

# New Meccano Model

## A Sculling Exerciser for Practical Use

ONE of the features of physical culture during recent years has been the introduction of various kinds of mechanical appliances, some designed to produce all-round physical development, and others intended to develop to the utmost certain groups of muscles for particular sports or games. An up-to-date gymnasium contains many examples of these mechanical aids, and among them one of the most interesting is what is known as the sculling exerciser. This appliance, as its name implies, is of great value to oarsmen, but in addition it is useful for anyone who wishes to improve his physical condition. An exerciser of this type fitted with a sliding seat brings into action almost every voluntary muscle in the body, and it enables deep rhythmical breathing exercises to be carried out without any abnormal strain being placed on the heart.

The Meccano model described in this article has as its original one of the latest types of sculling exerciser, and it is capable of being used by either a boy or an adult.

Construction should be commenced with the two main girders, each of which is built up in the following manner. Three  $24\frac{1}{2}$ " Angle Girders are placed end to end, and two  $24\frac{1}{2}$ " and two  $12\frac{1}{2}$ " Angle Girders are then bolted to these as shown in Fig. 2, thus forming a long reversed angle girder. Two of these are constructed, and when joined together they form a very strong flanged channel section girder. If desired the joints in the complete girder may be further strengthened by the use of 2" Strips. When both main girders are complete they are secured together by a number of  $12\frac{1}{2}$ " Angle Girders, one of which is placed at every 13th hole. In order to add strength to the structure a double  $12\frac{1}{2}$ " Angle Girder is placed at every fifth position. Two inner rails, each of which is built up from three  $24\frac{1}{2}$ " Angle Girders, are now fitted, and are placed 11 holes apart, Bolts being used to secure them at every point where they cross a  $12\frac{1}{2}$ " Angle Girder.

A  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flat Plate 2 is now fitted to each of the main girders at a point 16" from the end of the frame, and these two Plates carry  $7\frac{1}{2}$ " Angle Girders, the upper ends of which are joined together by two  $12\frac{1}{2}$ " Angle Girders 6, bolted together to form a channel section girder. Two vertical 6" Rods 2 are also fitted, and are held in place by means of Couplings.

The guide-pulley system is constructed in the following

manner. Two  $7\frac{1}{2}$ " Angle Girders 11 are first bolted in place as shown in Fig. 2, and these carry one Flat Trunnion of each pair supporting the Collar 9. This Collar is free to rotate on a 2" Rod that is prevented from moving laterally in its bearings by means of four fixed Collars, the two inner ones being spaced away from the Flat Trunnions by means of four Washers. These inner Collars each support a Pivot Bolt carrying two loosely mounted Collars, and they are held in a downward position by means of a Small Fork Piece 10. This Fork Piece is secured to a Threaded Pin mounted on the inner flange of one of the main girders of the model. The complete arrangement forms a very efficient guide for the cord connecting the springs with the handles.

The Flat Trunnions 12 are now fitted and each of these carries a 2" Angle Girder. These two short Girders are connected together by a  $12\frac{1}{2}$ "

Angle Girder, the two points of attachment being strengthened by 1" Corner Brackets. The  $12\frac{1}{2}$ " Angle Girder carries two Double Arm Cranks that are mounted directly above similar Cranks on the inner rails of the frame of the model. A  $2\frac{1}{2}$ " Rod is held securely in each pair of Double Arm Cranks, and these form supports for the deep groove pulleys 1. These pulleys are each built up from two 4" Circular Plates placed one on each side of a 3" Pulley Wheel. The three parts are held securely together by means of four  $\frac{1}{2}$ " Bolts, each Bolt being fitted with two locknuts in order that the 3" Pulleys may not be crushed. The complete pulleys are carried loosely on their respective Rods between two Collars.

The exercising spring, or springs, for the arms may now be fitted, the arrangement of which is shown clearly in Fig. 2. The springs employed on this model are Terry's rubber strands fitted with patent non-slip clips, but if desired steel springs may be used. If neither of these is available six or eight strands of  $\frac{1}{4}$ " square elastic may be used.

The spring is attached by one of its clips to the end  $12\frac{1}{2}$ " cross girder of the frame and the remaining clip has an 8" Rod 4 passing through it. Two  $\frac{1}{2}$ " fast Pulleys 3 are then placed on each side of the clip and clamped securely on the Rod. This Rod is fitted at each end with a small Flanged Wheel free to rotate between two Collars, and in this manner a cross-head is formed

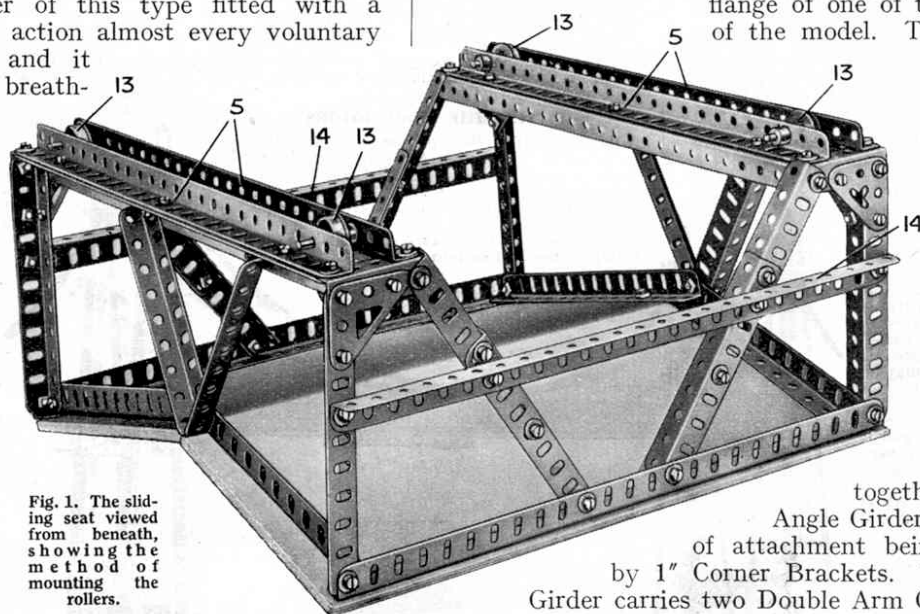


Fig. 1. The sliding seat viewed from beneath, showing the method of mounting the rollers.

that prevents the spring from catching on the  $12\frac{1}{2}$ " cross girders. In Fig. 2 the Flanged Wheels are shown at the side of the inner rails, but normally they run on the up-turned edge of the Girder forming the rails.

The two  $\frac{1}{2}$ " fast Pulleys 3 are now fitted with their cords, which are passed once round the pulleys, the loose end then being bound or sliced to the running end. These cords are passed round their respective pulleys 1 and under the Collars 9, the remaining ends then being attached to  $\frac{1}{2}$ " fast Pulleys in a similar manner to the fittings at 3. The fast Pulleys are each secured on a  $1\frac{1}{2}$ " Rod that is carried in the centre holes of the  $4\frac{1}{2}$ " channel section girder forming the base of the handle 8.

The construction of the handles is shown clearly in Figs. 2 and 3, but it should be noted that the 4" Rods supplied with the Wood Rollers are removed and  $4\frac{1}{2}$ " Rods fitted in their place. When the exerciser is in operation the Rods 2 prevent the cords from chafing on the Plates 7.

The construction of the sliding seat may now be commenced, and Fig. 1 should be referred to at this stage of the construction. Each pair of side girders 5 are constructed as shown in the illustration, the necessary connections being made between the two by means of 2" Angle Girders at each end and a 2" trip in the centre. Each outer corner of the double girders carries a vertical  $5\frac{1}{2}$ " Angle Girder held rigidly in place by means of two large Corner Brackets, and the opposite Girders of each side are then joined together across their ends by means of two  $12\frac{1}{2}$ " Angle Girders. Four bracing members are fitted as shown in the photograph, each consisting of two  $4\frac{1}{2}$ " Angle Girders overlapping five holes. In order to give extra gripping power, Bolts, passing through the slotted holes of the girders, should carry a Washer under their heads, as they are likely to be forced through the holes if any pressure above normal is applied.

A truss is now built on each side of the frame from two  $4\frac{1}{2}$ " Angle Girders and the two legs are spaced  $4\frac{1}{2}$ " apart. The foremost leg is fitted in place  $3\frac{1}{2}$ " from its end of the side girder. The apex of the truss carries the inner ends of a  $5\frac{1}{2}$ " and a  $7\frac{1}{2}$ " Angle Girder, the outer ends of which are attached to the  $5\frac{1}{2}$ " corner girders of the seat. Two three-ply boards are now required, the measurements of which are  $7\frac{1}{2}" \times 12\frac{1}{2}"$  and  $5\frac{1}{2}" \times 12\frac{1}{2}"$  respectively, and these are secured to the seat, as shown in Fig. 1, by means of  $\frac{3}{8}$ " Bolts carrying Washers under their heads. The

rollers of the seat, of which there are four, are composed of  $\frac{3}{4}$ " Flanged Wheels rotating loosely on 2" Rods. These Rods are held in place by means of Collars in the third holes from each end of the down-turned flanges of the side girders.

Care must be taken to see that the Flanged Wheels rotate freely on their respective Rods, for if the Rods turn in their bearings unnecessary friction will be caused. The Flanged Wheels run on the inner corners of the two main girders of the model, which form very smooth and level-running rails.

The seat is operated against the combined action of two springs clipped at one end to the fore-

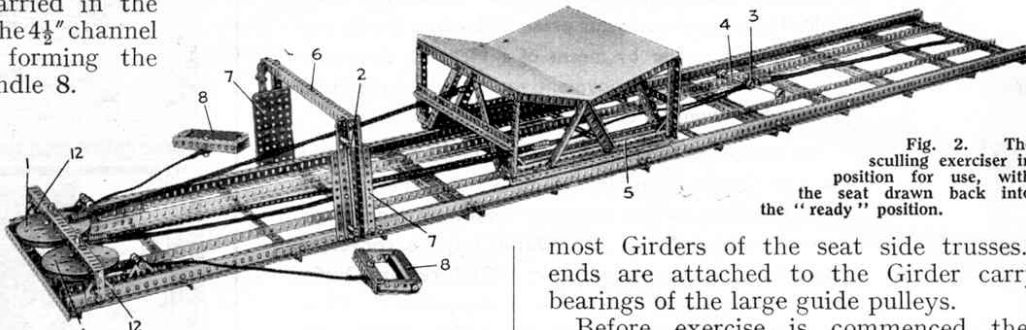


Fig. 2. The sculling exerciser in position for use, with the seat drawn back into the "ready" position.

most Girders of the seat side trusses. The opposite ends are attached to the Girder carrying the upper bearings of the large guide pulleys.

Before exercise is commenced the correct body position should be learned. Sit in the groove of the seat with feet on the ground and alter the position until the easiest sitting posture is found. The feet are then raised on to the rest 6 and both brought as near together as possible. Bend the body well forward from the hips and grasp the two handles 8, after which the legs are straightened with a vigorous jerk. This movement is followed through by a long pull with the arms, the movement of which must start slowly and end with a snap. When the arms are approximately half bent, the body is quickly brought into an upright position and, with the last snap of the arms, is leaned backward until from the hips upward the body takes up an angle of about  $15^\circ$ . The exercise should not be practised violently at first, as this is apt to destroy the rhythm of movement.

The model shown in Fig. 2 is fitted with one spring, but if desired two or three may be used. It should be noted that the tension on the seat is only just sufficient to return the seat carrying the person exercising. In training for rowing it is better to dispense with the spring and to substitute toe straps. The movement will then be identical with that experienced in a racing skiff.

As the springs are fitted with quick-release clips they may be detached from the sculling exerciser, together with the two handles, and used as chest expanders.

The following are the parts required to build the Meccano Sculling Exerciser:—

|             |              |              |   |
|-------------|--------------|--------------|---|
| 4 of No. 1a | 2 of No. 15a | 4 of No. 62b | 4 of No. 146a   |
| 12 " " 6    | 2 " " 16b    | 4 " " 63     | 4 " " 147b  |
| 26 " " 7    | 8 " " 18a    | 2 " " 70     | 1 piece of thin board $7\frac{1}{2}" \times 12\frac{1}{2}"$ |
| 40 " " 8    | 2 " " 19b    | 2 " " 106    | 1 piece of thin board $5\frac{1}{2}" \times 12\frac{1}{2}"$ |
| 8 " " 8b    | 6 " " 20b    | 10 " " 111a  | 3 rubber or steel chest expanders.                          |
| 6 " " 9     | 4 " " 23a    | 2 " " 111c   |   |
| 16 " " 9a   | 320 " " 37   | 2 " " 116a   |   |
| 8 " " 9d    | 18 " " 37a   | 6 " " 126a   |   |
| 6 " " 9e    | 118 " " 38   | 8 " " 133    |   |
| 3 " " 14    | 34 " " 59    | 4 " " 133a   |   |

Fig. 3. A plan view of the fore portion of the machine, showing the guide-pulley arrangement.