

## A BATTERY-OPERATED PHOTOGRAPHIC TANK AGITATOR

BY ERIC JENKINS  
DESCRIBED BY BERT LOVE

**P**RECISION scientific apparatus can cost a fortune in many cases, but the versatile qualities of Meccano have been recognised by research centres all over the world as a source of components from which very reliable and rugged apparatus may be constructed. There have been thousands of keen photographers among the readers of Meccano Magazine over the years and those who prefer to process their own films will find this excellent Tank Agitator by Eric Jenkins a first class dark-room accessory.

It is important when developing a roll film to make sure that the sensitive emulsion surface is constantly in touch with fresh developer solution. In the act of developing the film, the liquid developer rapidly exhausts itself at the point of contact on the emulsion surface and the instructions supplied with film tanks in general call for regular agitation of the developer. This may be achieved by shaking the tank and occasionally upending it, but it must be done with care by the operator. Eric's battery-operated Tank Agitator ensures a consistency of overall film development by ensuring liquid movement, rather than the lines of the giant mobile cement mixers. This particular model is designed specifically for the Paterson Tank System 4, using the single universal tank, the nylon spiral of which will accommodate roll films from 35 mm. up to 120 size. System 4 tanks are fitted with liquid-tight seals to the screw-on top and while the model could be

modified to accommodate other tanks, it is essential to ensure that no leaks come from them when they are tilted, as the caustic nature of developers in general plays havoc with paintwork, etc.

Construction is very straightforward and calls for no great building skill. Nuts and Bolts should be firmly secured, however, if the agitator is to be used on a long term basis. A start is made by bolting three  $5\frac{1}{2} \times 2\frac{1}{2}$  in. Flanged Plates between a pair of  $12\frac{1}{2}$  in. Angle Girders as shown in Fig. 1. The rear tank bracket is made by setting in a pair of Girder Brackets 1 two holes from the edge of the Flanged Plate and bolting on a pair of 3 in. Angle Girders to form the uprights. These in turn are braced by  $2\frac{1}{2}$  in. Perforated Strips 2 attached to the Girder Brackets and by a pair of Corner Gussets, attached to the 3 in. Girders and joined centrally by a  $1\frac{1}{2}$  in. Angle Girder 3 bolted to the Flanged Plate. The top ends of the 3 in. Girders are connected by a  $3\frac{1}{2}$  in. Double Angle Strip set at an angle equal to that of the tilt of the tank.

At the centre of the Double Angle Strip, a Bush Wheel is bolted on its rear side to form a bearing for the tank mandrel. This mandrel is made from a Collar, fitted with two Grub Screws, mounted on a  $1\frac{1}{2}$  in. Rod which is free to revolve inside the Bush Wheel. Two or three Washers are added for packing adjustment, the Rod being held in place by a Collar at the rear. A smear of Vaseline or graphite

Fig. 1 (above) A side view of the Tank Agitator showing the principle constructional points of the framework.

Fig. 2 (above left) In this general view of the Agitator, the gearbox and roller drive for tank rotation are clearly shown.

should be applied to the mandrel before inserting it in the Bush Wheel.

Construction of the front tank bracket is clear from Fig. 2. A pair of  $3\frac{1}{2}$  in. Girders 4 are joined by two crossed-over  $5\frac{1}{2}$  in. Strips as shown, the fixing Bolts also being used at this point to secure a pair of Trunnions 5 which carry the idler pulley shaft. Two 2 in. Girders 6, attached to the  $5\frac{1}{2}$  in. Flanged Plate, form bottom bearers for the  $3\frac{1}{2}$  in. Girders which, again, are braced by  $2\frac{1}{2}$  in. Strips. One drive and one idler roller are mounted at the front of the tank in Flat Trunnions at the ends of a pair of  $5\frac{1}{2}$  in. Curved Strips 7, secured to the tops of Girders 4 by means of  $\frac{3}{4}$  in. Bolts. Each Bolt also carries a stack of Washers to space the Flat Trunnions from the front Curved Strip to give sufficient clearance for the tank rollers, as shown in Fig. 1.

The idler roller is made from a 1 in. loose Pulley 8, fitted with a Rubber Ring and held with a Collar and Washers on a 1 in. Rod which is free to rotate between the pair of right-hand Flat Trunnions. The drive roller is supplied by a 1 in. fixed Pulley with Rubber Ring fitted to a 2 in. Axle Rod carrying a  $1\frac{1}{2}$  in. Pulley 9 which receives the drive from the gearbox by means of a 10 in. Light Driving Band. To accommodate the tilt angle of the tank, the Driving Band passes over two idler pulleys supplied by  $\frac{1}{2}$  in. Pulleys with boss, free to rotate on 6 in. Axle Rod held in Trunnions 5 by Washers and Collars, as shown in Fig. 2.

**Gearbox**

The gearbox is straightforward but the location of the drive unit—a Meccano 4½ volt Motor—is critical, requiring careful attention. A 2½ in. Angle Girder is bolted to the centre of the front Flanged Plate with its slotted holes in a vertical direction. A 2½ × 2½ in. Flat Plate 10 is fixed to the Angle Girder to form one side of the gearbox, the Motor being bolted to the Flanged Plate at the right-hand side of this plate with its shaft passing through the plate. The Motor base is bolted up securely, then the Bolts fixing the Flat Plate to the 2½ in. Girder are adjusted to make sure that there is no binding between the Motor shaft and the hole in the Plate through which the shaft protrudes.

A second 2½ × 2½ in. Flat Plate 11 is bolted to a second 2½ in. Girder at the other end of the Flanged Plate, the two sides of the gearbox thus formed being braced by a 3 × 1½ in. Double Angle Strip spaced by Washers to keep the Plates parallel. The Motor shaft is fitted with a ½ in. Pinion which drives a 57-teeth Gear on a 3½ in. Rod journalled in the gearbox sides.

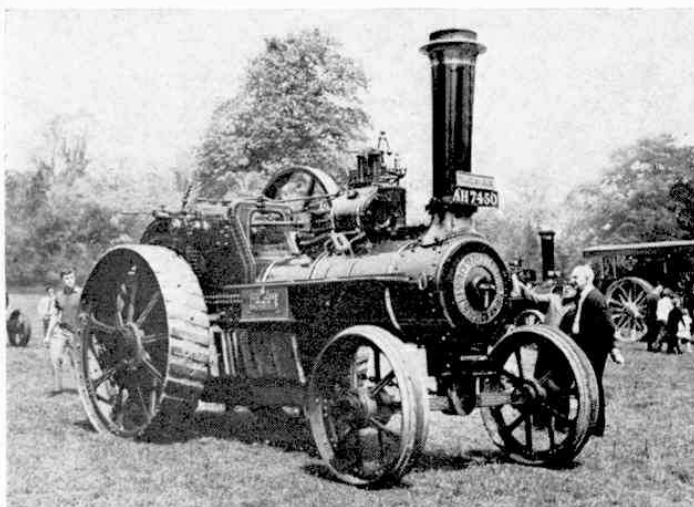
Also fixed on this Rod is a ¾ in. Pinion which meshes with a 50-teeth Gear 12 on another 3½ in. Rod, also carrying a ½ in. Pinion 13. This Pinion meshes with a 1½ in. Contrate Wheel 14 fixed on the gearbox output shaft, supplied by a further 3½ in. Rod journalled in a second 3 × 1½ in. Double Angle Strip 15 bolted to the inside of Flat Plate 11. Collars are used on all the shafts to hold them in place, the final drive being taken from a 1 in. Pulley fixed on the output shaft immediately below the ½ in. guide Pulleys already mentioned.

**Loading**

When using the apparatus, make sure that the correct amount of developer, as marked on the tank, is poured in and that the tank is properly sealed. Shake the tank to ensure the release of air bubbles and then place the tank base centre (which is recessed) over the Collar on the rear mandrel and lower the cap of the tank in place against the drive and idler rollers. Do not leave the tank in this position with the motor switched off, but start the Motor as soon as the tank is properly located. Do not use a

higher voltage than recommended for the Motor. Set a photographic timer to ring at the end of the development and remove the tank immediately on completion for pouring off the developer before rinsing, hardening and fixing in the usual manner. Some experimentation is advisable since the uniformity of developing speeds up the process a little. Try taking one minute off the recommended development times. Once the correct time/temperature combination is established, the Meccano Tank Agitator will give consistently good results with very evenly developed negatives. Keep the apparatus dry and free from any splashes of chemicals.

PARTS REQUIRED			
2-2	1-17	1-27a	2-89
4-5	1-18a	1-28	2-108
2-8	1-18b	65-37	2-111
2-9b	1-21	2-37a	2-126
2-9c	3-22	40-38	2-126a
2-9d	2-23a	2-47a	2-155
2-9e	1-24	1-48b	2-161
1-9f	1-25	3-52	1-186a
1-14	2-26	7-59	1 4½ v. D.C.
3-16		2-72	Motor.



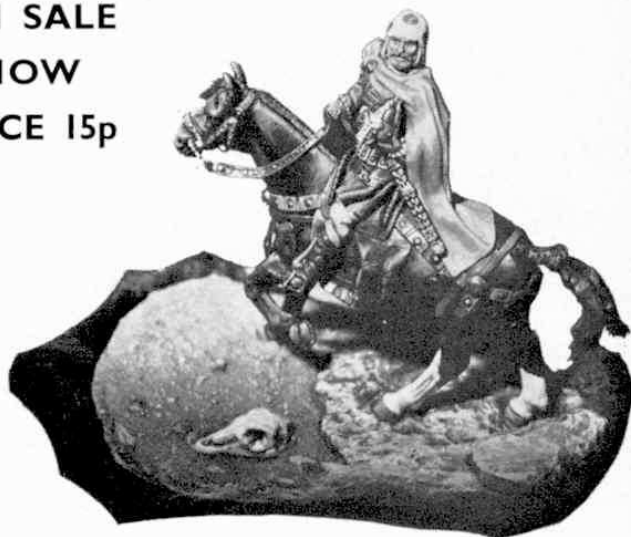
This issue contains reports on the Southern Federation Rally by D. E. Lawrence, the extension of the Keighley track by Northerner, and some fine photographs of the Strumpshaw Rally by Michael Warren. W. J. Hughes tells us more about his visit to Canada, and Don Young continues his constructional article on *Elaine*. There is also an article by John Haining on *Undertype Engines*.

Workshop articles include a Six-station turret head and an improved die and tool holder.

**Model  
Engineer**

**On Sale  
August 6th  
Price 15p**

**ON SALE  
NOW  
PRICE 15p**



A host of plans for Military Modellers sets the scene for our August issue and 1/76th scale drawings include the Bedford Q.L. World War II Series of military trucks, plans for V.H.F. Direction Finding radio vehicles of 1945 (terrific modelling subject for dioramas), more self propelled guns with scale drawings for the American M43 and in this month's instalment of *The Funnies*—our series on the specialised equipment of the 79th Armoured Division—scale plans and modelling suggestions for the Buffalo Carpet Layer.

Added to this stack of plans comes construction features of Peter Wilcox's Byzantine Strategos (the chap in our photo), reviews of the Tamiya Centurion and Bandai Grasshopper together with Figure Review on Starlux, two recent competition reports, Squadron Markings, Napoleonic Wargame, Bovington Tank Museum, Books and Notice Board.

**Military  
Modelling**