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THE FOUR SEAM TRAWL NETS OPERATED OFF COCHIN - AN ANALYSIS OF THE DESIGN ASPECTS - THE INTEGRATION OF THE VARIOUS PARTS OF TRAWL

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[A study has been made of 22 different designs of four seam trawls operated at Cochin for shrimp trawling. Formulae for the relations between the different parts of the nets have been derived.]

The present study deals with certain aspects of the design of four seam trawls, which are generally operated in and around Cochin waters from small and medium sized boats motorized with engines of horse power ranging from 20 to 60. Survey has revealed that these trawls fall under 22 different designs. Since information regarding the basis on which these designs have been made is lacking, the authors, by the aid of regression lines, have tried to establish a few important relationships among the different factors like Horse Power of the engine and the fishing gear proper and the various parts of the trawl itself.

Since size of the trawl net is expressed in terms of the length of the head rope, the different parts can in turn be considered as proportionate to this size. Text Fig. 1 depicts the component parts of a four seam trawl net.

Very little information is available on record drawing out the possible relationship between the size of the trawl and the horse power of the engine of the boat. Miyamoto (1958, 1959) was possibly the first author who attempted drawing out such and similar relationships in the trawling gear. Koyama (1962) has attempted to co-relate between the engine horse power and the size of the otter board. A similar empirical approach has been made in the present study as well.

The relation between the length of head rope (HR) and horse power of engine (P) is shown in Text Fig. 2 and expressed in an approximate equation:

$$HR = 0.5\ P + 28.1\ (Ft) \quad \ldots\ldots\ldots\ldots (1)$$

The relation between belly width (L) and the head rope length is shown in Text Fig. 3 and the equation derived from the figure is:

$$L = 0.7\ HR + 6\ (Ft) \quad \ldots\ldots\ldots\ldots (2)$$

The proportionate dimensions of the depth of belly (D); length of Bosom (Bm), minimum width of belly (B); width of side wedge (W) and length of jib (J) in relation to the maximum width of belly are shown in Text Fig. 4. The equations depicting these relationships are:

$$D = 0.7\ L + 2.3\ (Ft) \quad \ldots\ldots\ldots\ldots (3)$$
$$Bm = 0.5\ L - 2.87\ ,, \quad \ldots\ldots\ldots\ldots (4)$$
$$B = 0.24\ L + 0.92\ ,, \quad \ldots\ldots\ldots\ldots (5)$$
$$W = 0.4\ L - 4\ ,, \quad \ldots\ldots\ldots\ldots (6)$$
$$\text{and } J = 0.22\ L + 2.46\ ,, \quad \ldots\ldots\ldots\ldots (7)$$

When a four seam trawl net is non-overhang, the depth of the upper and lower bellies are similar in dimensions. But when it is an overhang trawl, the depth of the upper belly (D) exceeds the lower belly by the depth of the square (S). The relationship between D and S are shown in Text Fig. 5 and can be expressed in the equation:

$$S = 0.1\ D + 1.5\ (Ft) \quad \ldots\ldots\ldots\ldots (8)$$

The equations expressed in the foregoing paras would serve as a guide for the preparation of the component parts of a four seam trawl net. For mounting the trawl webbings to the rope, generally a hanging co-efficient of 0.4 to 0.5 is effected at bosum, according to which the distribution of the length of the rope to other parts are determined. At 50% take-up, the length of the rope required at bosum will be half the stretched length of the meshes and consequently the length of the rope at the jib will be the length of the hypotenuse of the resultant right angled triangle. Since the horizontal slackness and the vertical spread of a webbing are proportionate in a given take-up and as their corresponding values have already been determined, the length of the other two sides of the tringle could be calculated. In Text Fig. 6, the length of the two sides and the calculated length of the hypotenuse of the triangle are given at 50% take up, the corresponding vertical spread of which is 86%.

If the wing consists of straighi webbings, the length of the rope at that part is to be calculated according to the vertical spread of the webbing at the given take-up.

In Text Fig. 7, the relationship between the total extra buoyancy of floats "F" and the length of the hand rope "HR", as well as the total weight of sinkers "W" and the length of the foot rope "FR" are indicated. The equations derived are:

$$F = 0.75\ HR - 15\ (Lbs) \quad \ldots\ldots\ldots\ldots (9)$$
$$W = 0.8\ FR - 9.65\ ,, \quad \ldots\ldots\ldots\ldots (10)$$

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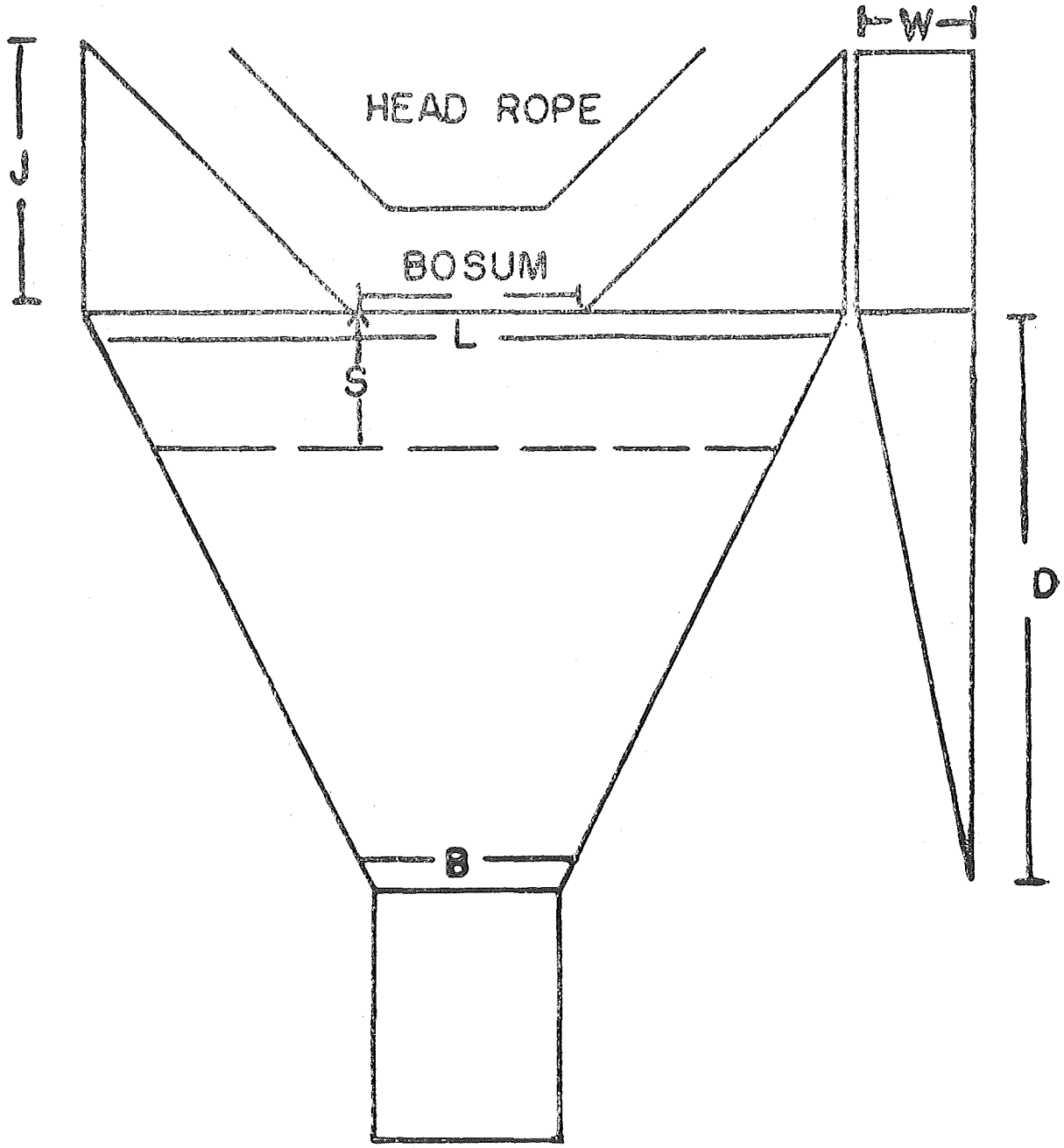

Fig. 1. Diagram showing the size of trawl (Length of Head rope at the mouth of the net.) and the vital dimensions of the Component parts.

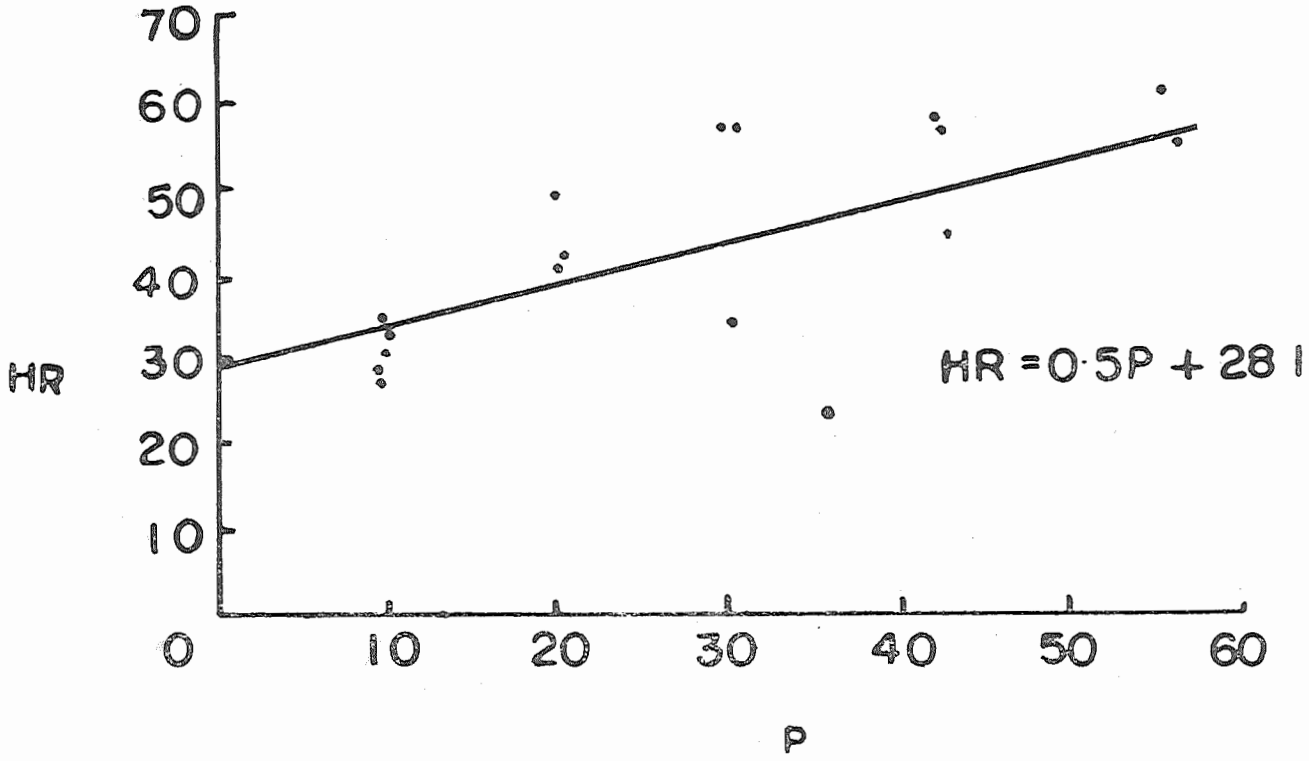

Fig. 2. Graph indicating the length of Head rope in relation to the H. P. of the engine.

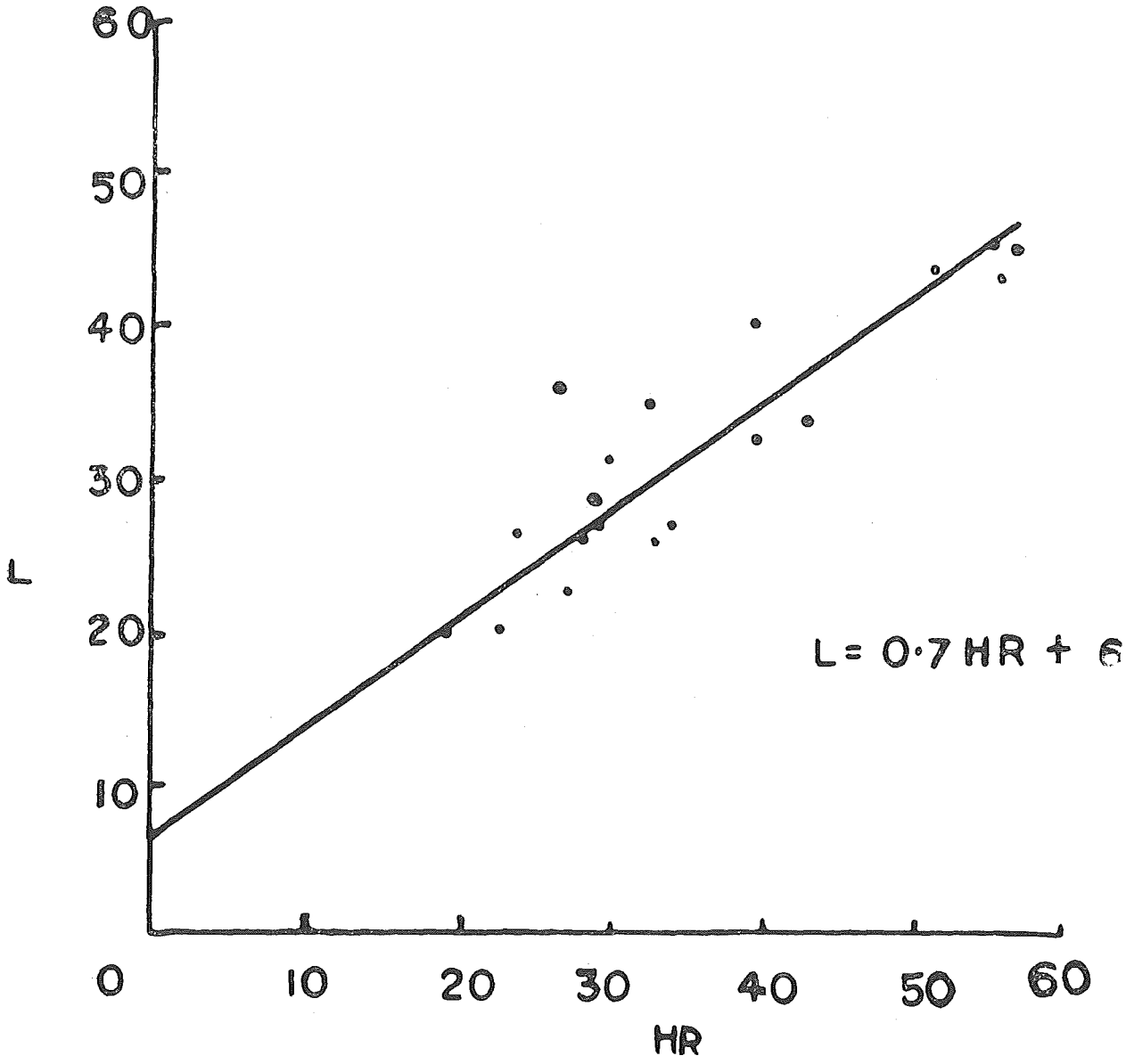

Fig. 3. Graph indicating the relation between the length of Head rope (size of trawl) and the maximum belly width "L".

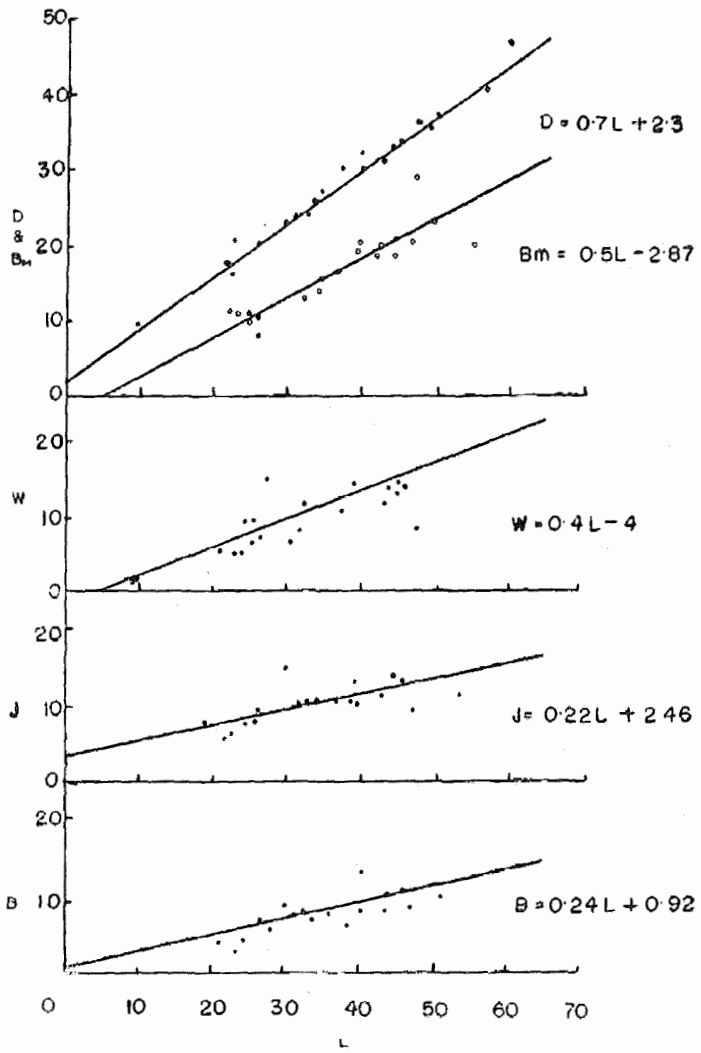

Fig. 4 Graph indicating the dimensions of the various parts in relation to the maximum belly width "L".

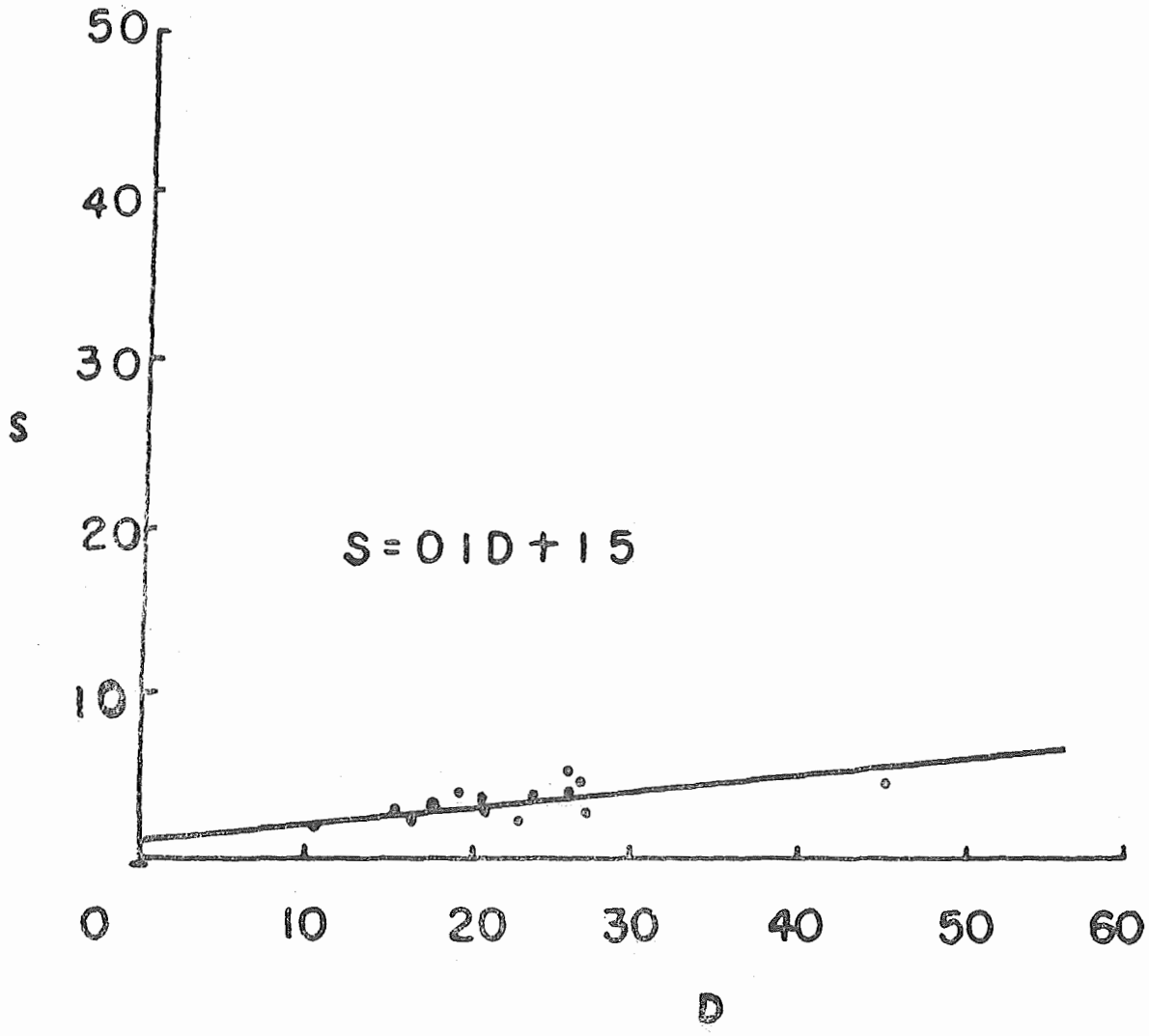

Fig. 5. Graph indicating the length of square "S" in relation to the depth of belly "D".

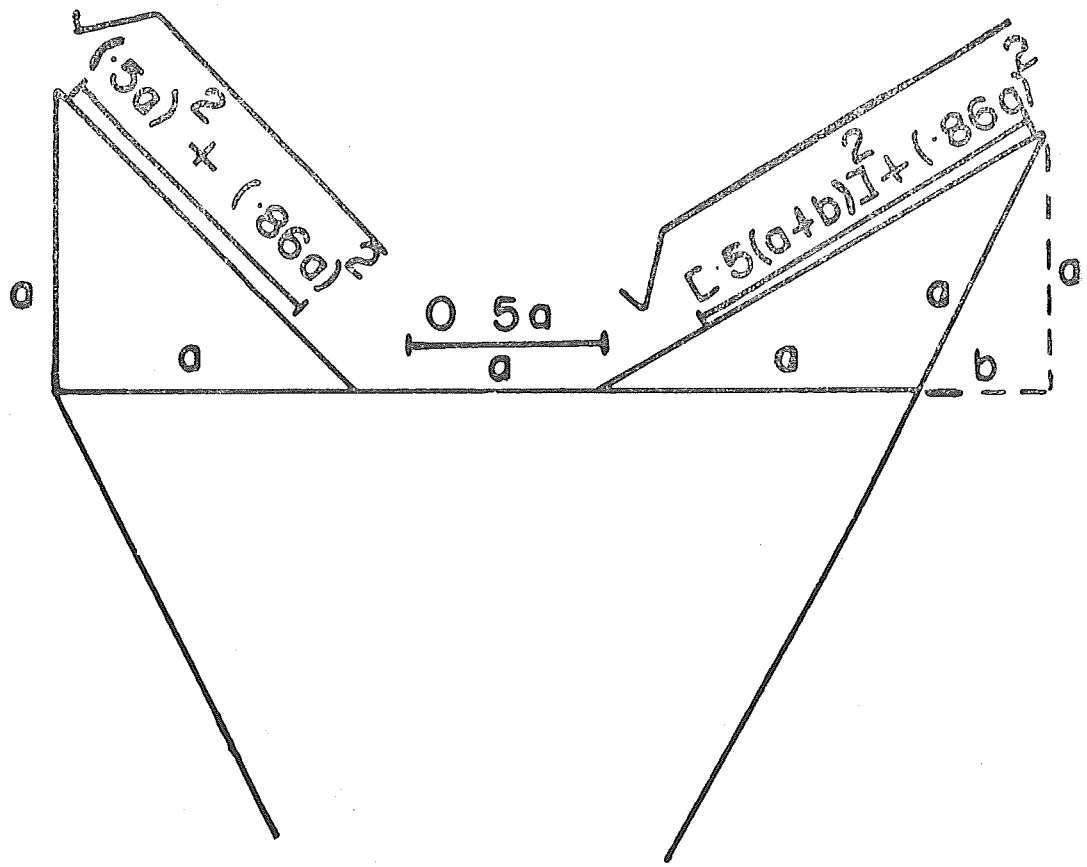

Fig. 6. Diagram showing the method of calculating the distribution of Head rope length to the Bosum and Jibs.

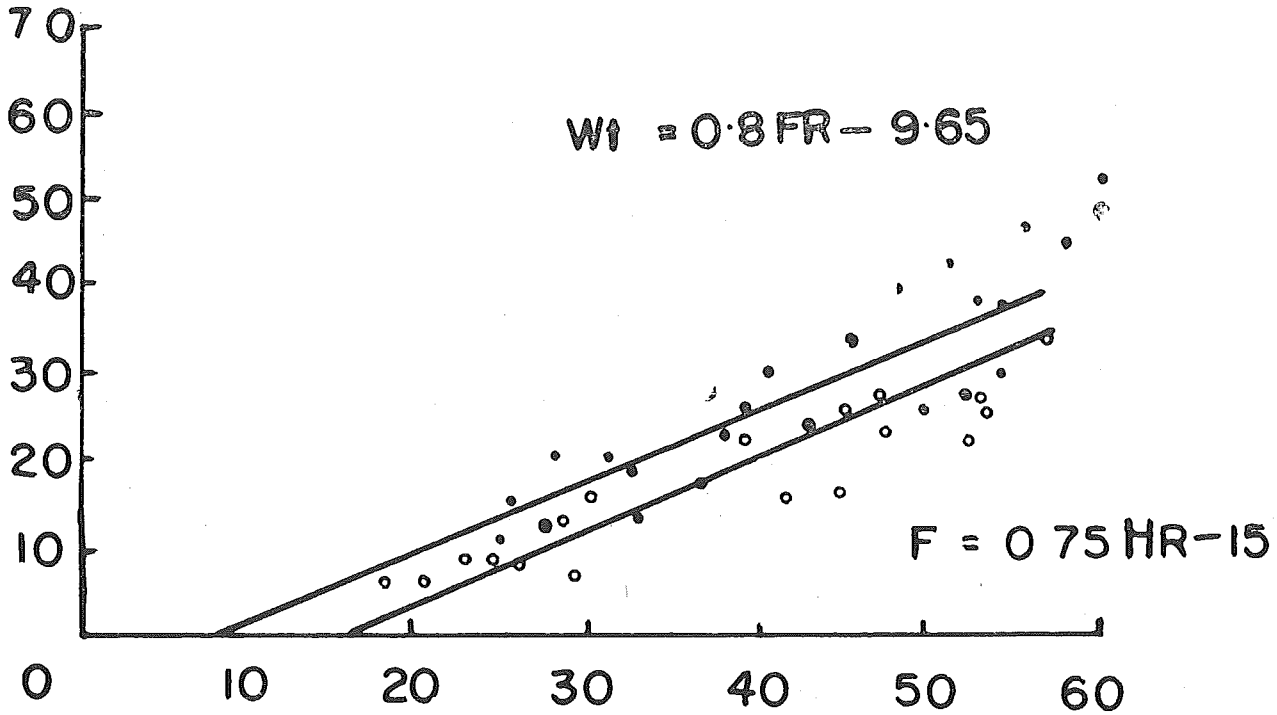

Fig. 7. Graph indicating the relation between the buoyancy of Floats to the length of Head Rope and weight of sinkers to the length of Foot Rope. In the graph wt. = 0.8FR-9.65, Wt. is taken along the Y - axis and FR is taken along the X - axis and in the graph F = 0.75 HR-15, F is taken along the Y-axis and HR is taken along the X - axis.