## Now Build this one!

# Auto-Reversing Transpor

THERE are few branches of engineering that appeal more to imaginative boys than bridge-building. In it are to be found some of the greatest structures and most creditable achievements in the history of engineering, while in no other branch do we find the amazing adaptability of the engineer emphasized in so many remarkable ways. In numerous cases the engineers have had to face what seemed to be insurmountable difficulties in the erection of their bridges, and they have shown undaunted courage in the face of obstacles. They have responded to every demand made upon them, and have even offered to bridge the English Channel between Dover and Calais! These facts appeal to our imagination and make us enjoy reading of the trials and triumphs of bridge builders.

There are many types of bridges, each of which has some outstanding feature that makes it particularly suitable for some special and individual purpose. These different types include arched bridges of stone, cast or wrought iron girder bridges, cantilever and suspension bridges, drawbridges, and transporter bridges. It is to the latter class that the Meccano model illustrated on this page belongs.

The problems confronting a bridge builder are indeed many and vary with each individual case. Because of this, nearly every bridge of importance embodies some original feature that is found in no other bridge, so it may be said that no two bridges are exactly alike. The Tower Bridge with its pair of bascules, the Forth Bridge with its mile-long roadway, and the high Menai Suspension Bridge, are all "bridges" but each differs from the other in almost every particular owing to the peculiarities of the local conditions.

**Local conditions to be observed**

When it is desired to bridge a river the local conditions must of course be taken into consideration before the type of bridge can be decided upon. Should the river be navigable the bridge must be placed at such a height that it will not interfere with the traffic on the water. On the other hand, in cases where the river banks are almost on the same level as the river the construction of a high bridge many feet above the water line is not always practicable, for the cost and inconvenience of building the necessary inclined approaches would be very great.

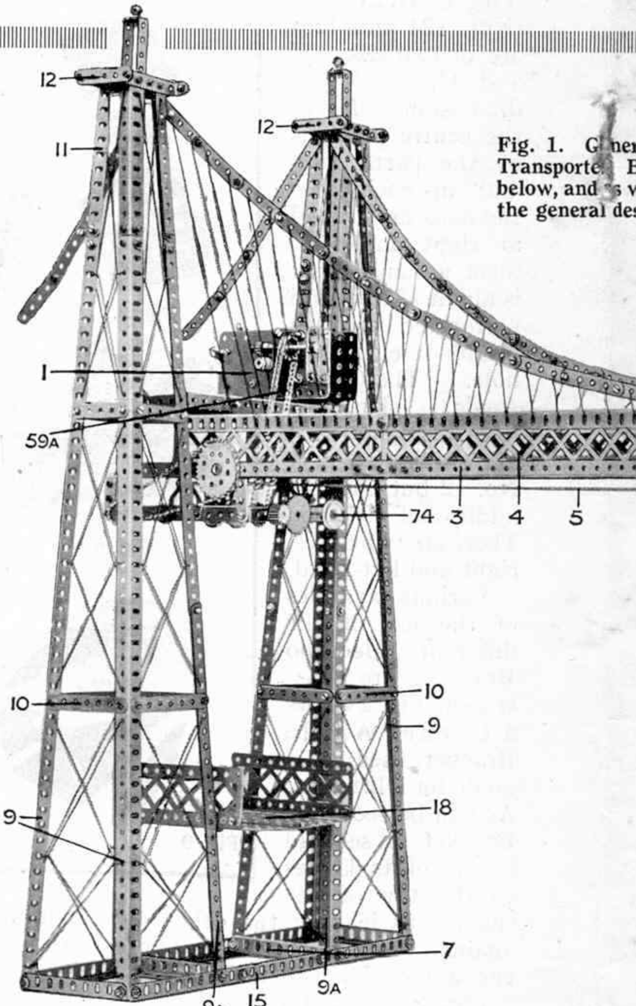
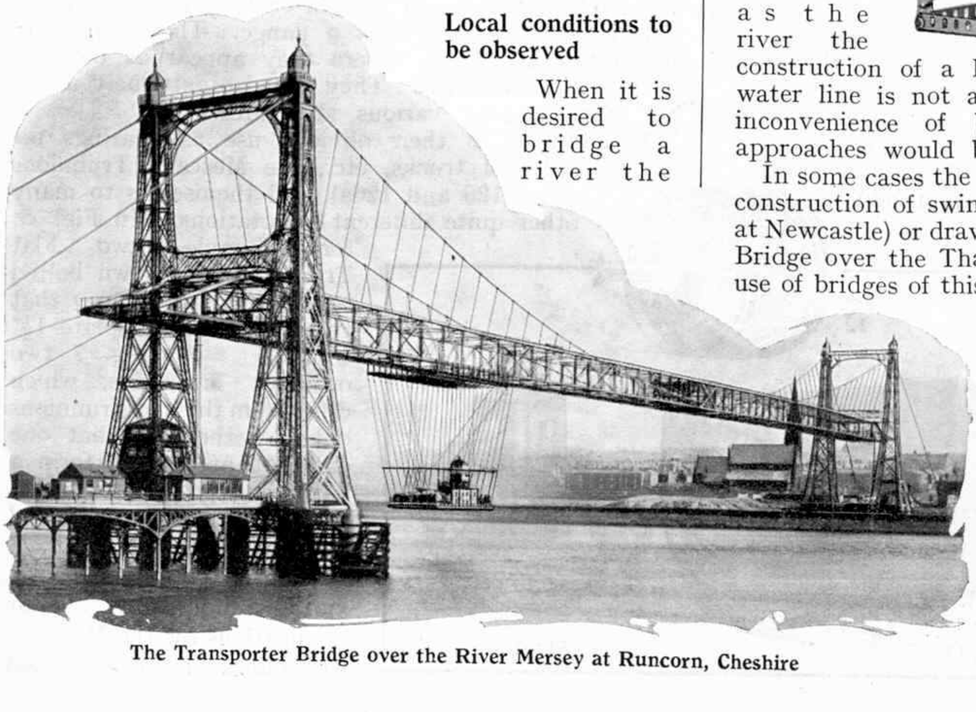



**Fig. 1. G[ne... Transporte[ B... below, and ... the general de...**

In some cases the difficulty has been overcome by the construction of swing bridges (as over the River Tyne at Newcastle) or drawbridges (as in the case of the Tower Bridge over the Thames) but it may be said that the use of bridges of this type is confined generally to comparatively narrow rivers. Moreover, the steering of large steamers through the narrow opening of a swing bridge calls for considerable navigating skill, and if a strong tide is running at the time, there is considerable risk of the ship fouling the piers of the bridge.

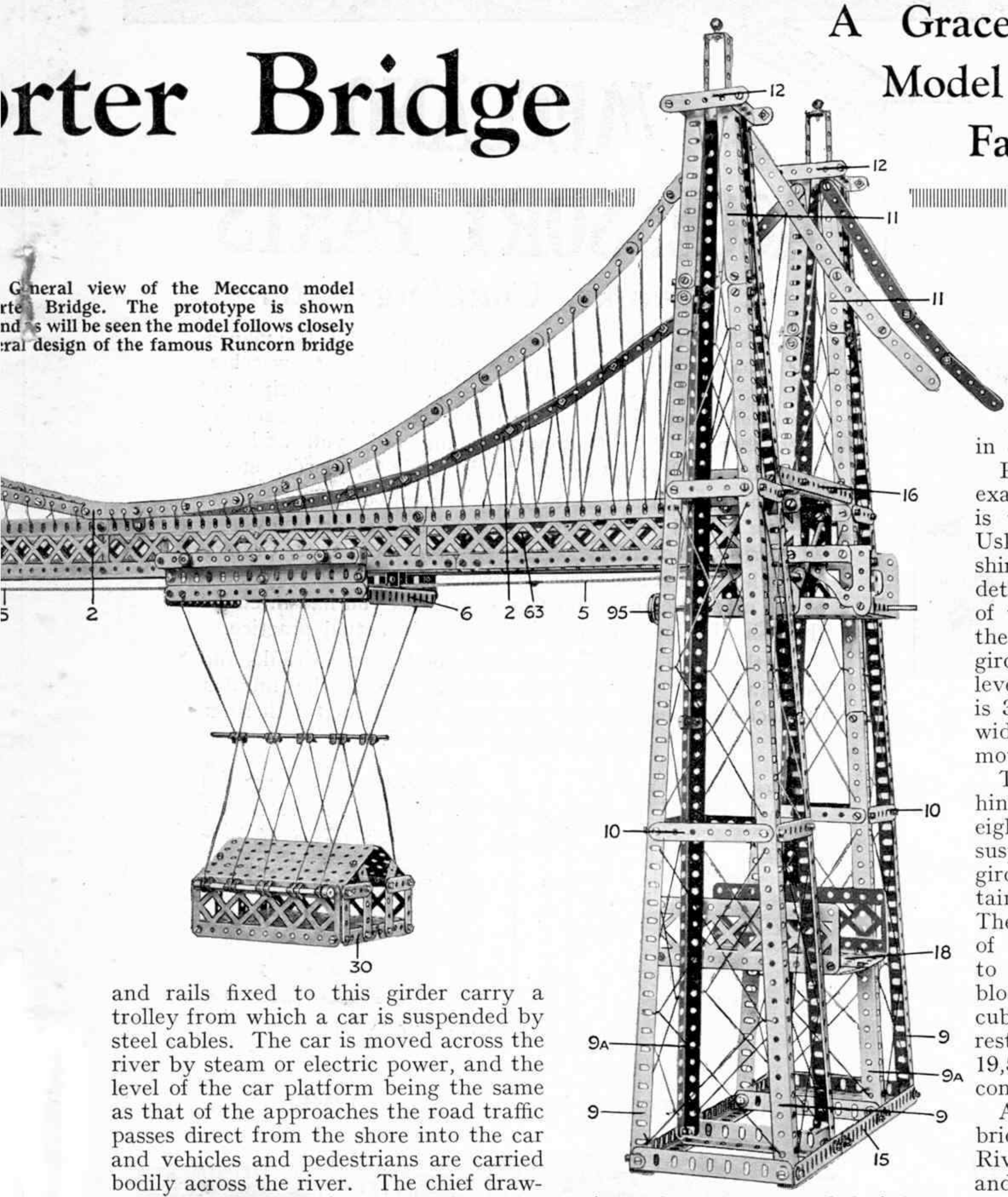
Consequently in certain places, use is made of transporter bridges. These consist essentially of a girder suspended at such a height that it clears the tallest masts,



The Transporter Bridge over the River Mersey at Runcorn, Cheshire

# rter Bridge

## A Graceful Meccano Model of a World-Famous Bridge




G neral view of the Meccano model rte Bridge. The prototype is shown nd s will be seen the model follows closely ral design of the famous Runcorn bridge

and rails fixed to this girder carry a trolley from which a car is suspended by steel cables. The car is moved across the river by steam or electric power, and the level of the car platform being the same as that of the approaches the road traffic passes direct from the shore into the car and vehicles and pedestrians are carried bodily across the river. The chief drawback to bridges of this type is, of course, the time taken in loading and unloading the car. Also whilst the car is taking one load across other road traffic may be held up until the car has completed the double journey. Hence it is improbable that transporter bridges will be made use of in the future except in places where the amount of road traffic is small.

The first transporter bridge was designed in 1872 to cross the River Tees at Middlesbrough, but owing to financial reasons the bridge was never built. For some years thereafter the transporter type of bridge remained more or less a novelty until Palacis, an architect of Bilbao, and Arnodin, a French engineer, took out a patent for this system of bridge design. In 1893 they designed and erected a transporter bridge at Portugalte, near Bilbao, the main span of the bridge being 148 feet above high water level and built in the form of a suspension bridge with "stiffening" girders. In 1897 a transporter bridge was erected across the River Seine at Rouen. It has a span of 472 feet and is operated by electric motors fixed to the top of the car. The towers are 280 feet in overall height.

Perhaps the most notable example of a transporter bridge is that which crosses the River Usk at Newport in Monmouthshire. The following are a few details of the principal features of the bridge: the span between the towers is 645 feet and the girders are clear of high water level by 177 feet. The car itself is 33 feet in length by 40 feet in width and is driven by two electric motors each of which is of 35 h.p.

The legs of each end tower are hinged and sixteen steel cables, eight inside and eight outside, suspend each of the two stiffening girders. Each of these cables contains 127 wires and weighs 4 tons! There is also a similar number of anchor cables which are fixed to foundations consisting of large blocks of masonry totalling 35,000 cubic feet. Each of the end towers rests on piers containing some 19,500 cubic feet of masonry and concrete.

Another famous transporter bridge is that which crosses the River Mersey between Runcorn and Widnes. This bridge is of the suspended girder type and is of very massive construction. The structural details of the Meccano model follow the lines of the Runcorn Bridge very closely—most of the principal features of the actual bridge being reproduced in the model.

A special automatic mechanism by means of which the travelling carriage will traverse slowly from one end to the other of the bridge and then reverse and travel back again is also included in the model. Each time the carriage reaches the landing platforms at either end of the bridge it pauses for a brief period before moving away again to the opposite end. This process is repeated automatically so long as the electric current is supplied.

The constructional details of the towers and the main bridge are dealt with fully in this issue. The automatic reversing gear and the construction of the travelling carriage will be described and fully illustrated in next month's "*M.M.*"

**Building the Meccano Model**

The base of each tower is formed by bolting together two pairs of 9½″ Angle Girders 15 (Fig. 2) overlapped nine holes. These are laid parallel to each other and connected crosswise by four 4½″ Angle Girders 7. The outer vertical members of each tower are constructed with 24½″ Angle Girders 9 butt-jointed to 5½″ Angle Girders 11. The joins are bridged by 2½″ Strips. Each inner vertical member consists of two 12½″ Angle Girders 9a bolted together and extended by 5½″ Angle Girders 11 in a similar manner to the outer members. The 3½″ Strips 10 and 2½″ Strips 14 connect the four girders of each tower while the top is braced by 2½″ Strips 12 bolted to 2½″ Double Angle Strips 12a.

The finials of the towers are formed by two 2½″×½″ Double Angle Strips 13 bolted to a 1½″ ×½″ Double Angle Strip that, in turn, is bolted to the inside faces of the Double Angle Strips 12a. Handrail Supports secured to the top of the Double Angle Strips 13 complete the structure.

Having constructed the end towers, they should be bolted to the base as indicated in Fig. 2 and the landing stages 18 placed in position. These are each composed of a 5½″×2½″ and a 5½″×3½″ Flat Plate overlapped one hole and bolted together. Two 5½″ Angle Girders 19 bolted to these Plates carry two 5½″ Braced Girders 17. The platforms are attached to the vertical members of the towers by Angle Brackets as shown. The 7½″ Angle Girders 16 may now be attached to the inner sides of the towers by means of 2½″ Angle Girders.

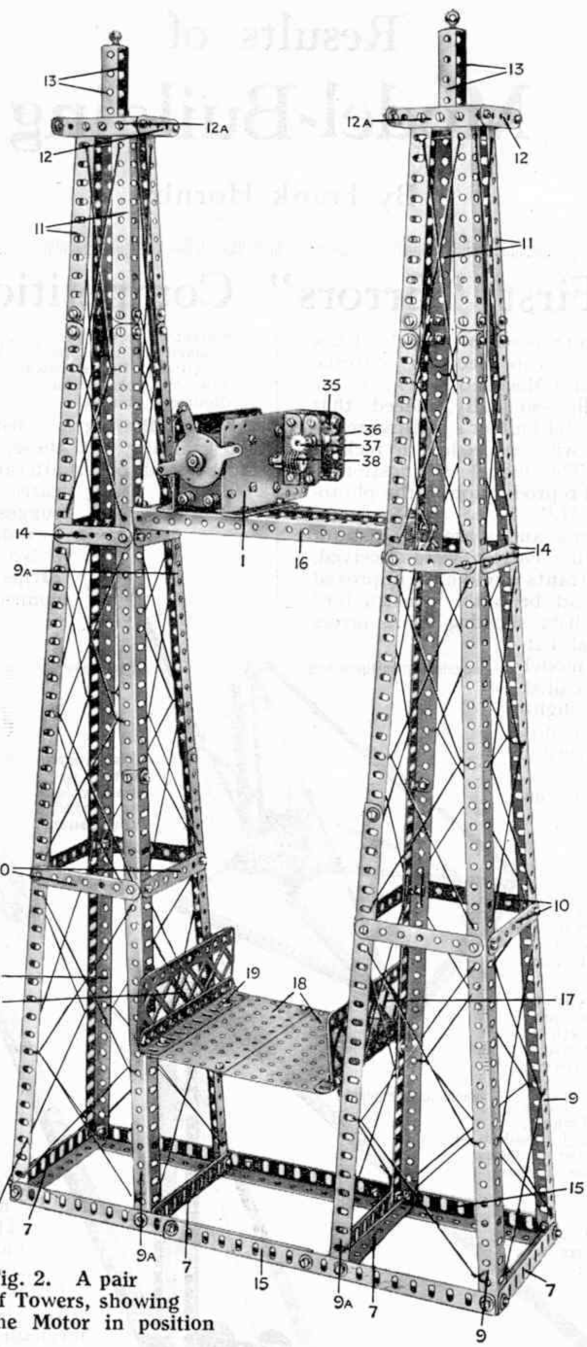


**Fig. 2. A pair of Towers, showing the Motor in position**

When each tower unit has been completely assembled Meccano Cord may be laced through holes in the Girders as shown. This will give the towers a very realistic appearance especially if care is taken to draw the cord quite tight. A 4-volt Meccano Electric Motor is secured in position by bolting the flanges of the Motor to the Angle Girders 16 (Fig. 2).

**The Main Span**

Each of the upper Girders of the main span or gantry (see Fig. 1) is formed by bolting three 12½″ and one 9½″ Angle Girders end to end. Each of the lower Girders 3, on which the carriage 30 (Fig. 1) travels, consists of one 24½″, one 12½″, and one 9½″ Angle Girders bolted to Braced Girders 4. The wheels of the carriage travel on the outturned flanges of the Angle Girders 3.

The two similar sides of the main span should now be joined together at each end of the bridge by bolting two 3½″ Angle Girders across the upper Girders. In addition to these 3½″ Angle Girders, a 3½″×2½″ Flanged Plate is secured by the same bolts across each end of the upper Girders and one is also secured across the centre of the main span, in order to hold the girders rigid.

To secure the main span to the towers proceed as follows. At the Motor end bolt the 3½″ Angle Girders to the transverse Angle Girders 16 (Fig. 2) of the towers. The non-Motor end is secured by bolting the Flanged Plate at that end to the Angle Girders 16 of its respective towers.

The suspension "cables" 2 (Fig. 1) are each constructed from twenty-four 2½″ Strips bolted end to end. Both cables are attached to the centre of the main span by Flat Brackets, and Meccano cord threaded as shown through the holes of the 2½″ Strips and the top Angle Girders of the main span represents the suspension bars of the actual bridge.

Although the model will be quite rigid without the use of "back-stays" or anchorages for the suspension cables, greater realism will be obtained by adding these. If the model is mounted on a baseboard and the cables are brought down and secured at each end to suitable anchorages, a very graceful and realistic model will be obtained.

(*To be continued*)

**Parts required to build the Meccano Transporter Bridge:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 of No. 1B | 4 of No. 8B | 1 of No. 12A | 2 of No. 17 | 1 of No. 29 | 17 of No. 48A | 4 of No. 70 | 2 of No. 103G |
| 8 „ „ 2 | 22 „ „ 9 | 8 „ „ 12B | 4 „ „ 18A | 1 „ „ 32 | 3 „ „ 48B | 10 ft. „ 94 | 2 „ „ 103K |
| 18 „ „ 3 | 8 „ „ 9A | 3 „ „ 13 | 1 „ „ 19 | 26 „ „ 35 | 3 „ „ 48C | 1 „ „ 95 | 4 „ „ 108 |
| 112 „ „ 5 | 4 „ „ 9B | 3 „ „ 13A | 4 „ „ 20B | 507 „ „ 37 | 2 „ „ 52 | 2 „ „ 96 | 2 „ „ 115 |
| 14 „ „ 6 | 4 „ „ 9D | 2 „ „ 14 | 4 „ „ 22 | 162 „ „ 38 | 2 „ „ 52A | 3 „ „ 96A | 4 „ „ 126A |
| 6 „ „ 6A | 2 „ „ 9E | 4 „ „ 15 | 4 „ „ 23A | 8 „ „ 40 | 4 „ „ 53 | 6 „ „ 99 | 4 „ „ 136 |
| 10 „ „ 7 | 6 „ „ 10 | 2 „ „ 15A | 1 „ „ 25A | 1 „ „ 43 | 28 „ „ 59 | 2 „ „ 99A | 2 „ „ 165 |
| 26 „ „ 8 | 6 „ „ 11 | 3 „ „ 16A | 3 „ „ 26 | 2 „ „ 45 | 2 „ „ 62 | 6 „ „ 100 | 1 Electric Motor |
| 10 „ „ 8A | 22 „ „ 12 | 1 „ „ 16B | 1 „ „ 27 | 4 „ „ 48 | 7 „ „ 63 | 20 „ „ 101 | |

## New Meccano Model:

# Transporter Bridge

## With Automatic Reversing Mechanism

*(Concluded from last month)*

THIS month we conclude the detailed instructions for building the Meccano model Automatic Reversing Transporter Bridge. In the March issue of the "*M.M.*" we explained the purpose and general principles of the "transporter" type of bridge, and described the construction of the towers and the main bridge span of the model. The present article includes instructions for building the travelling carriage and for assembling the mechanism controlling its movement. In reading the article it should be remembered that Figs. 1 and 2 appeared in the March "*M.M.*"

**LIST OF PARTS REQUIRED:**

| | | |
|---|---|---|
| 4 of No. 1B | 2 of No. 15A | 2 of No. 52 |
| 8 „ „ 2 | 3 „ „ 16A | 2 „ „ 52A |
| 18 „ „ 3 | 1 „ „ 16B | 4 „ „ 53 |
| 112 „ „ 5 | 2 „ „ 17 | 28 „ „ 59 |
| 14 „ „ 6 | 4 „ „ 18A | 2 „ „ 62 |
| 6 „ „ 6A | 1 „ „ 19 | 7 „ „ 63 |
| 10 „ „ 7 | 4 „ „ 20B | 4 „ „ 70 |
| 26 „ „ 8 | 4 „ „ 22 | 10 ft. „ „ 94 |
| 10 „ „ 8A | 4 „ „ 23A | 1 „ „ 95 |
| 4 „ „ 8B | 1 „ „ 25A | 2 „ „ 96 |
| 22 „ „ 9 | 3 „ „ 26 | 3 „ „ 96A |
| 8 „ „ 9A | 1 „ „ 27 | 6 „ „ 99 |
| 4 „ „ 9B | 1 „ „ 29 | 2 „ „ 99A |
| 4 „ „ 9D | 1 „ „ 32 | 6 „ „100 |
| 2 „ „ 9E | 26 „ „ 35 | 20 „ „101 |
| 6 „ „ 10 | 507 „ „ 37 | 2 „ „103G |
| 6 „ „ 11 | 162 „ „ 38 | 2 „ „103K |
| 22 „ „ 12 | 8 „ „ 40 | 4 „ „108 |
| 1 „ „ 12A | 1 „ „ 43 | 2 „ „115 |
| 8 „ „ 12B | 2 „ „ 45 | 4 „ „126A |
| 3 „ „ 13 | 4 „ „ 48 | 4 „ „136 |
| 3 „ „ 13A | 17 „ „ 48A | 2 „ „165 |
| 2 „ „ 14 | 3 „ „ 48B | 1 Electric |
| 4 „ „ 15 | 3 „ „ 48C | Motor |

### The Operating Mechanism

The driving power is obtained from a Meccano Electric Motor, which may be of either the 4-volt or the high voltage type. The Motor is mounted on the platform 16 of one of the end towers as shown in Fig. 2 (see March "*M.M.*").

The armature spindle of the Motor carries a Worm 38 engaging the Pinion 37, which is mounted on a Rod that is journalled in 2″ Flat Girders 35 bolted to the Motor casing by means of 2″ Angle Girders. The Rod of the Pinion 37 also carries a ¾″ Sprocket Wheel 36, which is connected by a Sprocket Chain 59A (Fig. 3) with a ¾″ Sprocket Wheel 59 carried on a Rod 54 incorporated in the mechanism at the driving end of the main span. This mechanism is shown in detail in Fig. 3. The framework supporting it consists of 4½″ × ½″ Double Angle Strips 41 connected at their ends to 5½″ and 3½″ Strips overlapped three holes and bolted together. The framework is supported from the Angle Girders 3 of the main span by short Strips and 1″ × ½″ Angle Brackets bolted to the Girders.

The Rod 54 carries a Double Width Pinion 57 that engages with a 50-teeth Gear 58 carried on the end of the Rod 50, on the other end of which are two ½″ Pinions 71 and 72. The Rod 50 is slidable in its bearings, the sliding movement being controlled by a Crank secured to the shaft of the 5½″ Crank Handle 46 and carrying a Threaded Pin to which is secured a Collar 75. The arm of the Crank engages between two 1″ Pulleys carried on the Rod 50, while the Collar 75 engages between two ½″ Pulleys 66 carried on a Rod 49 that is slidable in its bearings.

On the inner end of the Rod 49 is a 1″ Pulley 74. By pushing or pulling this Pulley the Rod 49 and the Crank are moved and the latter transmits movement to the Rod 50, thus bringing one or other of the Pinions 71 and 72 into engagement with the Contrate Wheel 73. It will be seen from Fig. 3 that by this means the direction of rotation of the Contrate Wheel 73 may be reversed according to which of the Pinions 71 and 72 is in engagement.

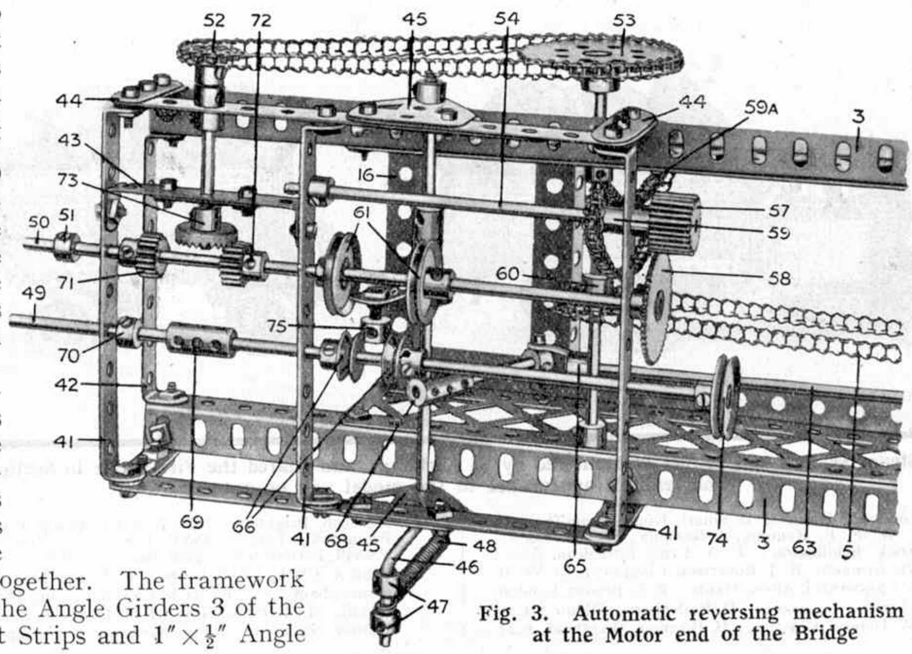



**Fig. 3. Automatic reversing mechanism at the Motor end of the Bridge**

A Spring 48 attached to the Crank Handle tends to bring the latter over sharply so soon as it has been moved past its "critical" position by the Crank carrying the Collar 75. Hence one or other of the Pinions 71 and 72 is always held properly in mesh with the Contrate Wheel.

The Crank Handle 46 is journalled in Flat Trunnions 45 and carries a Coupling 68 in which is secured a 2″ Rod carrying a Swivel Bearing 65. This is connected with Rod 63 (three 11½″ and one 8″ Rods coupled together) which runs the length of the main span and connects up with the mechanism at the other end of the bridge.

The final drive to the car is taken from the ¾″ Sprocket 52 (Fig. 3) carried on the Rod of the Contrate Wheel 73. This Rod is journalled in a Double Angle Strip 43 and the Strip of the frame as shown. The Sprocket Wheel 52 drives a 2″ Sprocket 53 on a Rod that is journalled in the Angle Girders 3. This Rod also carries a 1″ Sprocket 60 round which passes an 80″ endless length of Sprocket Chain 5 (see also Fig. 1) that carries a 1½″ Strip 96 (Fig. 4) and runs the whole length of the main span to the other tower, where it passes round a 1″ Sprocket 97 (Fig. 4) secured to a Rod 92 journalled in the Angle Girders 3. The purpose of the Strip 96 will be explained later, together with an explanation of the operation of the mechanism.

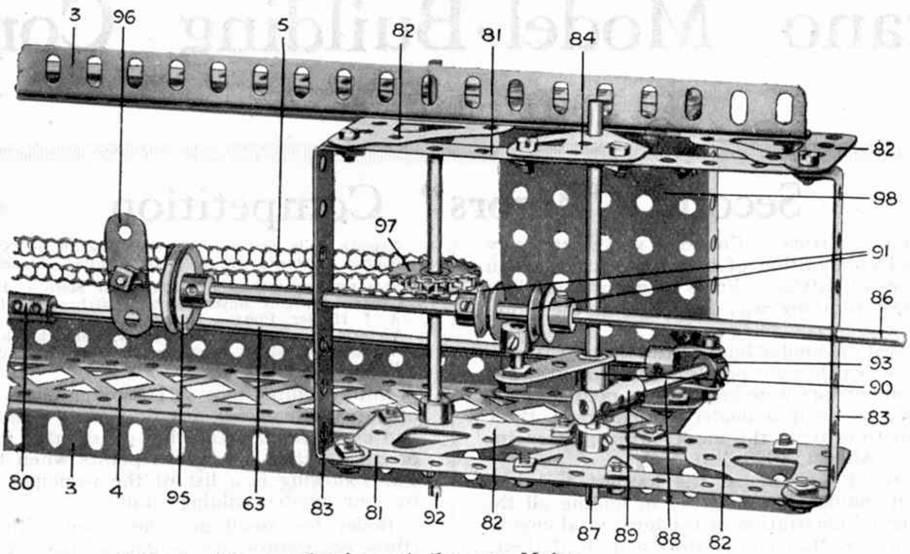



**Fig. 4. The mechanism at the non-Motor end of the Bridge**

### Mechanism at the Non-Motor End

This is shown in Fig. 4. The framework that supports the Rods of the mechanism is constructed from 3½″ × ½″ Double Angle Strips 83, to which are bolted 5½″ Strips 81. The frame thus formed is attached to the Girders 3 of the main span by Architraves 82.

A Rod 87 journalled in Flat Trunnions 84 carries a Crank 90, in the end of which is a Threaded Pin carrying a Collar that engages between two ½″ Pulleys 91. These are secured about ½″ apart on the Rod 86, which also carries at its inner end a 1″ Pulley 95. A Coupling 89 secured to the Rod 87 carries a 2″ Rod 88, on the end of which is fastened the collar of a Swivel Bearing 93. It will now be seen that by pushing the Pulley 95 the Crank 90 will be actuated and in turn will operate the Rod 63 through the Coupling and Rod 88.

### Details of the Travelling Carriage

The travelling carriage, or "transporter," is shown in Fig. 5. The rectangular framework carrying the Wheels 22 (¾″ Flanged Wheels) is built up from two 5½″ Angle Girders 6 bolted to 7½″ Flat Girders 20 that carry Flat Brackets to which are bolted 7½″ Strips 21. The travelling wheels 22 are secured to 1½″ Rods journalled in the Flat Girders 20 and in the Strips 23. Two Double Bent Strips 24 are bolted to the Angle Girders 6; the purpose of these will be explained later.

The carriage proper is suspended from the trolley by means of the Loom Healds 26 attached to the Rods 99 and 27, and spaced apart by Spring Clips. The carriage is composed of Flanged Plates 30 to which are secured 5½″ Braced Girders 28. The Girders 28 carry Angle Brackets 31 in the holes of which are journalled the 5″ Rods 27.

After the carriage and trolley have been constructed the whole unit may be placed in position on the main span of the bridge. To do this it will be necessary to remove one side of the trolley in order to set the travelling wheels 22 to run on the flanges of the Girders 3 (Fig. 1). When the trolley is in position two Angle Brackets 25 (Fig. 5) may be placed as shown so that they bear against the under surfaces of the Angle Girders 3 and thus prevent the trolley being lifted from the rails.

The Sprocket Chain 5 (Figs. 1, 3 and 4) may now be passed round the Sprocket 97 (Fig. 4), thence through the Double Bent Strips 24 (Fig. 5) secured to the trolley, and round the Sprocket 60 (Fig. 3). The 1½″ Strip 96 (Fig. 4) must be secured to the Chain 5 in a position between the Double Bent Strips 24 so that as the Chain moves along, the Strip 96 bears against one or other of the Double Bent Strips, with the result that the carriage is moved along also. The Chain itself is not actually secured in any way to the trolley.

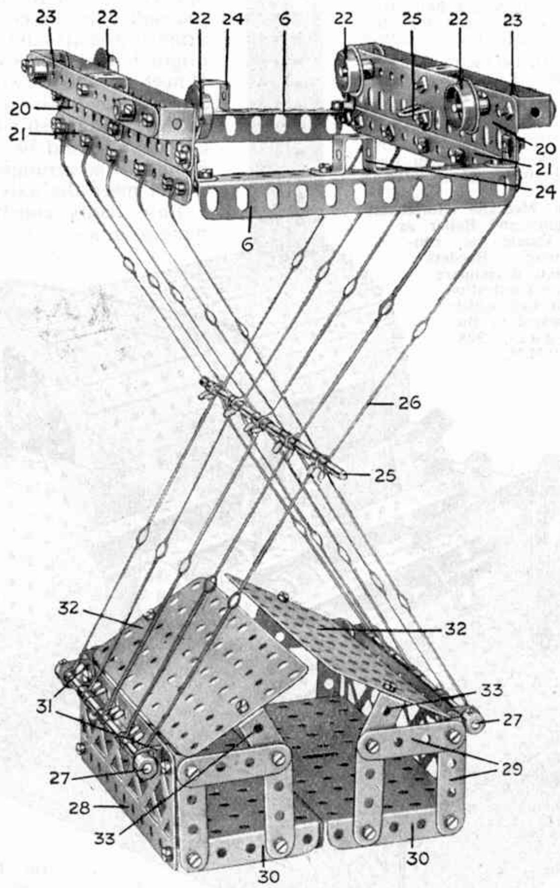



**Fig. 5. The overhead Trolley, with suspended Carriage**

### Action of the Automatic Reversing Gear

When the carriage 30 (Fig. 1) moving to the left strikes the Pulley 74 (Figs. 1 and 3), of the reversing gear, the Crank 75 on the Crank Handle 46 is moved round until the Spring 48 on the Crank Handle pulls the latter hard over. In doing so, however, the end of the Crank (Continued on page 303)

forty parishes. Here, says legend, is that vanished land where knights fought for their ladies, and where :—

"All day long the noise of battle roll'd
Among the mountains by the winter sea;
Until King Arthur's table, man by man,
Had fallen in Lyonnesse about their Lord."

And the sea which has separated Scilly from the mainland, has furnished most of her history. There is an old church on St. Mary's where, resting among the exotic plants of a more tropical island, lie the victims of many a wreck tossed upon the shore.

It is a silent witness that the island which can produce flowers can equally well furnish tragedy. Here is a grim story, half legend, half history, with which to conclude. It happened in the year 1707. A British fleet, under Sir Cloudsley Shovel, was returning from the siege of Toulon. Harassed by a series of storms, the fleet made towards Scilly. Legend has it that a sailor on board the flag-ship was a native of the Islands, and declared that the course held must inevitably bring her on the rocks of Scilly. He was tried for inciting mutiny, and hanged at the yard-arm, only a few hours before his warning came true. Three of the ships perished, and two thousand men. Sir Cloudsley's body was thrown ashore, at a point, according to tradition, called Porth Hellick, or the Cove of Willows, where still, say the old folks, no grass will grow. The Admiral's body was stripped and buried by the fishermen. Subsequently it was removed and re-buried in Westminster Abbey.

**Sorting and tying flowers in bunches ready for the market**

Grim stories of long ago! A lighthouse now warns sailors of the dangers they run, and the Islands of shipwrecks have become the Islands of Flowers. Nearly forty years ago, Sir Walter Besant, describing Samson, one of the smaller islands, wrote :—"I shall never again behold a daffodil in February, without thinking of Samson. You have lent a new association to the Spring flowers. Henceforth they will bring back this glorious view of sea and islands, grey and black rocks, the splendid sunshine and the fresh breeze."

We are indebted to the Editor of the "*Great Western Railway Magazine*" for permission to reprint this interesting article.

**Transporter Bridge**—(*continued from page 321*)

presses against one of the Pulleys 61 on the Rod 50, thereby throwing the ½" Pinion 71 out of engagement with the Contrate 73 and bringing its fellow Pinion 72 into engagement with the Contrate, thus reversing the direction of rotation of the Sprocket Wheels 52 and 53 and hence the direction of motion of the carriage. When the carriage reaches the other end of the bridge it strikes the Pulley 95 (Figs. 1 and 4) thereby actuating the reversing mechanism through the medium of the Rod 63 (Figs. 1, 3 and 4). This time the Pinion 72 is thrown out of engagement with the Contrate and Pinion 71 is brought into gear, while the Rod 49 carrying the Pulley 74 is returned to its original position, ready to meet the carriage again when the latter once more reaches the left-hand end of the bridge.

It should be noted that when the direction of the Sprocket Chain is reversed, the 1½" Strip 96 (Fig. 4) must travel from one Double Bent Strip 24 (Fig. 5) to the other before setting the trolley in motion. Hence the carriage pauses realistically at each end of its travel before returning.

**Conquest of the Air**—(*continued from page 301*)

launching skids; these necessitated the use of a launching platform.

On 21st September, 1908, Wright beat all previous records by flying for 1 hr. 31 min. 25 sec., during which period he travelled 56 miles through the air. On 31st December he added further to his laurels by accomplishing a flight that lasted two hours.

These various successes, following closely upon one another, helped to make the year 1908 one of the most progressive and interesting in the history of aeronautics.

While Wilbur Wright was giving demonstrations in France his brother Orville was carrying out test flights at Fort Meyer, U.S.A., for the American Government, and on 9th September he made three notable flights. On the third flight the machine carried a passenger in addition to the pilot, and the trip lasted 1 hr. 14 mins. On 17th September Orville Wright set out on a flight with a Lieut. Selfridge as passenger, but the machine came to grief and the trip ended in tragedy. The mishap was attributed to one of the propellers coming into contact with one of the stays of the main planes. Selfridge received such severe injuries that he died shortly afterwards, while Wright also was seriously hurt.

**Silkworms**—(*continued from page 305*)

together. When the thread of a cocoon has become loose, the end is located and slowly drawn up. If the water is of the right temperature the thread will unwind easily; if it is too hot the thread will come away in masses, while if it is not warm enough the thread will repeatedly "stick." The end of the thread drawn away from the cocoon is then secured to the drum of some simple reeling machine, by turning which the rest of the cocoon is unravelled and the thread is coiled around the reeling drum.

A simple reeling machine may be constructed as follows. Obtain four flat pieces of wood, each about 8 in. in length and ¼ in. in width, and attach them in pairs to form two crosses, the arms of which must be at right angles. The two crosses should then be fixed a few inches apart by passing through their centres a piece of stout, strong wire: which then resembles the axle of a pair of wheels. The device is now converted into a drum by fastening a number of flat, wooden strips across from wheel rim to wheel rim. One of these cross-strips should be made easily detachable so that, when the whole of the silk of one or more cocoons has been wound upon the drum, the strip can be slipped out. This causes the coil of silk to slacken a little and thus enables it to be grasped and gently pulled off the drum. Two wooden uprights serve to support the drum, the axle of which passes through a hole near the top of each post. A home-made handle of some sort is secured to one of the projecting ends of the axle and everything is then ready for reeling the silk.

The end of the thread drawn away from the cocoon in the basin is carefully fastened to one of the fixed cross-strips of the drum and winding is commenced. The reeling drum is rotated with one hand, while with the other the upward passing thread should be guided so that it coils evenly around the drum and does not pile up in one part. The basin should not be too near the reeling machine, otherwise the thread will be so wet when it coils around the drum that it will stick to the silk already wound.

When the completed coil of silk has been removed from the machine it should be drawn out into a loop and knotted in the middle to form a skein.