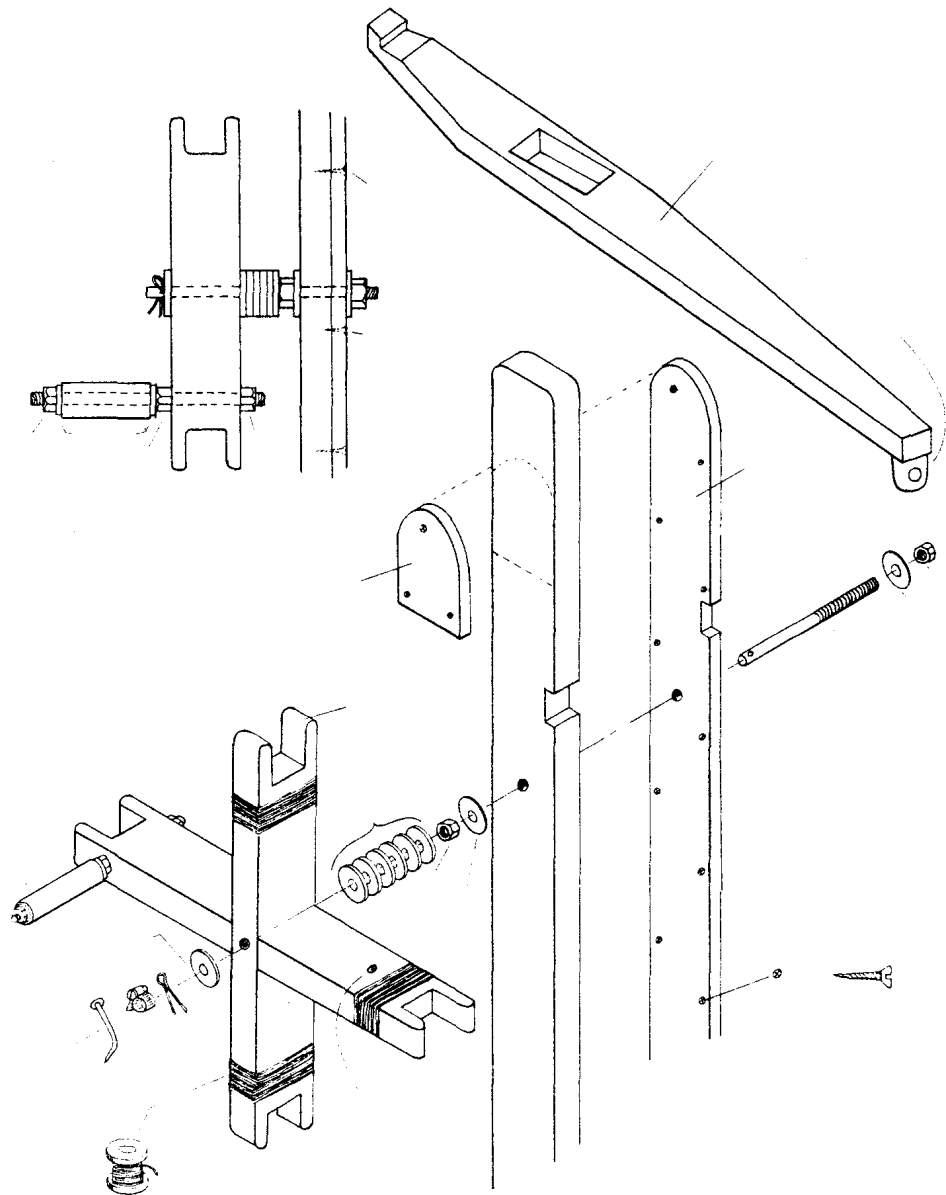


# HANDBOOK No. 25 (1985)



*Handbook No. 25 ( 1985)*

**NOTES ON THE CONSTRUCTION  
OF THE FAO WOODEN FISHING REEL**

**737/86**

**South Pacific Commission  
Noumea, New Caledonia  
May 1985**

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[by Hamish McKenzie and others].

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## INTRODUCTION

This simple wooden handreel (Figure 1) was developed in 1976 for deep bottom dropline fishing by the FAO/DANIDA\* Village Fisheries Project in Western Samoa, and later adopted by the South Pacific Commission (SPC) Deep Sea Fisheries Development (DSFD) Project. The reel has proven an effective and versatile fishing tool and its use for both trolling and droplining has been promoted throughout the Pacific Islands by the DSFD project and by an increasing number of fisheries services. Its low cost, simple design, and the ease with which it can be constructed and repaired using simple equipment and locally available materials make it ideal for use by village fishermen.

However, while the handreel is relatively easy to make, there are a number of stages during construction where particular care must be taken if the completed reel is to give satisfactory service. SPC Master Fishermen conducting DSFD project visits in Pacific Island countries have considerable first-hand experience of the variety of problems encountered by local fishermen using badly constructed reels. These include breakage or splitting of parts built from materials with inadequate strength or reinforcement; badly aligned components which lead to uneven winding or the line jumping over the edge of the reel; and incorrect dimensions which cause muscular discomfort and strain to the operator.

Many of these faults may not be noticeable or may appear negligible in the workshop. However, minor discomforts or inconveniences assume new proportions when combined with the generally uncomfortable working conditions that prevail on a small fishing boat. More serious problems, such as breakage or splitting of components, or wrap-around and breakage of the line on the winding shaft, tend to occur at times when the reel is under the greatest stress, that is, with a large fish on the line. In some localities the loss of even a single large fish means the loss to the fisherman of earnings which may exceed the value of the reel. At best it is frustrating, and costly in terms of lost gear and fishing time.

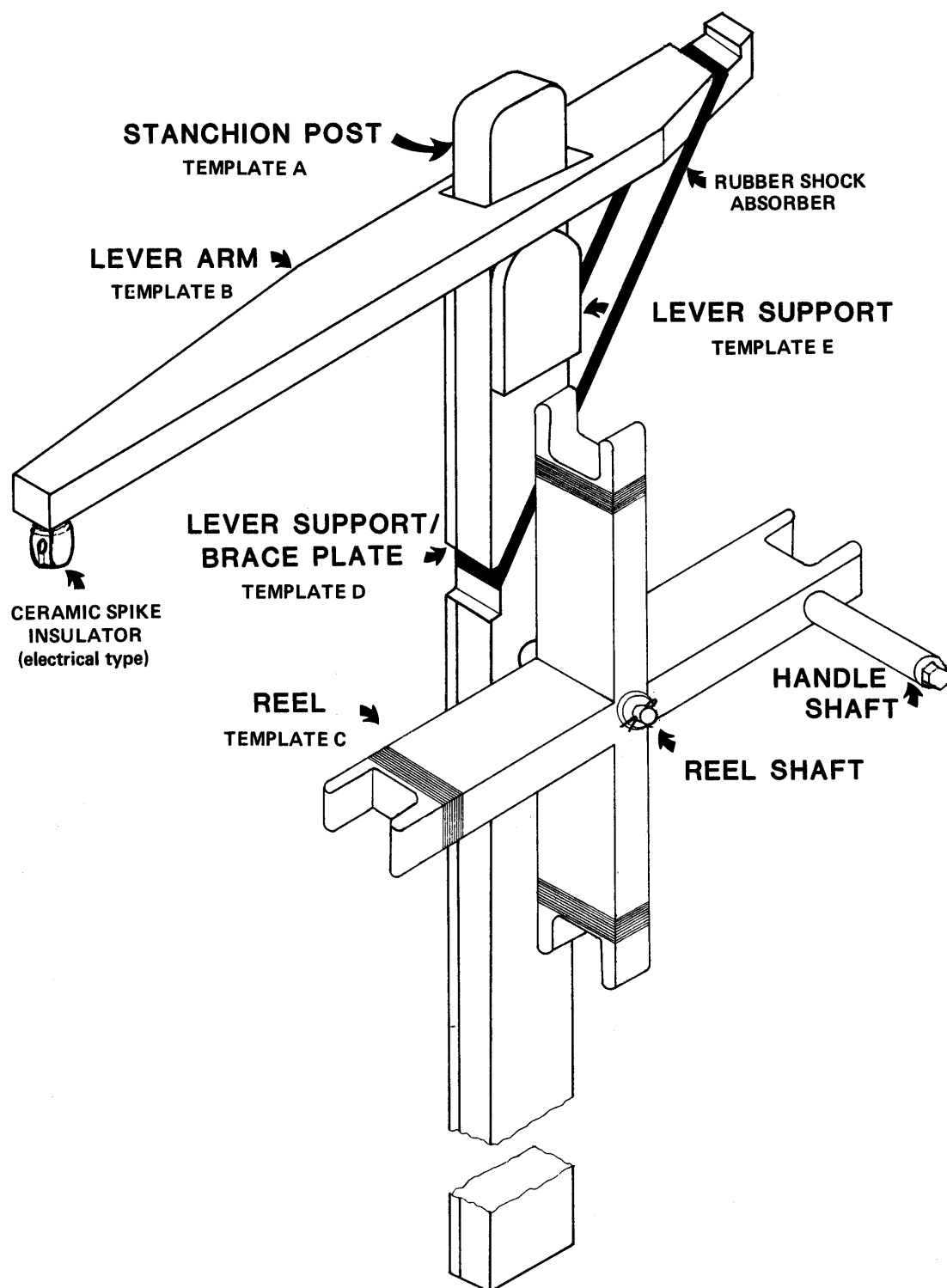
Most of these problems can be avoided by the exercise of care and accuracy while building the reel. The following notes were compiled by SPC consultant engineer Hamish McKenzie in collaboration with other SPC fisheries personnel, and provide guidelines to the reel's construction. These have been kept as simple as possible, and assume limited access to sophisticated tools and equipment and only basic carpentry skills on the part of the user. A number of modifications to the original design, developed by SPC Master Fishermen to improve the overall efficiency of the reel, have also been incorporated. Areas where particular care is required are indicated in the text and detailed instructions are provided to help eliminate common mistakes. Full size paper templates of the major wooden components of the reel are included (inside back cover) and these are intended for use with the construction notes. Where a number of reels are to be made, the paper drawings can be used to prepare more permanent templates of plywood or metal.

Other than the templates, diagrams are not intended to be scale. Dimensions are given in millimetres unless otherwise stated. The symbol 'Ø' means 'diameter'.

---

\* Food and Agriculture Organization of the United Nations/Danish International Development Agency.





*Figure 1: Wooden handreel developed for deep bottom dropline fishing.*





## CONSTRUCTION NOTES

### MARKING OUT

- 1.1 With sharp scissors cut out the TEMPLATES from the large sheet enclosed (inside back cover). DO NOT CUT RIGHTDOWN TO THE TEMPLATE OUTLINES. LEAVE A MARGIN OF ABOUT 1 cm ALL AROUND.

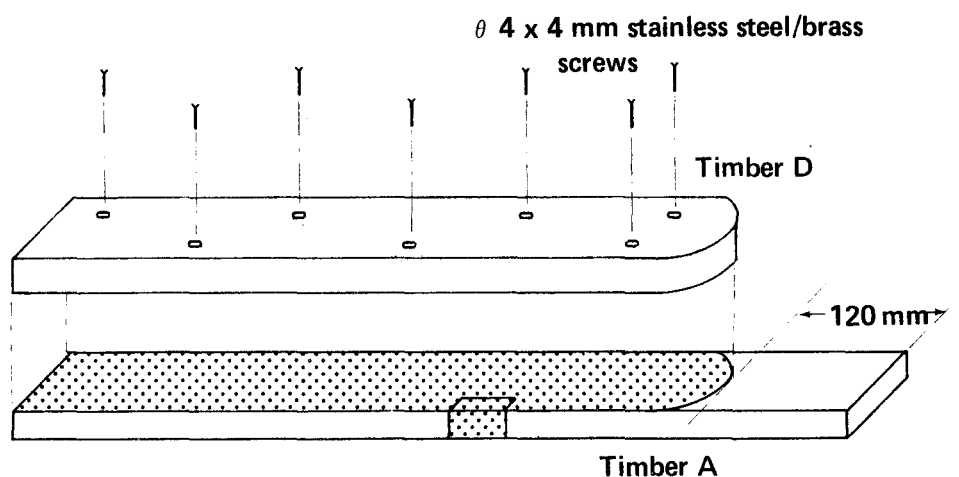
- 1.2 Mark out templates A, B and C onto 90 x 40 mm hardwood. Template C should be marked out twice. Mark out templates D and E onto 90 x 20 mm hardwood.

NOTE: Do not draw around the templates. Mark the points shown with a dot. Marks should be made through the paper with a sharp point (small nail). Square the timber with a set square and marking knife and mark out the reverse side of the timber from the template. Join the marks with a straight edge.

- 1.3 Cut the timber to length.

**STANCHION POST.** Construct the stanchion post as follows:

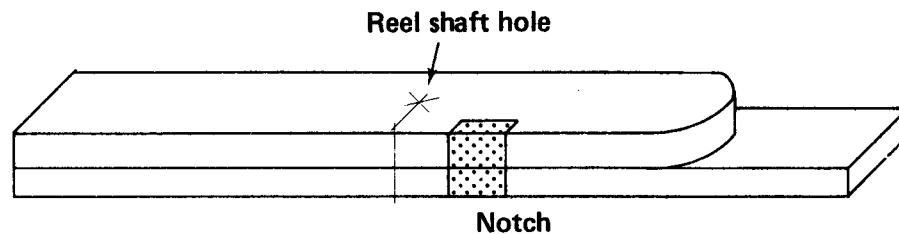
- 2.1 Drill 4 mm diameter holes through timbers D (lever support/brace plate) and E (lever support) at the positions marked.
- 2.2 Glue and screw timber D (lever support/brace plate) to timber A (stanchion post).



*Figure 2*

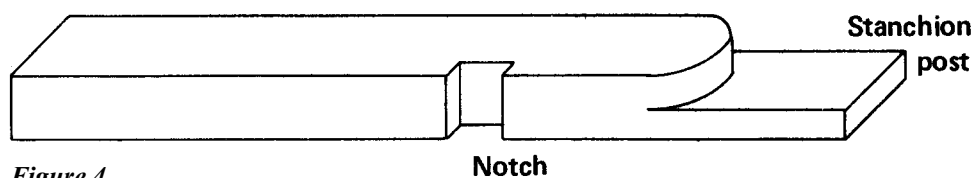
3. Using a set square, ruler and pencil, mark out position of notch and reel shaft hole onto timber D by transferring marks already made on timber A.

**NOTE: The notch on this edge will make a right-hand reel. For a left-hand reel, put the notch on the opposite edge.**



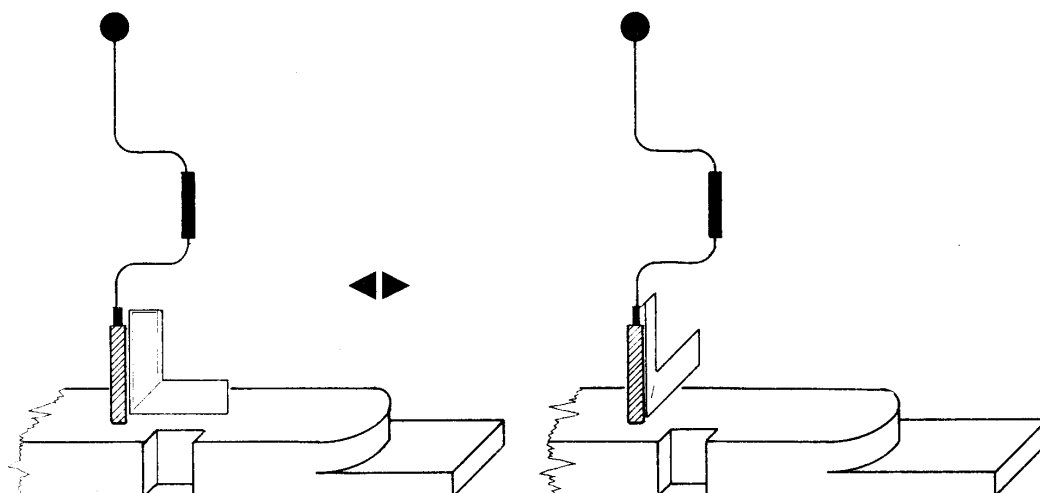
*Figure 3*

4. To remove notch, make two saw cuts along the marked lines and take out waste wood using a chisel and mallet.



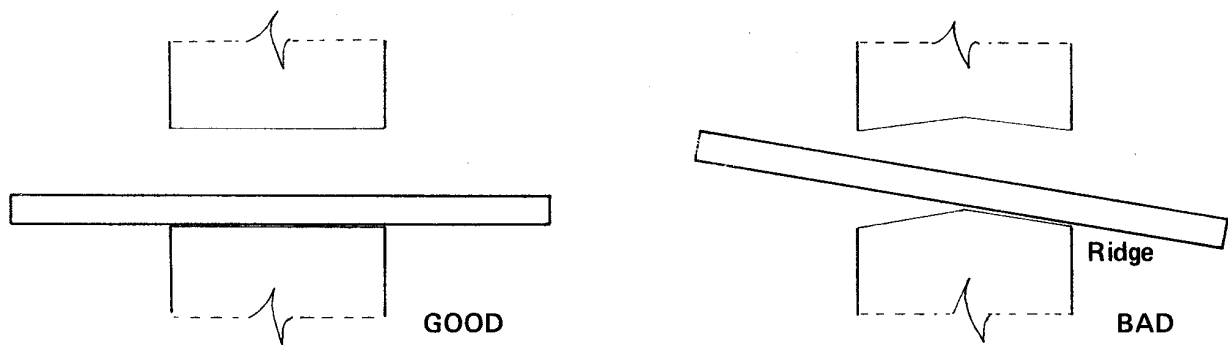
*Figure 4*

5. Drill a 17 mm diameter hole for the reel shaft. This hole must be very straight. Use a vertical drill press. If this is not available, use the following method:
  - 5.1 Ensure that centre of hole is marked on both sides of the timber.
  - 5.2 Drill to half the depth of the timber using a square to check the vertical.



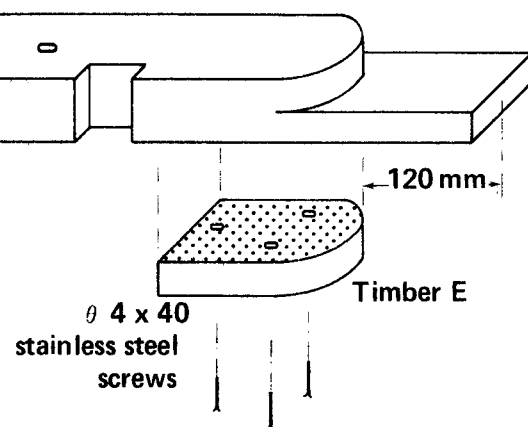
*Figure 5*

- 6.1 Turn the timber over and repeat the process until the two holes join.
- 6.2 Check the straightness of the hole with a flat edge. If there is a ridge formed, gently chisel it out from the middle. Be careful not to damage the outer edges of the timber. Finally, check that a 16 mm bolt will fit into the hole.



*Figure 6*

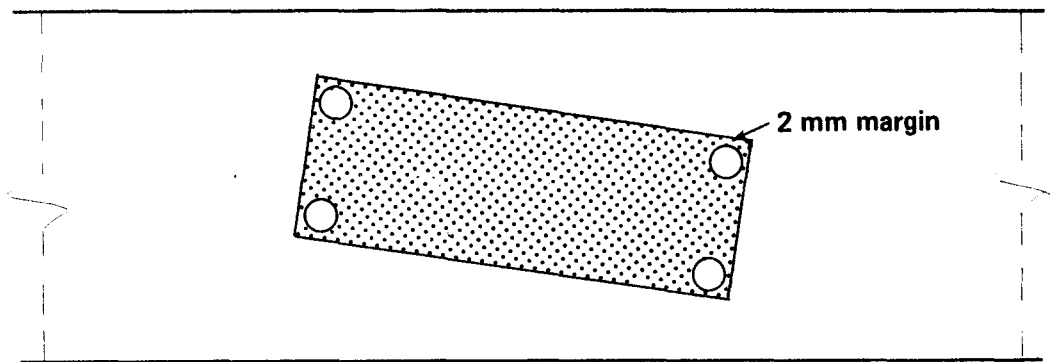
7. Glue and screw timber E (lever support) onto the assembly. This completes the stanchion post.



*Figure 7*

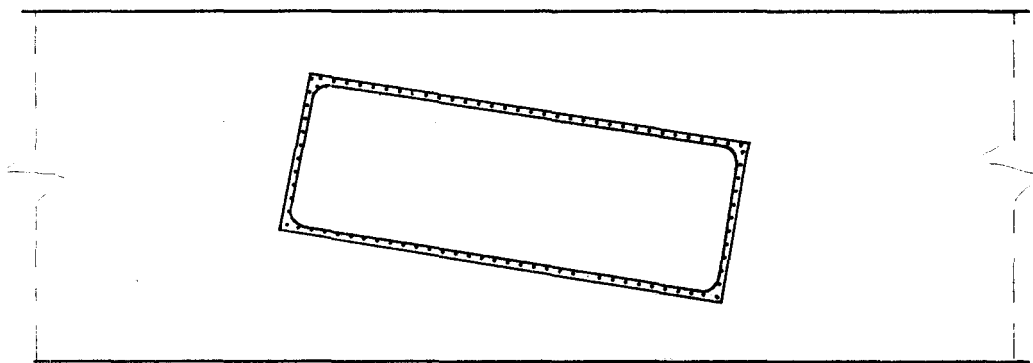
**LEVER ARM.** Construct the lever arm from marked timber B as follows:

8. To make the central slot, drill a 17 mm diameter hole at each corner leaving at least 2 mm of waste to the marked edge.



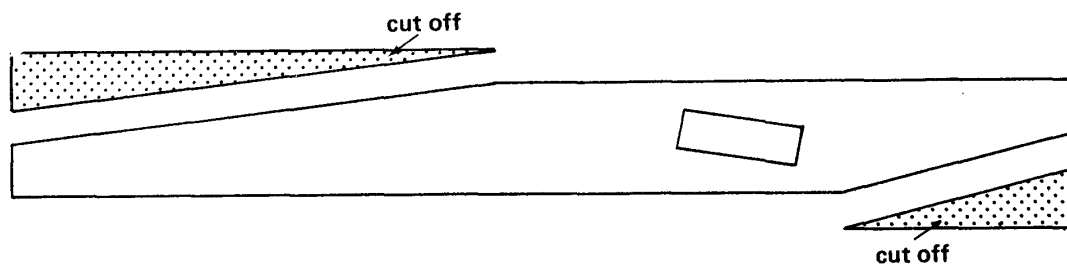
*Figure 8*

9. Take out most of the waste with a jig-saw or coping saw.



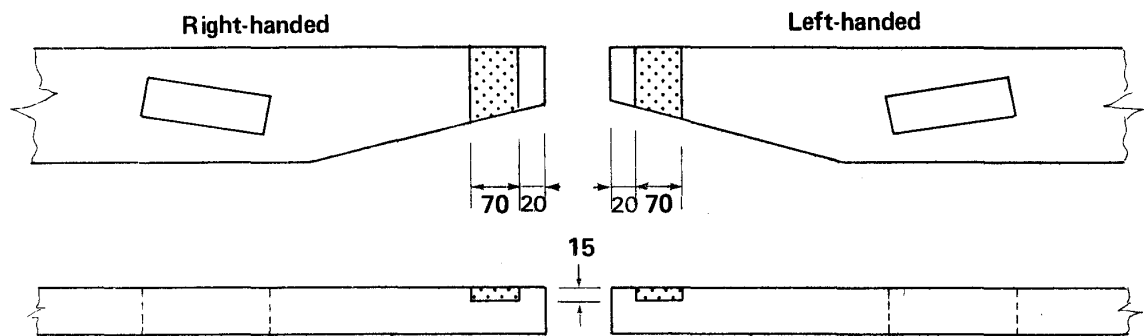
*Figure 9*

- 10.1 Carefully chisel out the remaining timber to half the depth of the slot. Turn the timber over and repeat.
- 10.2 Cut the bevels (angles) off with a saw.



*Figure 10*

11. Cut the notch which will take the rubber shock absorber.



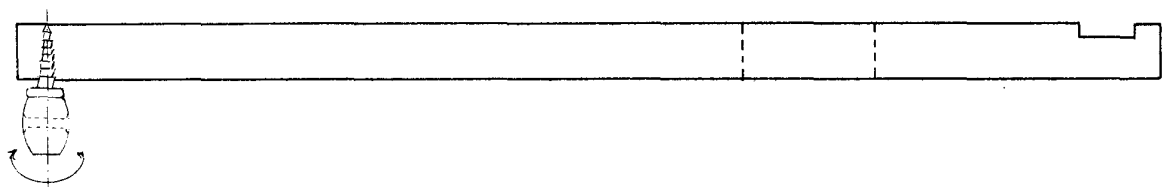
*Figure 11*

12. Drill a hole to take insulator at position marked. This hole should be slightly smaller than the insulator screw.



*Figure 12*

13. Screw the insulator onto the opposite face to the notch. Do not use glue. This fit should allow for a slight twisting movement which will assist the user of the reel to align the fishing line correctly. The lever arm is now complete.

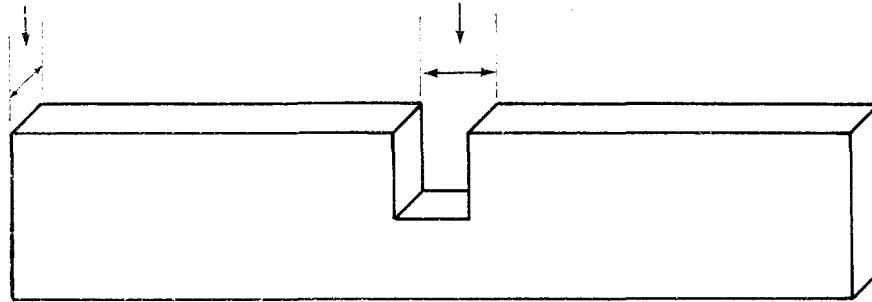


*Figure 13*

**REEL.** Construct the reel (two C timbers) as follows:

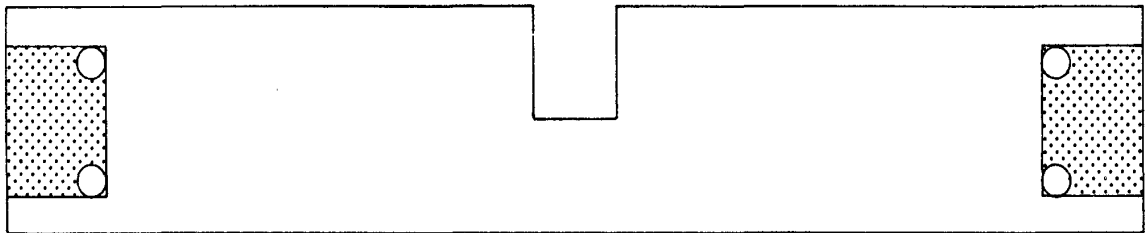
14. Ensure that the central notch width is the same as the timber thickness. Remove the notch with, saw and chisel.

**These two measurements should be equal**



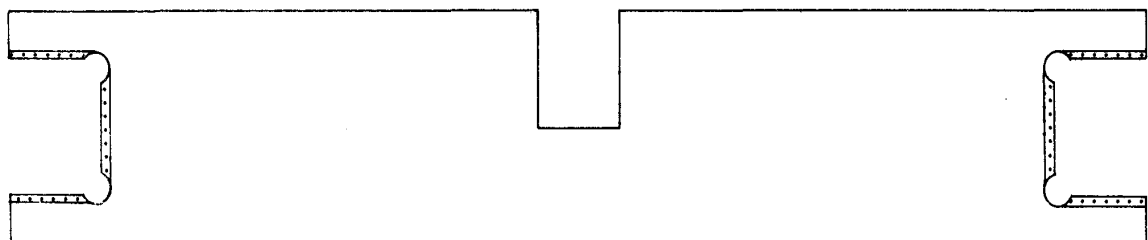
*Figure 14*

15. To remove the end notches, drill holes at corners.



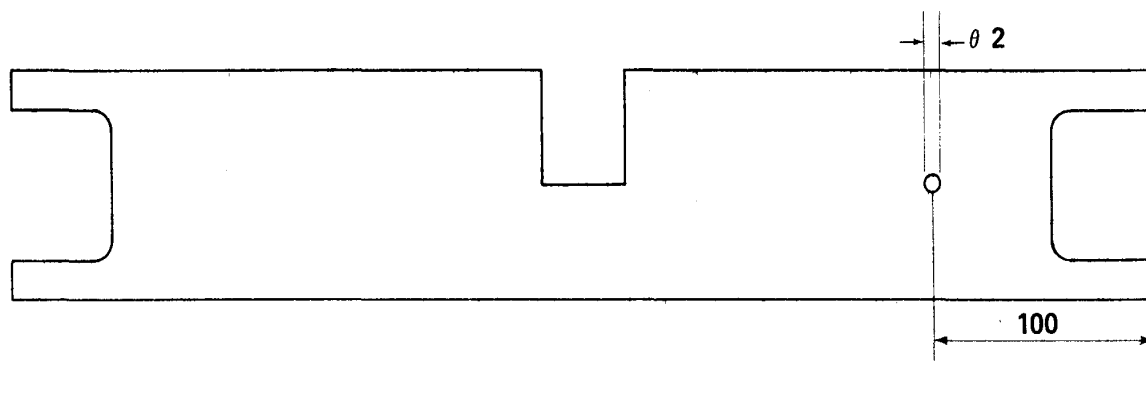
*Figure 15*

16. Remove most of the waste wood with a coping saw or jig-saw.



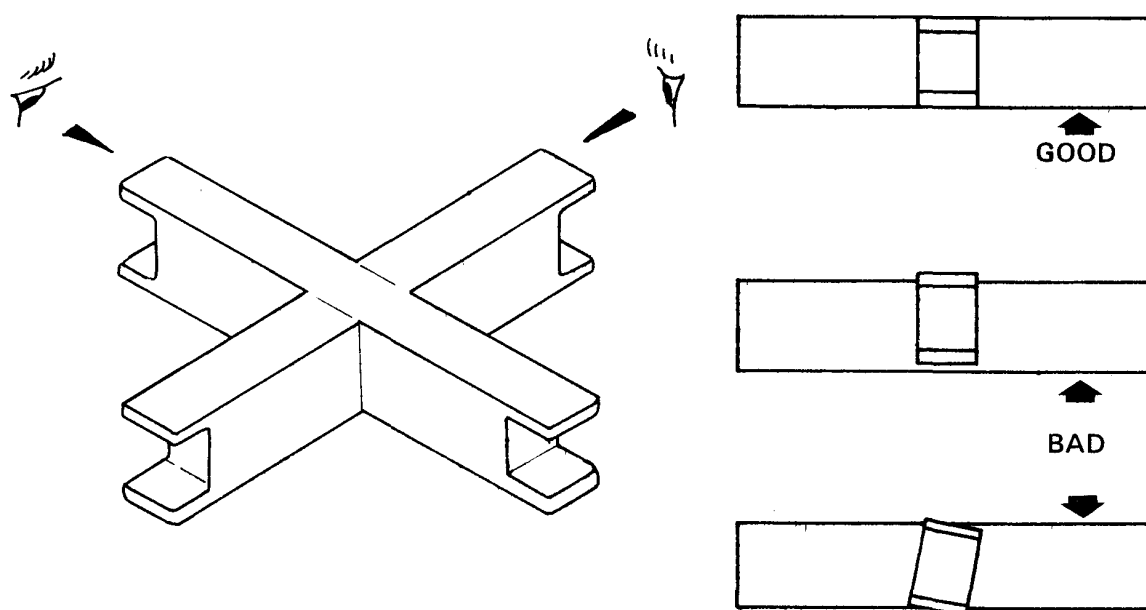
*Figure 16*

17. Remove the remaining waste wood with a sharp chisel and round off any sharp edges. Mark out and drill a hole on one arm section as shown, to take the end of the fishing line.



*Figure 17*

18. Glue the two C sections together, ensuring a flat fit. Allow the glue to dry.



*Figure 18*



19. To mark the position of the hole for the reel shaft, find the centre of the reel by marking a cross as shown. Also mark out the position of the hole for the handle shaft. Drill both holes using a vertical drill press, or the method described in notes 5 and 6. It is very important that the reel shaft hole is straight and accurately centred.

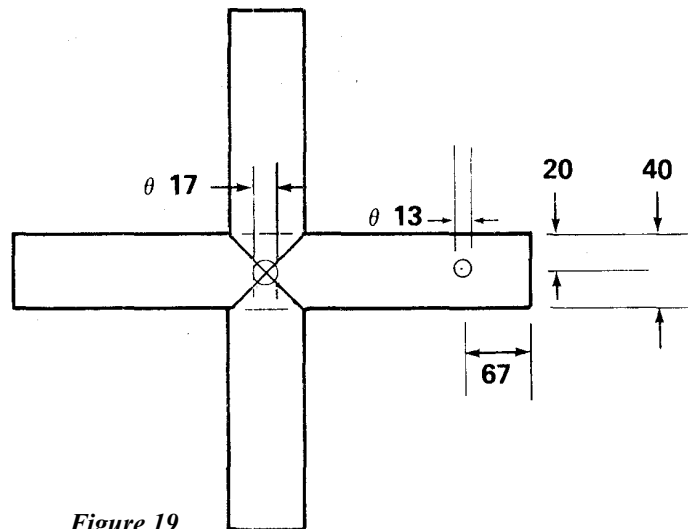


Figure 19

20. Reinforce the end of each arm by binding, with copper wire, strong nylon monofilament fishing line, cord or similar. If the latter are used, coat the binding with a layer of glue or epoxy resin. Alternatively, drill a 5 mm diameter hole and insert a 5 mm diameter bolt with large washers as shown.

**NOTE: No reinforcement is needed for the arm which has the handle.**

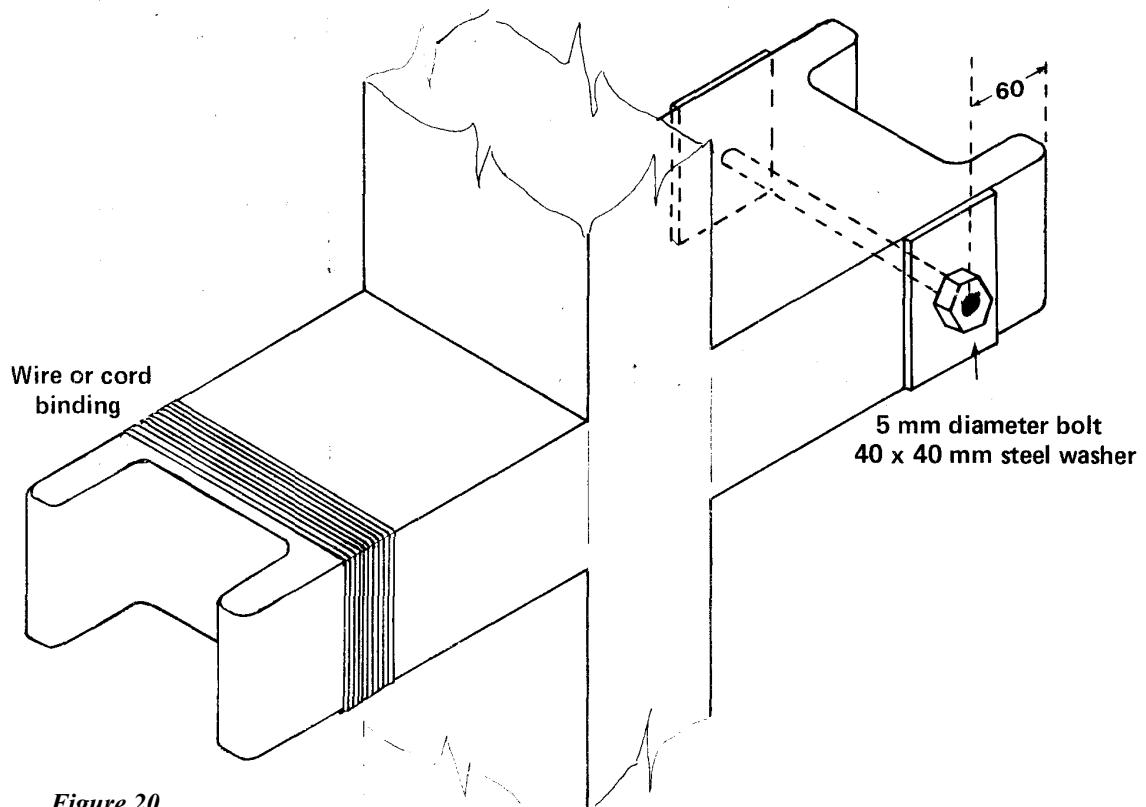
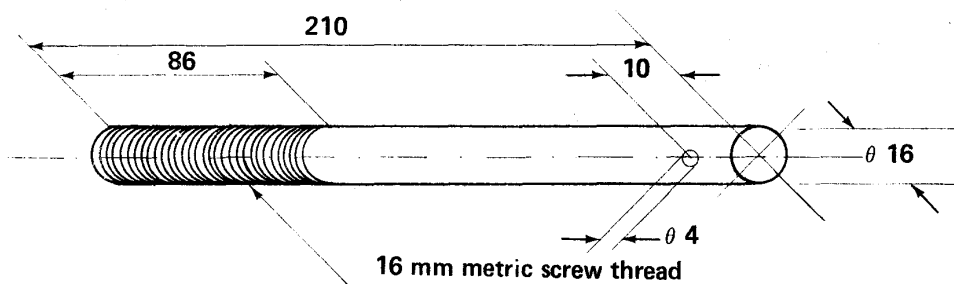


Figure 20

**REEL SHAFT.** To make the reel shaft:

21. Use a 16 mm diameter stainless steel, bronze, or galvanised steel bar. If possible, have the threads turned on a lathe, or use a 16 mm die. Alternatively, use a galvanised steel bolt. Turn any extra thread required using a 16 mm die. Drill a 4 mm diameter hole beneath the bolt head to take the split pin. Then remove the bolt head with a hacksaw.

**NOTE: A small diameter stainless steel hose clamp can be used in place of the split pin to hold the reel on the shaft.**

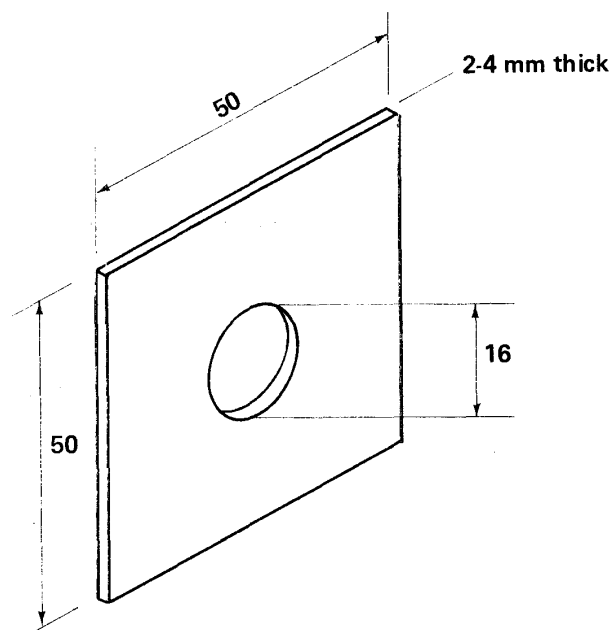


*Figure 21*

- 22.1 If using bolts, make eight steel plate washers by cutting and drilling to size shown. Remove all sharp edges with a file. Plywood washers (125 mm diameter) can be used for spacers, but metal washer should be inserted on each side of the plywood to reduce wear and friction.

- 22.2 To complete the reel shaft assembly, you will require:

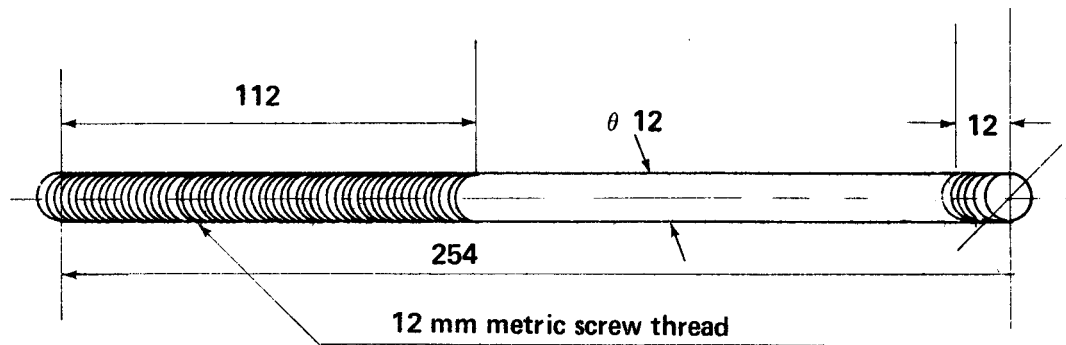
- two 16 mm diameter nuts (stainless steel, bronze or galvanised steel), and
- one 4 mm diameter split pin (stainless or mild steel).



*Figure 22*

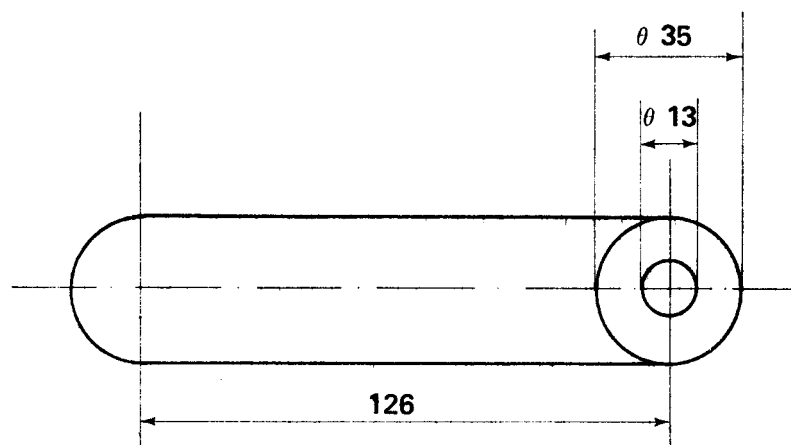
**HANDLE SHAFT.** To make the handle shaft:

23. Use a 12 mm diameter stainless steel, bronze or galvanised steel bar. If possible, have the thread turned on a lathe, or use a 12 mm die. Alternatively, use a galvanised steel bolt. Turn any additional thread required using a 12 mm die. If a bolt is used, do not cut the short thread shown, but leave the bolt head instead.



*Figure 23*

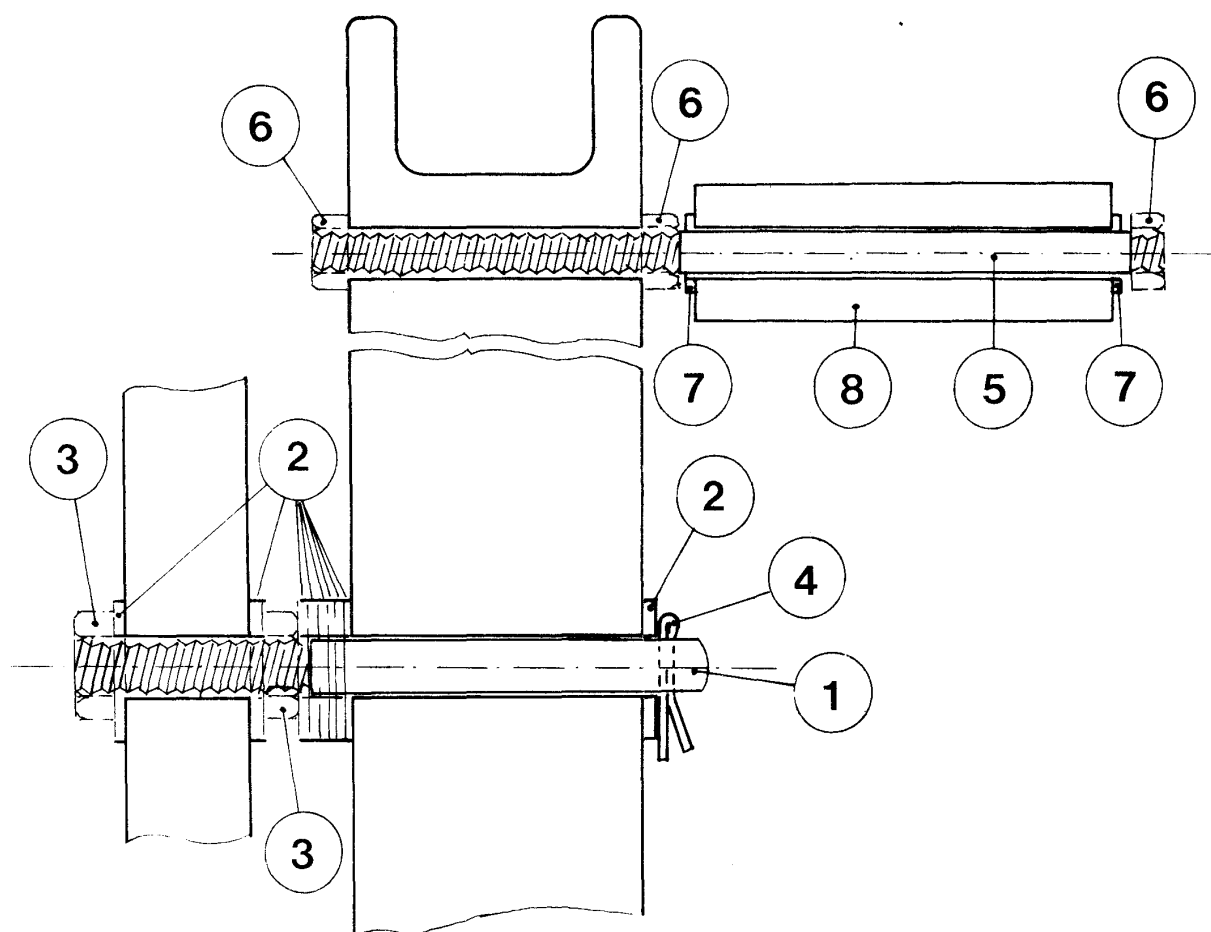
24. To complete the handle assembly, you will require:
- three 12 mm diameter nuts (stainless steel, bronze or galvanised steel),
  - two 12 mm diameter washers, and
  - one rounded hardwood handle. This can be made from off-cuts.



*Figure 24*

**ASSEMBLY.** Figure 25 shows a central cross-section of the assembled reel.

- 25.1 Bolt reel shaft tightly to stanchion post. Some users recommend that the nut behind the stanchion post be locked to prevent it coming loose during use. This can be done using 'Loctite' or a similar light adhesive, a spring washer, a nylon-lined lock-nut or a second nut tightened against the first (not shown).
- 25.2 Pack out shaft with washers so that reel will fit tightly against split pin.
- 25.3 Bolt handle shaft to reel. The wooden handle should rotate freely on the shaft.



**Figure 25**

1. Reel shaft 16 mm diameter x 210 mm (see note 21)
2. Steel plate washers 2–4 mm thick, 16 mm internal diameter (see note 22)
3. Nut 16 mm diameter (see note 22)
4. Split pin 4 mm diameter (see note 21)
5. Handle shaft 12 mm diameter x 254 mm (see note 23)
6. Nut 12 mm diameter (see note 24)
7. Washer 12 mm internal diameter (see note 24)
8. Hardwood handle (see note 24).

**OTHER ITEMS**

26. To protect the wood against weathering, the following painting is recommended for all wooden parts:
- 1 coat red lead primer
  - 1 coat undercoat surfacer
  - 1 coat marine gloss.
27. The rubber strap used as a shock absorber can be easily made from a 50 mm wide strip cut out of a used inner tube from a motor tyre.

## APPENDIX 1

## MATERIALS

(Dimensions in millimetres unless stated otherwise)

Item No.	Name	Material	Size	Length	No.	Notes
1.	Timber	Hardwood	90 x 40	3600	1	Strong, heavy timber is ideal
2.	Timber	Hard wood	90 x 20	1600	1	"
3.	Bolt	Steel	$\theta 5$	100	3	
4.	Nut	Steel	$\theta 5$		3	
5.	Washer	Steel	50 x 50 x 2		6	
6.	Reel shaft	Steel, stainless steel or bronze bar, threaded	$\theta 16$	210	1	Galvanised steel bolt may be used instead
7.	Nut	Stainless steel galvanised steel or bronze.	$\theta 16$		2	
8.	Washer	Mild steel plate	50 x 50 x 2		10	
9.	Handle shaft	—	$\theta 12$	260	1	Galvanised steel bolt may be used instead
10.	Nut	—	$\theta 12$		3	
11.	Washer		$\theta 12$		2	
12.	Strap	Rubber	50 mm wide		1	Tyre inner tube is ideal
13.	Screw	Stainless steel	$\theta 4$	40	15	
14.	Paint					As required

**APPENDIX 2****TOOLS****(i) Marking out tools**

Pencil  
Marking knife  
Scissors  
Square  
Ruler  
Tape measure

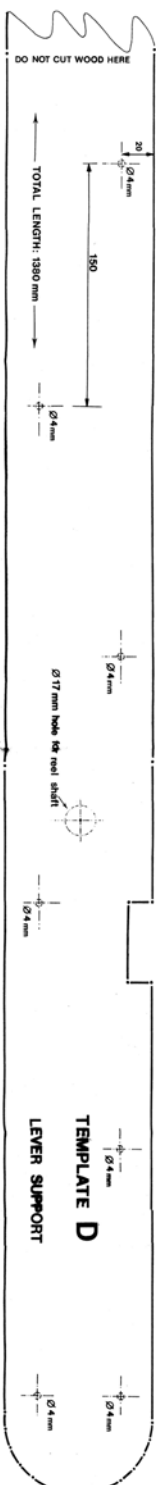
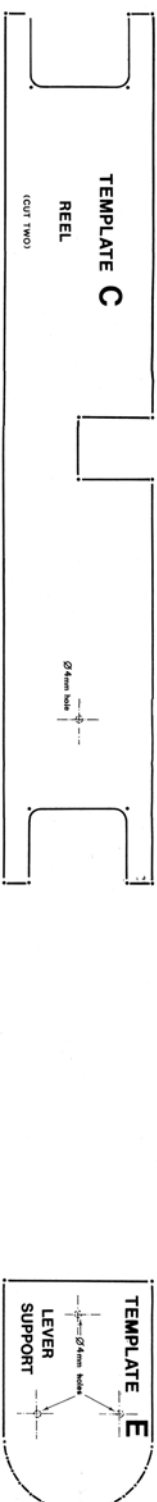
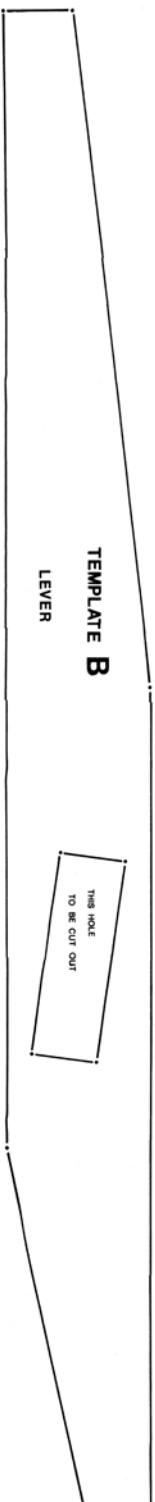
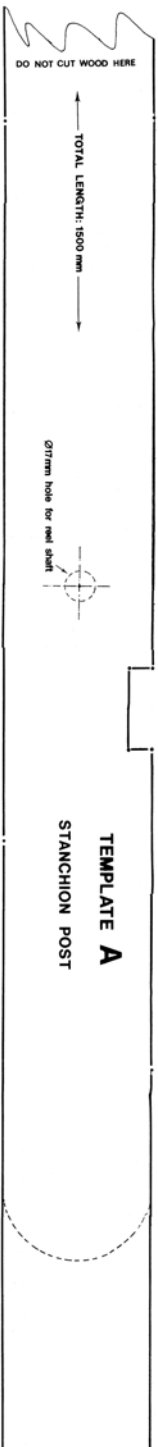
**(ii) Carpentry tools**

Crosscut saw  
Rip saw  
Coping saw  
Jig-saw  
  
4, 6, 13 and 17 mm drill bits  
  
Chisels  
Mallet  
Workbench with vice  
Screwdriver  
G-cramps

**(iii) Metalworking tools**

Scriber  
Centrepunch  
Hand drill  
4 mm diameter bit  
12 and 16 mm diameter dies  
Handle  
Cutting oil  
Hacksaw.

# TEMPLATES FOR FAO FISHING REEL

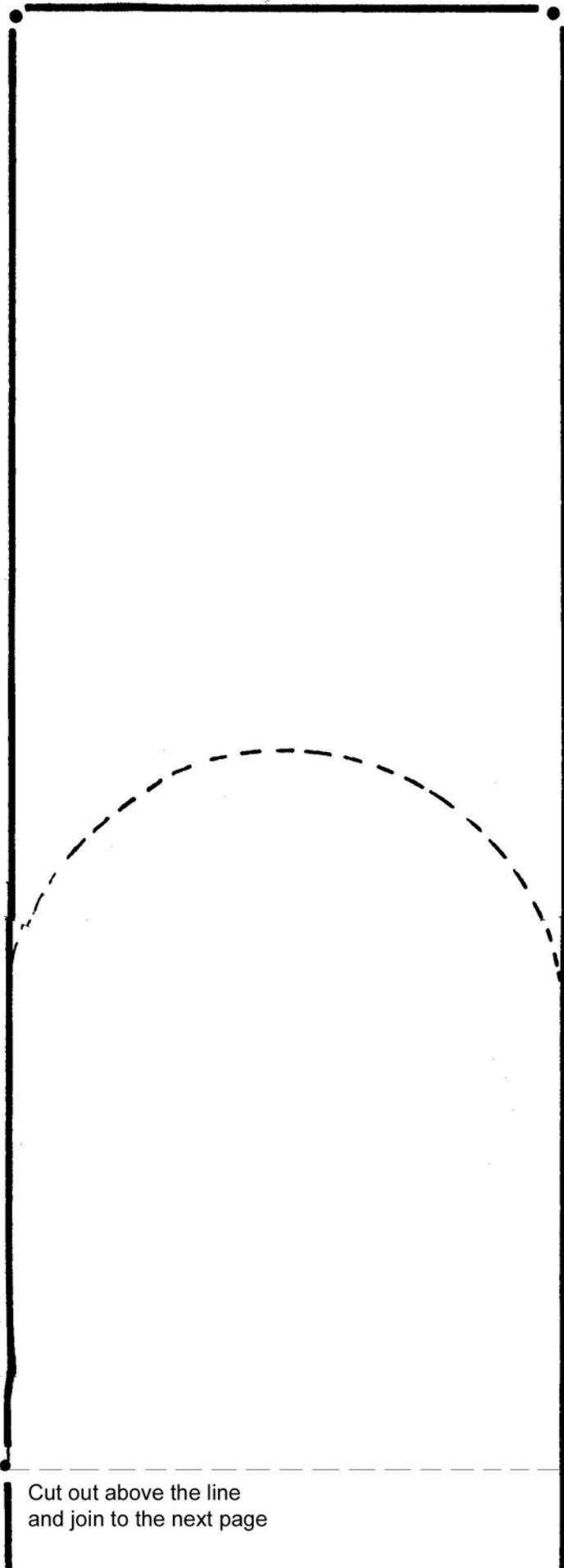




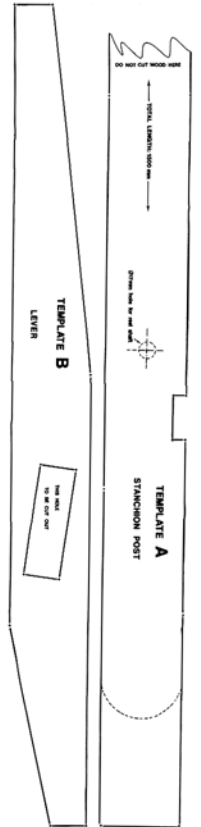
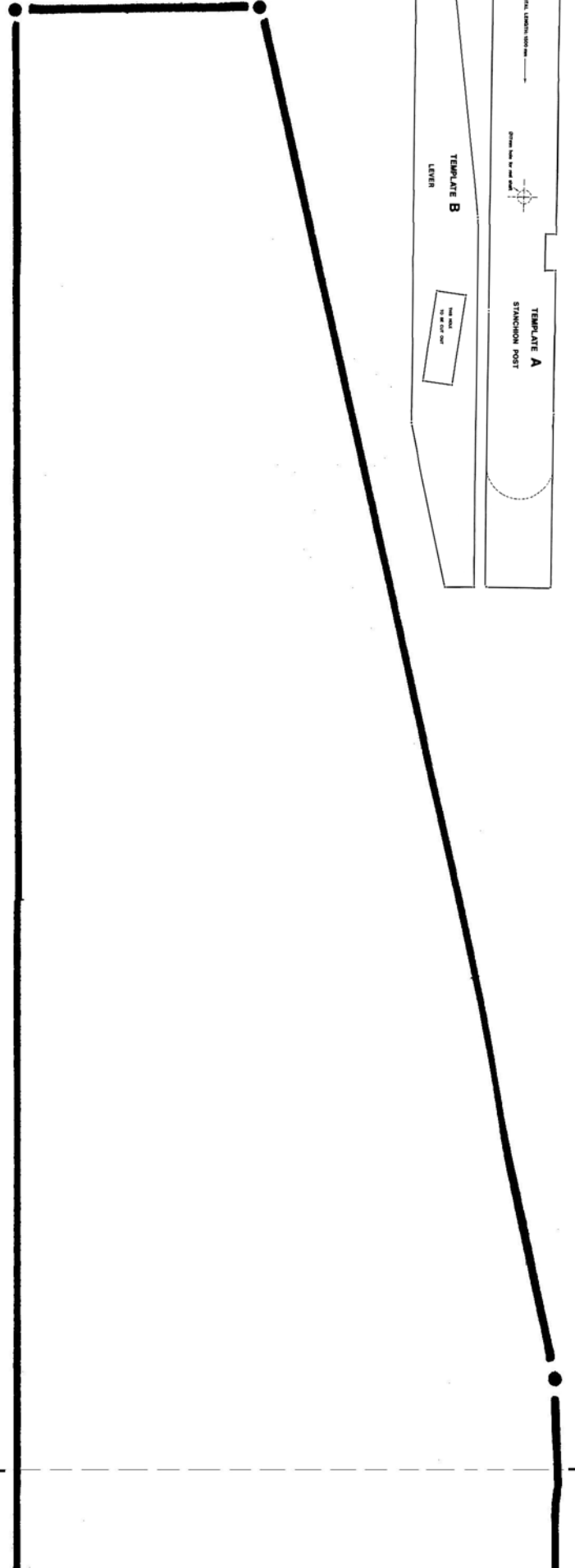
# TEMPLATES FOR FAO FISHING REEL (SCALE: FULL SIZE)

#1/4

## TEMPLATE A



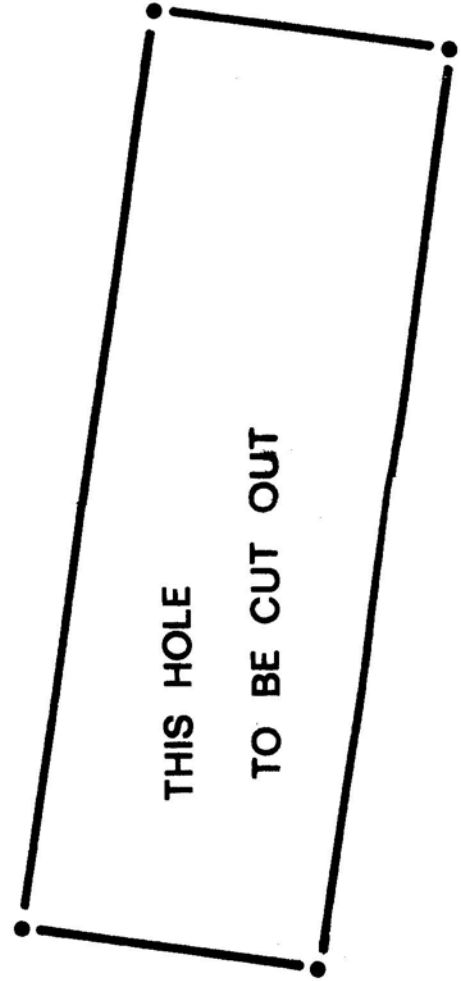
## TEMPLATE B



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and join to the next page

# TEMPLATE A

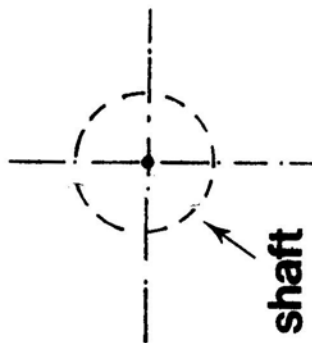
## STANCHION POST



B

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Ø17 mm hole for reel shaft



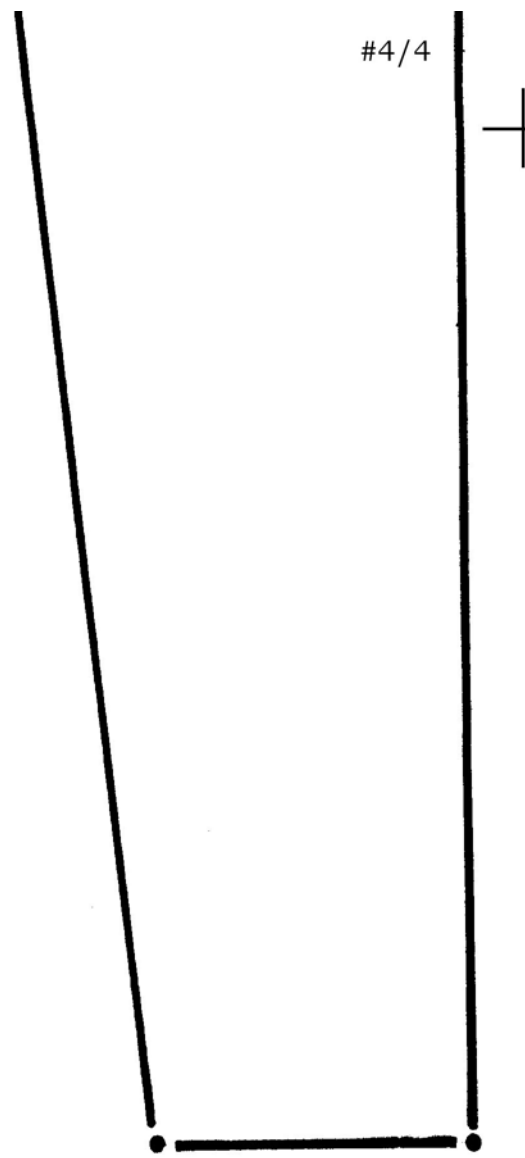
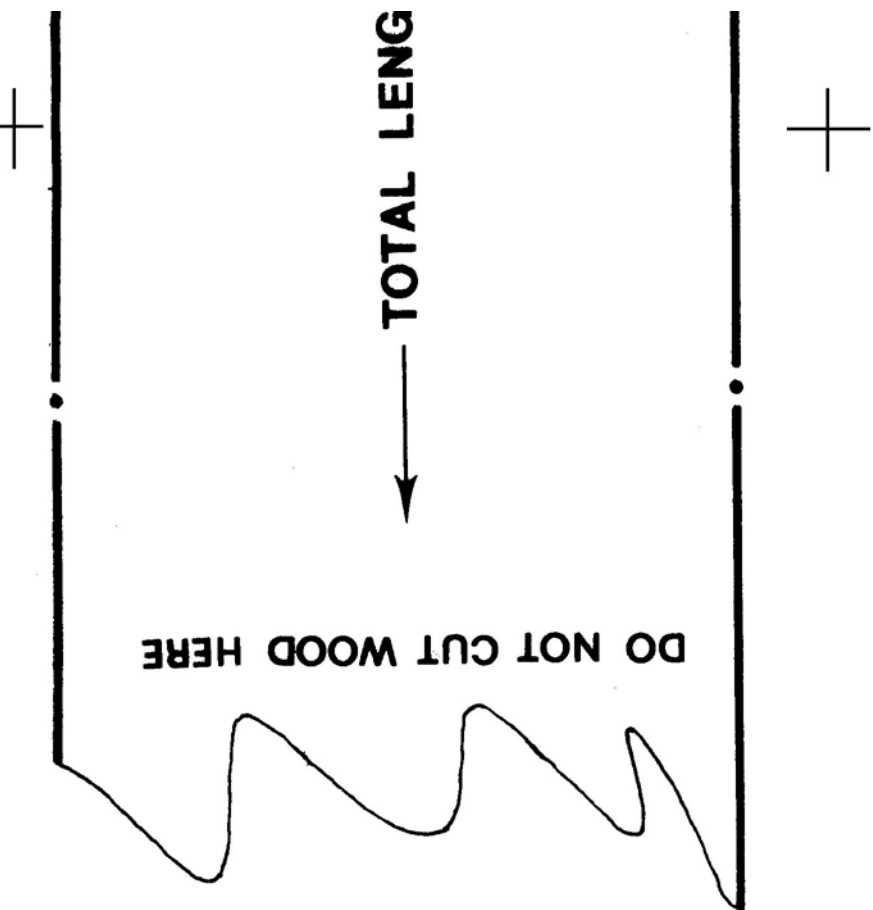
**A** LENGTH: 1500 mm



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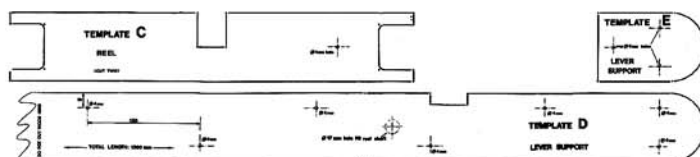
**TEMPLATE B**

**LEVER**

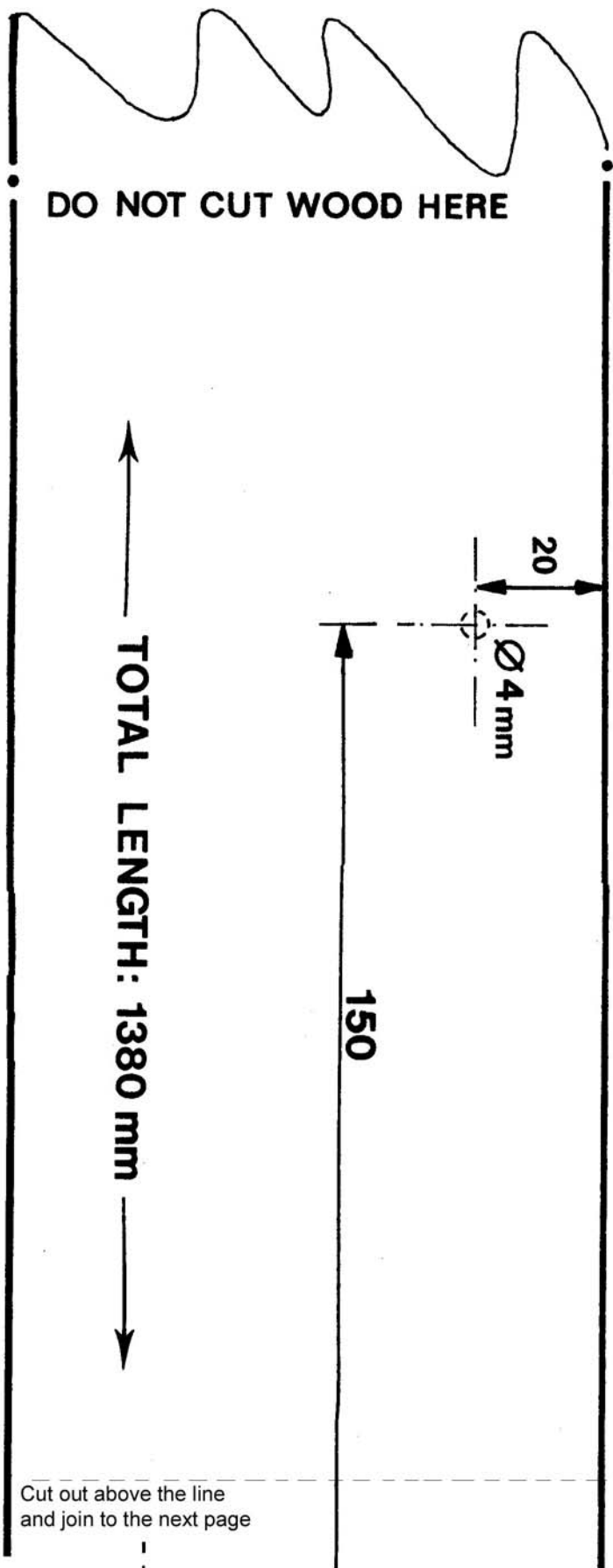


# TEMPLATES FOR FAO FISHING REEL (SCALE: FULL SIZE)

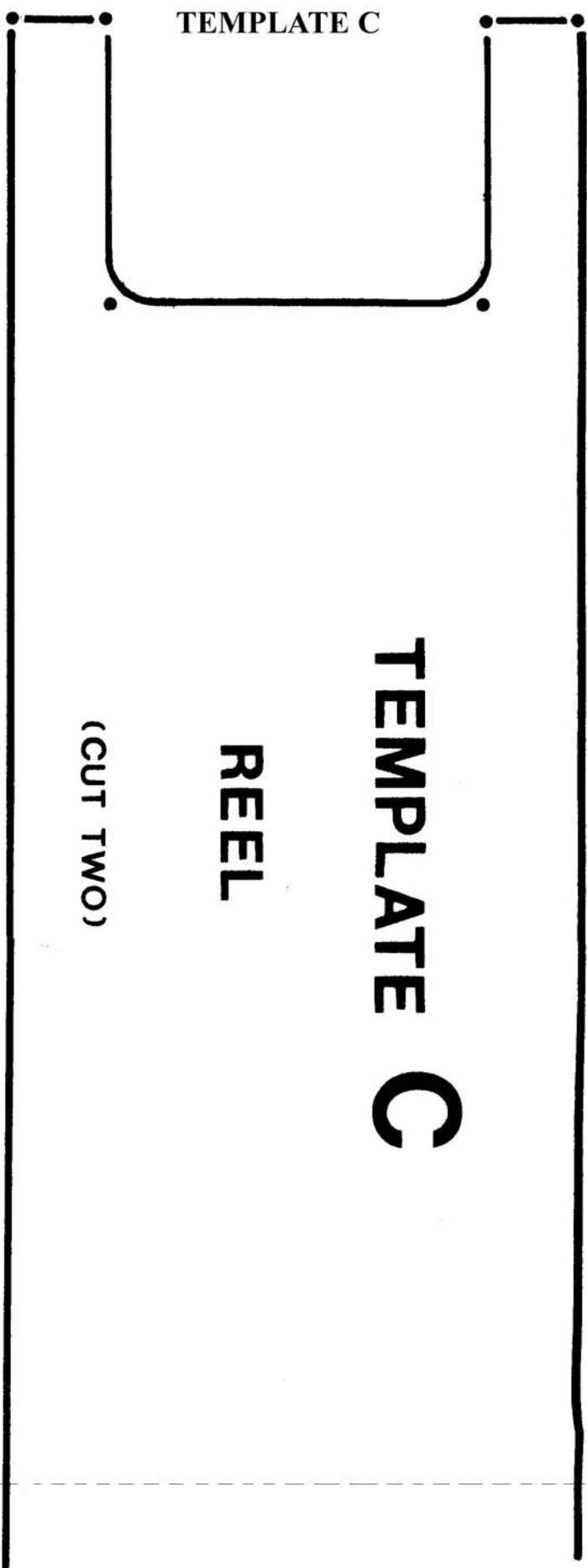
#1/4



TEMPLATE D



TEMPLATE C

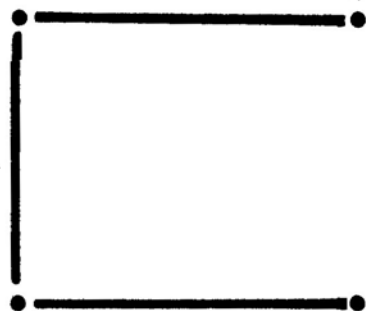


TEMPLATE C

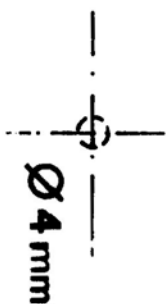
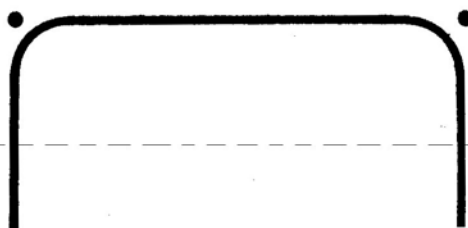
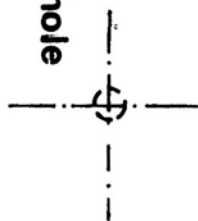
REEL

(CUT TWO)

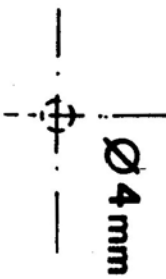
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Ø 4mm hole



Ø 4mm

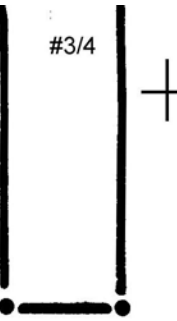


Ø 4mm

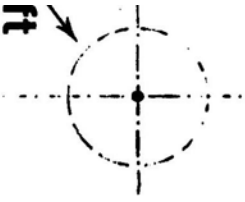
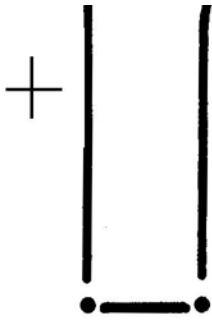
Ø 17 mm hole for reel shaft



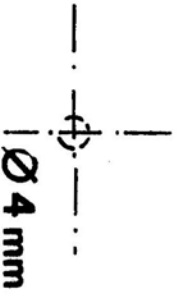
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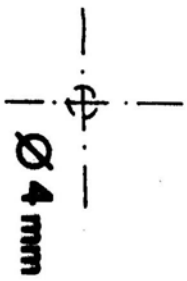
#3/4



ft



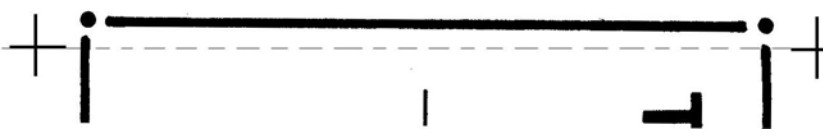
Ø 4 mm



Ø 4 mm

**TEMPLATE D**

**LEVER SUPPORT**



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# TEMPLATE E

Ø 4 mm holes

LEVER  
SUPPORT

Ø 4 mm  
Ø 4 mm