the model illustrated in Fig. 9 is confined to vertical plane rotation, the cantilever or over-hung central shaft must be of substantial proportions. It is, in fact, made from long Screwed Rods and Wheel Discs, the Rods themselves passing right through a large bearing at the front of the model. This means that the shaft on which the boom is carried is almost the diameter of a Wheel Disc—some $1\frac{1}{2}$ in. diameter, although its construction is in cage form. The important part is the front end bearing which really carries all the weight of the rotating structure. This is simply a square box made from 1×1 in. Angle Brackets mounted in a framework of short Angle Girders with Nuts and Bolts selectively placed in the corners of the assembly, where they will not foul the large-diameter compound axle. By placing several thicknesses of Wheel Discs together on the Screwed Rods at this point, a large rolling surface is rotating inside of a 'square' bearing—unorthodox, but quite strong and efficient at low speed, so long as the bearing is packed with grease. Motor car grease is quite suitable, but oil must be avoided. Long Screwed Rods pass right through the eight holes available in the 3 in. Sprockets and into a thick sandwich of 8-hole Wheel Discs at each end of the main axle assembly. A 'square' bearing is mounted at the top of each massive 'A' frame and the support given is quite adequate for the heavy wheel revolving at the low speed of a fairground model.

In the case of the cage shaft used for the over-hanging boom of the "Torpedoes", only one of these 'square' bearings is used, i.e. at the front, where the main weight is carried. Running through the centre of the cage shaft is a fixed Axle Rod secured in a Bush Wheel bolted to a $2\frac{1}{2}$ in. square Plate at the rear of the model. This allows a pair of 8-hole Wheel Discs at the rear end of the cage shaft to rotate on a "dead" centre and at the same time to be held in place literally by a pair of Collars, thus positioning the other Wheel Discs at the other end of the cage in the correct lateral position inside the front 'square' bearing. The fixed centre Axle Rod runs right through into the centre structure of the rotating boom where it holds a fixed $1\frac{1}{2}$ in. Contrate Wheel. A pair of $\frac{1}{2}$ in. Pinions run round the fixed Contrate Wheel in epicyclic motion to pass on rotation to the aerocars or torpedoes through the long Axle Rods in the arms of the boom. Final drive to the cars is by Pinion and small Contrate Wheel, as shown in Fig. 8b.

Traditionally, the central feature of all fairgrounds for more than a hundred years is the Roundabout, Carousel or Gallopers and these machines offer an excellent subject for Meccano Modelling. Fig. 10

shows just one of the hundreds of examples of which the Meccano system is capable and the model illustrated is built as far as possible on the lines of basic prototypes. Meccano models have appeared from time to time employing a heavy base turntable and this is basically wrong as the showman could never transport such a heavy turntable across country. Instead, for the early types of travelling fairs, a pivot truck formed the centre of a set of gallopers. The truck carried the steam engine, to drive the " ride ", as well as the smoke stack and the central " mast ", or pivot, on which a heavy crown wheel and bevel gearing was mounted. The truck wheels and frame were heavily shored and wedged with timber to give a stable centre pivot and the sections of the roundabout were suspended from 'spider' arms rigged to a stout centre mast through which the exhaust gases from the steam engine were vented.

Although modern gallopers are fitted with electric motors and electrically-driven " steam " organs, traditionally they still follow the centre truck design. Fig. 11 illustrates the heart of a Meccano roundabout capable of driving 24 gallopers. The centre support is an octagonal pillar made from Ange Girders and Flexible Plates on which a Circular Girder is mounted. A simple ring roller race made from Curved Strips carries eight ½ in. Pulleys, over which a second Circular Girder runs on a self-centring path. This second Circular Girder is reinforced with short Strips and Flexible Plates to form an octagonal 'skirt' which revolves outside the central octagonal pillar. Bolted to the top Circular Girder are eight 1 × 1 in. Angle Brackets carrying free-running ½ in. Pinions on Short Threaded Pins fixed in their horizontal lugs, the vertical lugs providing a thrust bearing for ¾ in. Contrate Wheels in direct mesh with the Pinions. As the roller race carrying the ½ in. Pulleys is " hollow ", a 3½ in. Gear Ring may be secured rigidly at the top of the central pillar by a series of Reversed Angle Brackets.

The object now is to get the whole superstructure revolving about the fixed gear ring so that the eight ½ in. Pinions will run round the ring and pass on their motion to the Contrate Wheels. Both in the large-scale machine and the Meccano model, the superstructure has very considerable inertia, i.e. resistance to motion when in the stopped position, and, as the drive must be transmitted from the centre of the roundabout, considerable torque must be supplied. This asks a great deal from a Meccano-size Axle Rod, but the hollow centre bearing lends itself to the 'cage' axle design already described. If a single Axle Rod is used for the central drive, adequate means must be provided for securing driving gears etc. to the Rod. It must also be suitably geared by providing a large Gear Wheel of 2½ in. or 3½ in. diameter at its lower end and this should be reinforced with a Sprocket Wheel with a large boss to give a total of four Set Screws gripping the Axle, the Sprocket Wheel being bolted directly to the large Gear Wheel. At the upper end of the central Axle Rod, two Face Plates are provided, careful fitting of which is very important. The lower Face Plate carries eight ½ in. Angle Brackets to form inner bearings for the 3 in. Axle Rods carrying the Contrate Wheels, and the height of this Face Plate is adjusted to give a slight tilt to the 3 in. Rods for easing the meshing between Contrates, Pinions and Gear Ring. It is then locked into place with two Set Screws. The upper Face Plate carries eight 7½ in. Perforated Strips (only four shown in Fig. 11 for clarity) which are slightly " sprung " by long Bolts

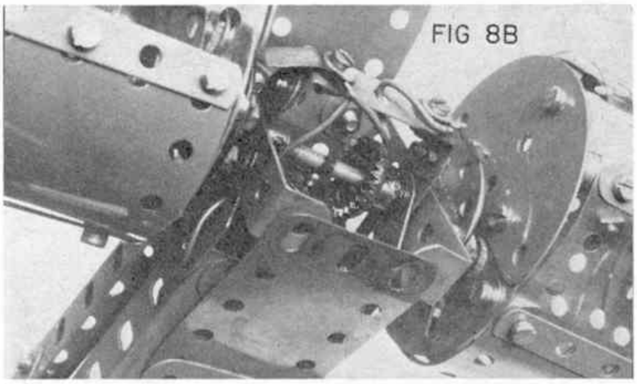


Fig. 8b. Close up view of the Contrate Wheel between the Torpedo's passenger cars with flexible cover plate removed. This gear receives a drive from a ½ in. Pinion fitted to a long Axle Rod running to a 1½ in. Contrate locked to a stationary Rod at the centre of the rotating boom.

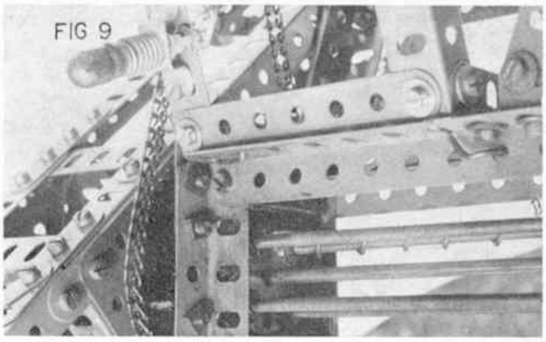


Fig. 9. The 'cage' shaft built from Screwed Rods and stacked Wheel Discs which supports the overhanging rotating boom for the " Torpedoes " in the 'square' bearing mentioned in the text.

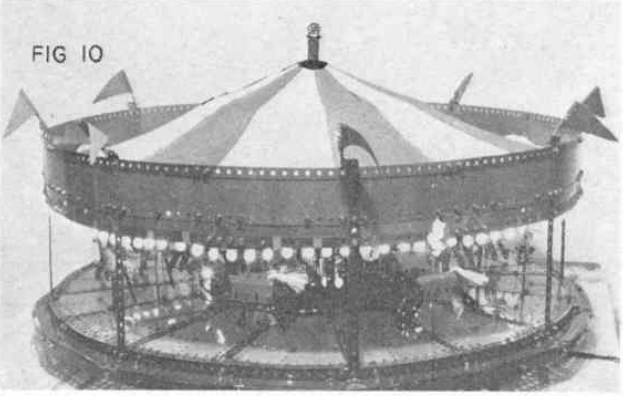


Fig. 10. The ever popular Roundabout, Carousel, or Gallopers —a challenging Meccano subject. Canopy, flags and chimney details again add to the realism.

at their extremities to support the rotating superstructure. However, as these suspension arms pass out through gaps *between* the Contrate Gears, the top Face Plate must be staggered between the holes of the lower Face Plate and must also be locked to it to form a solid hub. This is done by means of four ½ in. Reversed Angle Brackets. We now have four Set Screws (or long Grub Screws) available for securing the hub to the Axle Rod. By this method, standard parts provide all the grip required without the necessity of filing flats on Axle Rods.

Continued on page 517

car outline COMPETITION

50 Dinky Toy Models to be Won!

Fill in the form opposite and simply send it in to *Meccano Magazine*, Comp', 13-35 Bridge Street, Hemel Hempstead, Herts., marked "Car Outline Competition" or if you don't want to cut your magazine just jot down your answer on a postcard and *don't* forget your address!

The first 50 correct entries received will be sent a model of the vehicle illustrated.

The vehicle illustrated is....................

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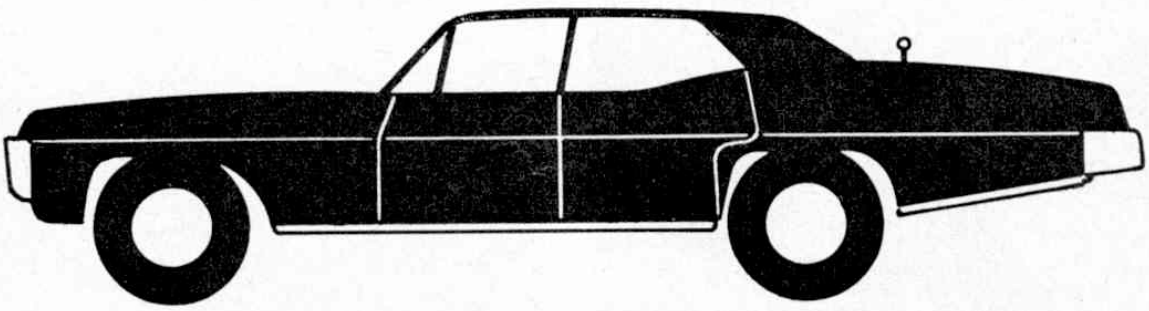

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Rise and fall motion for three gallopers in line are provided by linking two Crank Shafts, part No. 134, by a central crank made from a pair of Couplings secured to a 1 in. Axle Rod. This arrangement allows all three motions to be adjusted for rise and fall at 120° intervals giving very realistic galloping in correct phase. Universal joints connect the Contrate drives to the galloper crank shafts, while twin Fishplates and Rod and Strip Connectors form the swivel ends for the horse poles, these being located on the pins of the cranks with Washers and Spring Clips. The lower end of the horse poles pass through slots in Flat Girders which form radial elements of the decking below.

The roundabout illustrated was adequately driven from 6 volts by a D.C. Motor with 6-ratio Gear Box, which also provided power for a horizontal replica "steam" engine built on to the side of the central pillar. This, together with an illuminated "steam" organ with working musicians, made the model a most attractive and realistic roundabout.

Coloured lights add tremendously to the realism of fairground models and all the models mentioned in this chapter are fitted with lights on both stationary and revolving parts. This requires the use of commutators or slip rings to feed current to the rotating parts—no less than five separate rings being required for the "Torpedoes". A later chapter in the Guide will deal with the circuits and components required for multiple illuminations, but elementary systems can be assembled using existing Meccano electrical parts.

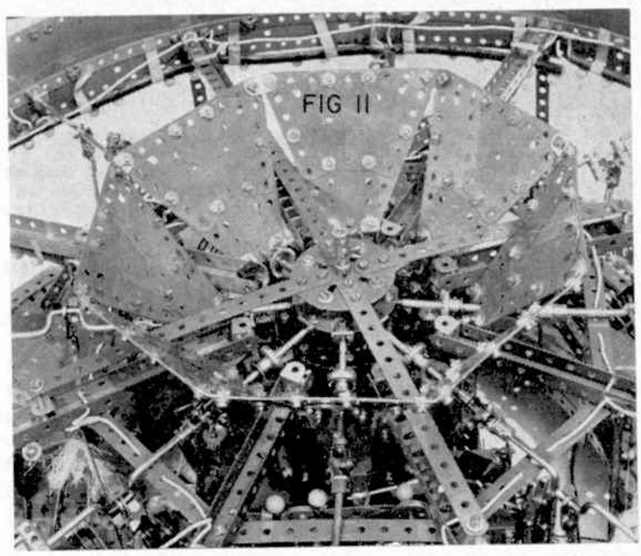

Fig. 11. The "crownhead" gearing for a Meccano 24-horse galloper. Note universal joints to the galloping cranks.

Those constructors who are adept with a sewing machine, or can recruit a member of the family in this direction, can make their fairground models very attractive with bunting and canopies in bright colours. The canopy for the roundabout shown in Fig. 10 is made from triangles of red and white material, trimmed with pinking shears and sewn at the centre to a 1 in. Rubber Ring. This nestles snugly over a small Flanged Wheel which supports the chimney extension.