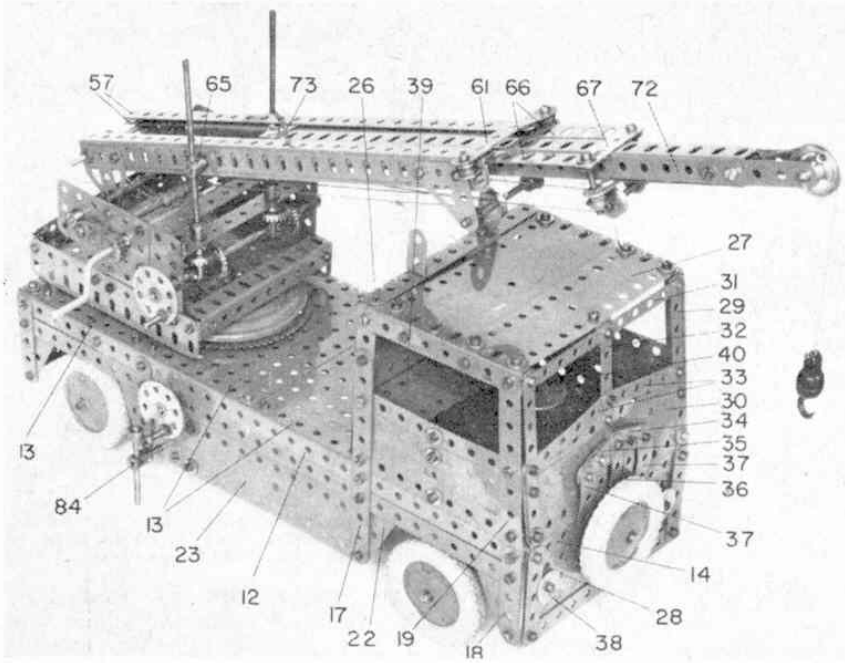
A PLANT HIRE CRANE

described by Spanner



A mobile crane with a difference is this advanced model based on a Coles Hydra Telescopic Truck Crane as manufactured by Coles Cranes Ltd. of Sunderland.

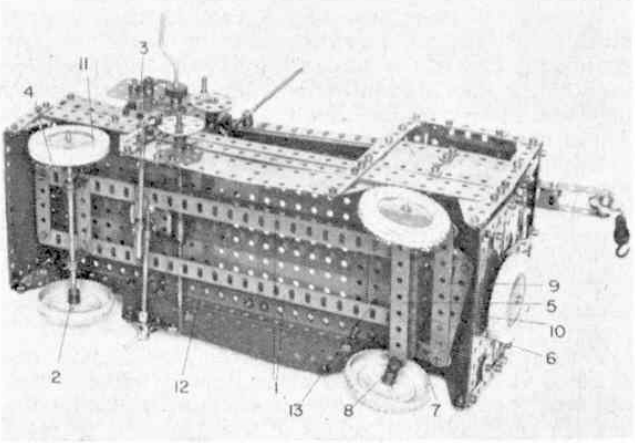
VARIOUS kinds of mobile cranes are in use today, but there is one particular type which is becoming increasingly popular with hire companies, namely the telescopic-jib variety. As the name suggests, these cranes have a jib split into several sections, one section fitting inside the next and designed to be extended or retracted just like a telescope. The Meccano model featured in this article is roughly based on just such a crane, the 12-ton Coles Hydra Telescopic Truck Crane manufactured by Coles Cranes Ltd. of Sunderland. On the model, the hydraulic actions of the original are reproduced by screw jacks and Cord.

Chassis

Beginning construction with the chassis, two 12½ in. Angle Girders 1 are connected at one end by a 2½ in. Strip, through their fourth holes by a 2½ × 1 in. Double Angle Strip 2 and through their eighth holes by another 2½ in. Strip 3. The Bolts securing the end 2½ in. Strip also hold two 1½ × ½ in. Double Angle Strips 4 in place. At their other ends, Girders 1 are joined by a 4½ in. "U"-section girder 5, built up from two 4½ in. Angle Girders, the open end of the "U" pointing forward. The upper arm of the "U" is overlayed by a 4½ in. Strip, while the Bolts securing the girder to Girders 1 again hold two 1½ × ½ in. Double Angle Strips 6 in place.

Journalled in the end holes of "U"-section girder 5 are two 1½ in. Rods, each held in place by a Crank 7 above the girder and by a Collar 8 beneath it, the Collar being spaced from the girder by two Washers. Lock-nutted between the arms of Cranks 7 is a 4½ in. Strip 9, a 3½ in. Strip 10 also being lock-nutted to the left-hand Crank. A Double Arm Crank which, in due course, will take the steering column, is lock-nutted to the end of Strip 10, then a ¾ in. Bolt, on which a free-running 2½ in. Road Wheel is mounted, is screwed tightly into one tapped bore of each Collar 8. Two similar Road Wheels 11 are mounted on the rear axle, supplied by a 6½ in. Rod held by Collars in the lugs of Double Angle Strip 2.

An underside view of the model showing the layout of the chassis and steering gear.



Body and Cab

Coming now to the body, a framework is first built up from two 15 in. compound girders 12 connected by four 5½ × 3½ in. Flat Plates 13 and joined at each end by a 5½ in. Angle Girder 14. Girders 12 each consist of a 12½ in. Angle Girder extended five holes by a 5½ in. Angle Girder. Bolted to rear Angle Girder 14 to form the back of the body is a 5½ × 2½ in. Flexible Plate edged along the sides by 2½ in. Strips and along the bottom by a 5½ in. Strip. Attached to the back by Angle Brackets are two 2½ × 1½ in. Triangular Flexible Plates, one at each side, each overlayed by a 2½ in. Strip 15 bolted, along with the Triangular Plate, to compound girder 12.

Also bolted to compound girder 12 in the positions shown are another 2½ in. Strip 16, a 5½ in. Strip 17 and a further 2½ in. Strip 18, the last extended upwards by a 4½ in. Strip 19, angled rearwards. Secured to Strips 15, 16, 17 and 18 is a 15 in. compound strip 20, built up from a 12½ in. and a 4½ in. Strip, the Bolt securing it to Strip 18 also fixing another 2½ × 1½ in. Triangular Flexible Plate in position, while similar

Triangular Flexible Plates 21 and 22 are held by the Bolts fixing Strips 16 and 17 to the compound strip. The lower ends of Strips 16 and 17 are joined by a 7 × 1½ in. compound flexible plate 23, obtained from one 5½ × 1½ in. and one 2½ × 1½ in. Flexible Plate overlapped two holes.

Strip 17 is now extended two holes upwards by a 3½ in. Angle Girder 24, the top of which is joined to the top of Strip 19 by two 3 in. Angle Girders 25, overlapped four holes. Girders 24 at each side are themselves joined by a 5½ in. Angle Girder 26, the securing Bolts at the same time helping to fix the back of the cab in position, the back being supplied by two 5½ × 2½ in. Flexible Plates overlapped two holes. A 2½ × 1 in. Double Angle Strip is bolted to the top flange of Girder 26, while the cab roof is represented by one 5½ × 2½ in. Flexible Plate and one 5½ × 1½ in. Flexible Plate 27 bolted between Angle Girders 25.

In the case of the cab front, a 5½ × 2½ in. Flat Plate 28, overlayed along its side edges by 2½ in. Strips and along its lower edge by a 5½ in. Strip, is bolted to the back of the vertical flange of front Angle Girder 14. The 2½ in. Strips are extended upwards by 4½ in. Narrow Strips 29 which are in turn connected by a 5½ × 2 in. compound flexible plate 30, obtained from two 5½ × 1½ in. Flexible Plates, and by a 5½ in. Narrow Strip 31, the securing Bolts in the latter case also fixing the cab front to Strips 19 by means of Angle Brackets. The centre of plate 30 is connected to Narrow Strip 31 by a 2½ in. Narrow Strip 32, the upper securing Bolt again holding in place an Angle Bracket which is also bolted to Plate 27. A further two 2½ in. Narrow Strips 33 are bolted between Narrow Strips 29 and Narrow Strip 32.

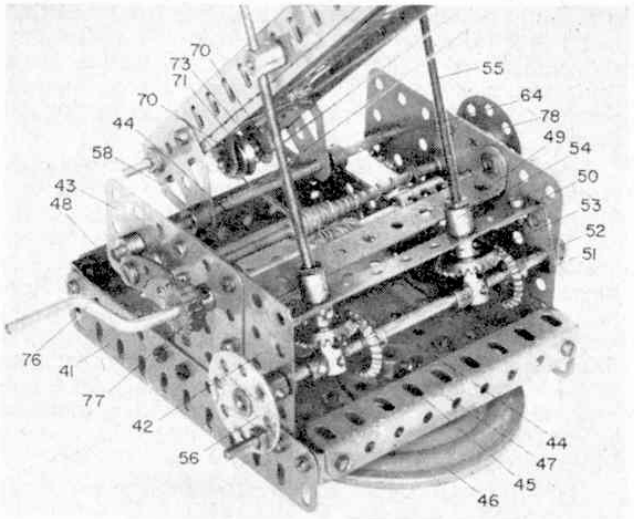
The radiator-grille is built up from three 1½ in. Strips 34, one behind the other and interlocking with three similar Strips 35, all bolted to the front of the cab along with a 2½ in. Narrow Strip 36. Another two 2½ in. Narrow Strips are bolted one each to the centre of Strips 34 and 35 while two 2 in. Strips 37 are secured to the end of the Strips. A 2½ in. Road Wheel, representing the spare wheel, is bolted to Flat Plate 28 immediately below the radiator grille, while two ¾ in. Washers 38 are added to the same Plate to serve as headlamps. Strips 18 are attached to the cab front by Angle Brackets.

Inside the cab, a seat is provided by a 5½ × 1½ in. Flexible Plate 39 attached to Girders 24 by 1 × ½ in. Angle Brackets. Also, a Double Bent Strip is bolted to the top of front Flat Plate 13, this later acting as one of the bearings for the steering column.

Now tightly fixed to the tops of the third and fourth Flat Plates 13 (counting from the front) is a Ball Thrust Race Toothed Disc, after which the body can be secured to the chassis by bolting the free lugs of Double Angle Strips 4 and 6 to respective Flat Plates 13. A 3½ in. Rod representing the steering column, is then journalled in the above-mentioned Double Bent Strip and the Flat Plate to which it is bolted, being fixed in the boss of the Double Arm Crank lock-nutted to Strip 10. Mounted on the upper end of the Rod is an 8-hole Bush Wheel 40, serving as the steering wheel.

Crane Section

Although not especially difficult, the most complicated part of the model is the actual crane section. This is built up on a swivelling base, each side of which consists of two 2½ in. Angle Girders butt-jointed together by a 5½ in. Flat Girder 41 projecting forward one hole, the Bolts fixing it to the front Angle Girder also holding a 2½ × 2½ in. Flat Plate 42 in position. This Plate is, in turn, extended three holes rearward by a 3 × 1½ in.

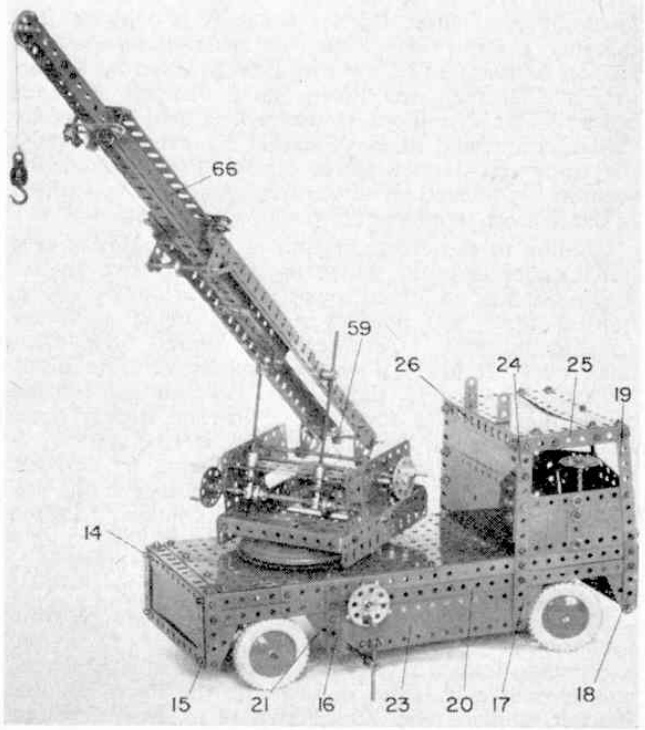


In this close-up view of the crane section base, removed from the model, the construction of the jib-raising gear is clearly shown. Note that the hydraulic rams of the original are replaced by screw jacks on the model.

Flat Plate 43, whereas the lower flanges of the Angle Girders at each side are connected by two 4½ × 2½ in. Flat Plates 44. Bolted to the top of the foremost of these Flat Plates is an 8-hole Bush Wheel 45, the securing Bolts helping to fix a Ball Thrust Race Flanged Disc 46 to the underside of the Plate. The projecting ends of Flat Girders 41 are joined by a 4½ in. Angle Girder 47, secured by Angle Brackets, while, at the rear, they are joined by a 4½ in. Flat Girder 48, also secured by Angle Brackets.

Flat Plates 42 are now joined through their top centre holes by a 4½ × ½ in. Double Angle Strip 49, spaced from each Plate by a Washer. A 4½ × 1 in.

A general view of the model showing the crane section out of the travelling position, with the jib partially extended.



compound double angle strip 50 is then produced from two 1 × 1 in. Angle Brackets bolted to a 4½ in. Strip and is mounted on a 5½ in. Rod held by Collars in the front centre holes of Flat Plates 42. Note that the compound double angle strip is *not* bolted to the Flat Plates.

Also mounted on the 5½ in. Rod are two similar arrangements, each consisting of a ½ in. Bevel Gear 51, a Short Coupling 52 and a Collar. The Bevel and Collar are fixed on the Rod, but the Short Coupling must be perfectly free. In mesh with the Bevel is another ½ in. Bevel Gear 53, fixed on an Adaptor for Screwed Rods 54, journalled in double angle strip 50 and in the longitudinal bore of Short Coupling 52. Held in the Adaptor is a 4½ in. Screwed Rod 55 which will later act as one of the rams for raising the crane jib. An 8-hole Bush Wheel 56, fitted with a Threaded Pin, is mounted on the end of the 5½ in. Rod in Flat Plates 42, to serve as a handwheel.

The jib, itself, consists of three separate sections, one fitting inside the other. In the case of the lower and largest of these sections, two arms are each built up from two 12½ in. Angle Girders 57, placed one over the other and bolted together through their elongated holes in such a way that their horizontal flanges are separated by a space of about ⅛ in. At their lower ends Girders 57 at each side are connected together by a 3 in. Screwed Rod held in place by Nuts, the Nuts helping to hold two Flat Trunnions 58 in place as shown. Free on the Screwed Rod is a ½ in. Pulley without boss 59.

Fixed through the upper end holes of Girders 57 at each side are a Reversed Angle Bracket 60, on the inside of the Girders, and an Angle Bracket on the outside of the Girders. The Angle Brackets at each side are joined by a 2½ in. Strip 61 spaced from the Brackets by five Washers on each securing ⅜ in. Bolt. Reversed Angle Brackets 60 on the other hand, remain undisturbed, as their inside lugs will later serve as guides for the centre section of the jib. Still on the lower jib section, however, two 1½ in. Corner Brackets 62 are bolted through the second and fourth holes from the upper ends of Girders 57. Held by Collars in the lower holes of these Corner Brackets is a 2½ in. Rod carrying a ½ in. loose Pulley 63, then the completed section is mounted on a 5½ in. Rod 64, held by Collars in Flat Plates 43, the Rod passing through the apex holes of Flat Trunnions 58 where it is held in place by Collars. Screwed Rods 55 should be screwed through the transverse tapped bores of two Rod Sockets 65, secured one to each set of Girders 57, so that movement of handwheel 56 affects the position of the jib.

Coming to the centre section of the jib, this is very much easier to build, consisting simply of two 12½ in. Angle Girders 66 joined together at one end by a 2 in. Slotted Strip 67, two 1⅛ in. Bolts being used for securing purposes. Another 2 in. Slotted Strip 68 is fixed by Nuts lower down the shanks of these Bolts, beneath the Girders, then Angle Brackets are secured to the Bolts further down still. The free lugs of these Brackets are joined by another 1⅛ in. Bolt which carries a ½ in. loose Pulley 69. Slotted Strips 67 and 68, together with the vertical flanges of Girders 66, will later serve as guides for the upper jib section. Bolted to the lower ends of Girders 66 are two 1 in. Corner Brackets 70, the lower corners of which are joined by a ¾ in. Bolt carrying a ½ in. loose Pulley 71.

The upper section of the jib is now produced from yet another two 12½ in. Angle Girders 72 joined together to form a box girder by two Double Brackets, one at each end. The Bolts fixing the lower Double Bracket in place also secure two 1½ in. Strips 73 one above and one below the box girder to act as guides, while the Bolts fixing the upper Double Bracket in place help to secure two 2½ in. Strips 74 to the sides of the girder to extend it a distance of three holes. A free-running 1 in. Pulley without boss 75 is held by Collars on a 1 in. Rod journalled in the end holes of Strips 75.

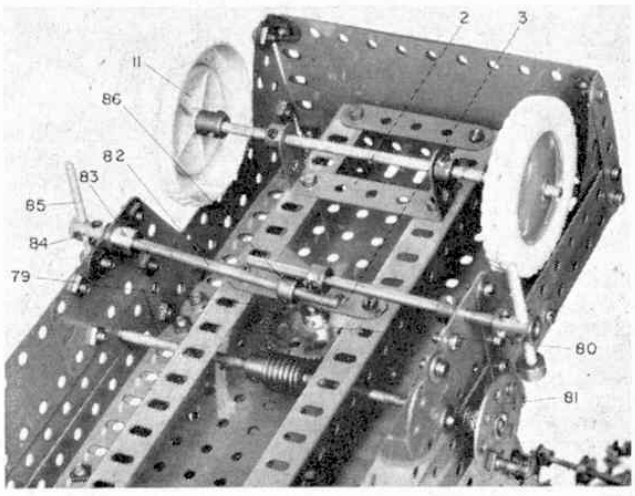
At this stage the three jib sections can be slotted inside each other, temporarily removing the parts that would otherwise prevent this being done, then the operating cords should be fitted. First, a 5 in. Crank Handle 76 carrying a Ratchet Wheel 77 and extended, via a Coupling, by a 1½ in. Rod, is journalled in Flat Plates 42 where it is held in place by a Collar. A good length of Cord is then tied to an Anchoring Spring on the Crank Handle, is taken round Rod 64, brought up and round Pulley 63, taken back and around Pulley 69 and is finally tied to the lower end of the box girder formed by Angle Girders 72. A Pawl mounted on a Pivot Bolt held in appropriate Flat Place 43 engages with Ratchet Wheel 77 to prevent the jib closing up under its own weight when Crank Handle 76 is released. However, when the Pawl is disengaged and the Crank Handle turned in the reverse direction, the weight of the jib should cause it to close up.

In the case of the load hook, a length of Cord is simply tied to a Hook, passed over Pulley 76, taken down the centre of the jib and round the Screwed Rod joining Girders 57, to be secured to a 5½ in. Rod held by Collars in Flat Plates 43, An 8-hole Bush Wheel 78, fitted with a Threaded Pin, is fixed on the end of the Rod to serve as the handwheel.

Next, the finished crane section can be mounted on the body, being held by a 3 in. Rod 79 fixed in the boss of Bush Wheel 45 and projecting through the Ball Race (to which a Ball Cage must of course be added), as well as appropriate Flat Plate 13 and 2½ in. Strip 3. It is secured by a Collar beneath this Strip, while, above the Strip, is fixed a 57-teeth Gear Wheel 80 which meshes with a Worm on a 6½ in. Rod journalled in compound strips 20 and held in place by a Collar and an 8-hole Bush Wheel 81. This Bush Wheel is spaced from Strip 20 by three Washers and is also fitted with a Threaded Pin so as to serve as the handwheel controlling the slewing movement of the crane.

Last of all, two pull-out stabilising rams are each produced from a 4 in. Keyway Rod 82 mounted in the boss of a Double Arm Crank 83 bolted to the inside

The mechanism controlling the slewing movement of the crane is clearly shown in this detail shot of the rear underside of the model.



lower edges of compound flexible plate 23. Fixed on the end of the Rod is a Short Coupling 84, through the end transverse tapped bore of which a 2 in. Screwed Rod 85, carrying a Collar on its upper end, is screwed. The Keyway Rod is prevented from turning in the boss of Crank 83 by a Key Bolt screwed into the upper tapped bore of the boss and reached, when the ram is to be extended, by a screwdriver inserted through a hole in appropriate Flat Plate 13. A Collar 86 fixed to the Rod acts as a stop to prevent the Rod being pulled completely out of its mounting. When operating the crane, by the way, it is important to remember that the stabilising rams must be pulled out and Rods 85 screwed down to the ground otherwise the model is in danger of tipping over when the jib of the crane is swung out to the side.

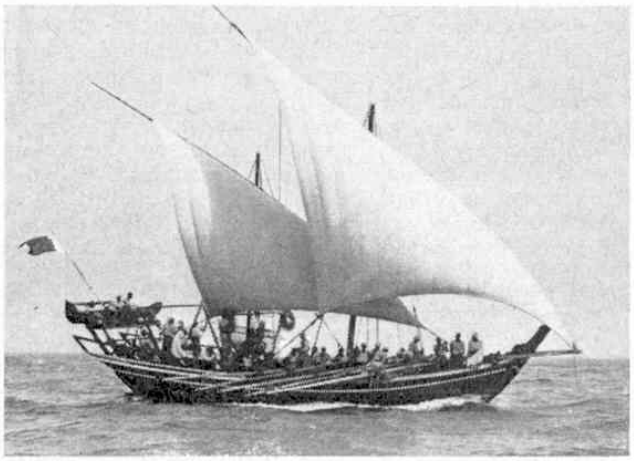
PARTS REQUIRED

2—1	3—15	2—55a	2—126a
5—2	3—16a	1—57c	2—133
7—2a	2—18a	26—59	2—133a
1—3	2—18b	2—62	1—147
1—4	1—19h	3—62b	1—148
13—5	1—22a	4—63d	1—168
2—6	4—23	2—64	2—173a
8—6a	5—24	2—72	1—176
10—8	4—30	2—73	5—187
3—9	220—37a	2—80b	11—188
5—9a	185—37b	1—80c	5—189
2—9b	80—38	2—81	5—192
4—9c	2—38d	2—103	8—221
4—9d	1—45	1—103c	2—230
2—11	2—46	4—111	2—231
16—12	4—48	8—111c	4—235
2—12a	1—48c	3—111d	2—235a
2—12b	4—52a	1—115	2—235d
2—14	2—53a	2—125	1—235f

DEVON'S MUSEUM OF SAILING CRAFT

by ARTHUR GAUNT

DEVONSHIRE, FOREVER associated with Drake and other Sea Dogs, is today building-up a fascinating collection of sailing ships from various parts of the world. The International Sailing Craft Association, as the supporters of the project have named it, has been founded because the age of sail marked an important stage in the evolution of man, and concerns



A pearling dhow, one of the two presented to the Exeter collection of sailing craft.

an aspect of human history equivalent to the development of steam power and great engineering feats.

You will find this maritime museum at Exeter, where about twenty sailing ships and man-propelled working craft are already being preserved, mostly in working condition.

Until recently the creation and maintenance of such a museum of full-sized working craft would hardly have been possible. A suitable site would have been hard to obtain, most small ports in Britain being in regular use and unavailable for an enterprise of this sort. The problem was heightened by the difference of preserving wood, iron, canvas, and rope.

Science, and the shrinking of coastwise trade, have now largely taken care of these snags. Exeter, geographically an ideal sport for a museum of sailing ships, is no longer economic as a port. Again, with television in nearly every household, and with the gradually increasing amount of leisure time, the scheme can be brought to the notice of a vast number of people with opportunities to make use of it.

Scientific progress has enabled the problem of preservation also to be solved. Synthetic materials, plastic paints, and effective fungicides and insecticides can nowadays help to save or replace many things that would otherwise soon perish.

Exeter City Council have co-operated in establishing the new museum by granting a site in the Quay area. Here the large craft can be kept afloat along the west bank of the River Exe and in the basin nearby. The smaller vessels can be housed in cellars to the west of it, and can be moved to the Quay whenever the weather allows.

The arrangements for the smallest and most fragile craft are to keep them in two warehouses on the east bank.

Among the variety of vessels so far acquired is the ceremonial barge *Venita*, built about the year 1900 for the Duke of Westminster. Another noteworthy acquisition is the steam tug *St. Canute*. She was built in Denmark in 1931 to serve as a firefighter and ice-breaker. Her displacement is 130 tons, and she has a triple expansion coal-fired engine.

But oar-propelled coats are being collected too. These include two Irish currachs—an eight-oared four-man one measuring 26 ft. and a four-oared two-man example measuring 16 ft. The International Sailing Craft Association also possess a lifeboat built in 1886. Trolley-launched, this life-saving craft was oar-propelled for more than 40 years, and was equipped with an engine only shortly before being withdrawn from rescue operations in the 1930's.

A 25 ft. double gun punt, with all its equipment (such as a breach-loading gun), is also being preserved, and there are two coracles representing Britain's most primitive type of craft still in use.

Unusual interest attaches to a 120-ton two-masted dhow giving by the Kuwait Government. She was to have sailed to Britain last year but the closure of the Suez Canal prevented this, and the donors agreed to hold her until the Canal opened again.

The preservation association, however, has been provided with a second dhow. A 52 ft. one has been specially built for the Devon museum by the Ruler of Bahrain.