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DEVELOPMENT AND OPERATION OF ANCHORED POUND NETS AT THE BALTIC COAST OF GERMAN DEMOCRATIC REPUBLIC

by

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Abstract

Beginning with the historical development of trapnet fishery especially for herring the development and introduction of anchored pound nets with resistance to wind and currents are described.
This pound nets are setted along the coast of Baltic Sea.
They are operated from cutters and enable a reduction of fuel per ton fish of 75% in comparison with trawl fishery.
Technology is extensive mechanized.

I. Description of trapnet fisheries and historical development

Trapnet fishing along the GDR Baltic coast is a traditional fishing method.

With a number of about 1100 hoop nets (see fig. 1) and about 1400 eel basket lines the small trapnets represent the most importance group of trap-like fishing gears as far as it concerns their quantity, though their importance in total landings is quite small.

Commercially importance are first of all large stake pound nets used in almost all fields of onshore fisheries.

The main operation areas of them are situated in the waters around the Isle of Rügen and the Greifswalder Bodden in the east of the GDR.

Annually up to 400 of these large stake pound nets are used in spring at up to 300 ones in autumn.

Though nearly all occuring fish species are fished by these traps, herring takes the most important part in total landings amounting to more than 90 %.

Herring almost exclusively is caught in spring in the month of March, April and May.

In total landings of coastal fisheries in the last years the trap net catches amounted to 18% showing an increasing tendency. This trend will continue further in future aiming at a protective and high selective fishing of the stocks at the lowest fuel consumption.

Even if the different stake pound nets differ in some details from trap crew to trap crew (a trap crew is composed of 3 to 10 fishermen), the basic type of a stake pound net with its characteristic parameters could be described as follows.

A stake pound net consists of the leader and wings as well as of one or two cribs arranged in longitudinal direction. The leader can have a length of 200 to 500 m and is fixed in opposite to other parts of the trap in the ground by anchors which are connected by anchor ropes to the foot rope. The mean mesh size is about a = 22 or 24 mm. Only exceptionally net material having a larger mesh size up to a = 28 mm is used.

The length of the after part of wings varies from 12 to 18m and the length of the front part from 22 to 30 m.

In this two parts the mesh size usually is equal and ranges from 20 to 24 mm.

When operating only with one crib ,its length is about 15 to 18 m and the width of it is up to 12m. In the case of two cribs the length of each of these cribs is 9 to 15 m and the width 7 to 10 m. The mesh size of a crib mostly is 18 mm. The cribs don't have a cover. In order to avoid the escape of fishes and to compensate fluctuations of the water level the sider of the cribs stand out up to 1,5 m from the water surface. Opposite to the leader the wings and the cribs are set up at stakes,which are fixed by 1 to 3 anchors.

The stake pound nets are used in water depths from 3 to 12 m. Only exceptionally they are set directly at the shores,however there they are exposed much stronger to charges by wind and currents.

Even nowadays the trap nets are emptied manually by small hand nets. When in the past the catches were landed completely ashore,since some years they have been transborded at sea on factory ships anchoring on a central position. For this purpose the catches are shoveled by a hand net immediately from the trap-net into a brial having a capacity of about 1,5 tons. and hieved up from the trap net boat on deck of the factory ship by means of a derrick.

In last years repeatedly it could be shown,that the stake pound nets don't bear the heavy charges by wind and currents,so that sericus damages up to total losses of the gears took place.

With the utilization of the outer coastal area for trapnets exploited to a small extent up to now it was necessary to design a trapnet resistant to wind and currents.

In connection with the higher flexibility of them the anchored pound nets have a much better resistance to storms and currents as stake pound nets. Those anchored pound nets have been used in other areas of the Baltic since the twenties of this century (7) and in other coastal regions even still earlier (8).

First tests with anchored pound nets at the outer coast line of the GDR were carried out by the Institut für Hochseefischerei und Fischverarbeitung Rostock (IfH) in 1964 (4) the aim of which was the utilization for trap net fishery the outer coastal area which is heavily exponed to

wind and currents. At the same time the manual work should be reduced compared to the stake pound nets.

Previously there was a successful operation of anchored hoop nets in Rerik in 1961 (see above mentioned fig.2) (5) .

Though it could be proved ,that working effort in setting and hieving could be reduced considerabely compared to the stake pound nets,wind resistance was much better and the captivity was almost equal, these traps were not introduced by different reasons in that time.

After tests in the meantime in the region of Bansin (Isle of Usedom) in 1975 - 1977,where partially good catches were obtained,this problem has been reopened under the guidance of the VEB Fischwirtschaft Rostock within a research project in the places of Karlshagen and Warnemünde.

II. Operation,results up to now and possibilities for perfectioning of the anchored pound nets

The aimed development and wide application of the anchored pound nets at the outer coastal area in the beginning of the 80 ies mainly was done by two reasons:

- utilization of fish resources not fully fished up to now
- expanded application of energy reduced and protective fishing methods intending a substitution of a part of trawl fishing.

Based on this as experimental places were chosen Warnemünde and Karlshagen, where two efficient fishing cooperatives for cutters are settled and suitable places for trap nets were available. The two created trap net crews had at their disposal fishing cutters of a length of 17m and 12 m respectively.

Within a development project a standard trap net which resulted from analysing different constructions of stake pound nets was determined. The distinction from the kind of mooring of the stake pound net is shown in fig. 4.

Considering the employment of a 12m or a 17m-cutter the technology of setting and removing the trap could be improved, so that the expenditure

of time is half as much as in the stake pound nets.
The technology of emptying the trap had been modified in so far as the fish was shot by lifting of the crib into a tunnel, where a detachable delivery cod-end was connected(fig.5). The two boats provided for lifting the trap are equipped with winches and horizontal capstans in order to facilitate this process. The delivery cod-end is taken over by the cutter and by means of a portioning rope as in the case of a trawl.
This new trap emptying technology generally resulted in an essential relief of working conditions and a shortening of the time for emptying compared to manual emptying by hand nets. In that way maximum catches per day of 15 to 25 t can be taken over without any problems and in a comparatively short time (about one hour per trap).
With a mean catch of more than 50 t per trap the fishing efficiency of the anchored pound nets could also be proved, so that a commercial explcitation of anchored pound nets could start in 1981.
In last years the advantages of the anchored pound nets and the strained situation in energetics resulted in a partial chance from active trawl fisheries and the gillnet fisheries with a high working expenditure to trap net fishing with anchored pound nets especially in the outer coastal areas.
In tab.1 is shown the number of the operating anchored pound nets in the last years and the total catch obtained by them.

Table 1 :
Number and catches of anchored pound nets exploited at the GDR outer coast line during spring season from 1981-1985

Year	number of traps	catch (t)
1981	6	250
1982	12	612
1983	21	700
1984	21	1450
1985	23	1420

It can be seen from the table, that already for a period of 2 years in the outer coastal area a quantity of about 1,5 kt of fish(mostly herring) has been caught by these trap-nets and all this at a fuel consumption which has been reduced up to more than 75% in comparison with trawling and a higher fish protection at the same time. The maximum water depth fished was about 14m.

Inspired by the good experiences with the anchored pound nets and encouraged by our scientific and technical cooperation anchored traps have been succesfully used at the polish coastline not far from the GDR boundary since 1984. In spring of 1986 in that area fishing with 12 traps was programmed.

In previous years the anchored pound nets repeatedly showed a higher storm resistance compared to the stake pound nets, especially in such places which are exponed to the wind and currents such as the outer coast line. For the first time in 1986 in a longer lasting storm from the east and waves up to a water depth of 15m certain damages of the anchored pound nets were found, but a much less extent as in the stake pound nets. Besides of the point of view of fisheries the anchored pound nets had a positive influence in other respects.

So they encouraged gillnets fishermen fishing formerly individuelly to join crews the property in fishing gears of which was a cooperative from now on. The change from trawl fishing to trapnet fishing promoted the protective and fuel reduced passive fishing in general, because these crews carried out gillnetting beyond the main fishing period. In future the introduction of a mechanized long-line fishing is intended.

III. Works on perfection of trap net fisheries

Parallel to the commercial introductions of the anchored pound nets further research work concerning the perfection of trap net fishing was done.

So, within a student's work based on the standard anchored pound net were elaborated standarized construction specifications as well as a construction technology. Those specifications facilitate and simplify for commercial purposes problems of material planning, making of the

particular construction drawings and the manufacture of trap nets.
Further, the effects of a change of the relation of the twine diameter to the mesh size d/a in the leader was investigated. According to (1) a relation of d/a = o,02 to 0,03 is recommended. In the trapnets at GDR Baltic coast used up to now this relation is 0,05 to 0,07.
The reduction of the d/a-relation can be reached by increasing the mesh size under the condition of maintaining strength (d-const.).
In this way also an early perception of the leador is delayed, biological deposits are reduced, the net material necessary decreases and the current resistance is diminished.
As the buoyancy and weight as well as the necessary anchoring are diminished by this, a total reduction of the expenses up to 50% can be realized, however the reduction of the d/a-relation in the leader must not affect negatively the fishing efficiency. For the investigation of the behaviour of fishes at a leader with larger mesh sizes besides of a comparison of the catches in trap nets with a traditional leader an objective registration on the base of results of observations is necessary.
The most effective and succesful method of long-term observations is the use of an underwater-tv-camera ,necessarily completed by a video-recorder to assure the reproductability of the results with regard to the behaviour of fishes.
The principal requirements in such an observation system, especially the choice of a suitable camera support, were determined within a research work done by the Institut für Hochseefischerei und Fischverarbeitung Rostock (IfH).
In the course of first experiments of pound nets off Warnemünde in 1980 by means of a 12m-cutter used as an observation and equipment station the feasibility of the determined methodology could be proofed and by this a base for further systematic development was created.
Meanwhile a complete operative underwater observation system for coastal fishing is available. It can be used both on bord the cutter and on smaller boats (battery driven) for the investigation of the fish behaviour at stationary gears, such as gillnets, traps and longlines (see fig.5).
With further mechanization of the process of trap emptying in mind first research works on the fish behaviour with regard to an air bubble curtain were done in cooperation with fishery biologists of the Wilhelm-Pieck-

Universität Rostock. As could be seen from (6) it is possible to concentrate the fish, in particular herring by means of an air bubble curtain in a crib. From this possibilities can be derived to mechanize the discharging process of the traps in connection with fish pumps or a detachable transbording net.

As reports show, for example from Finland (9) the use of fish pumps in trapnet fishing is an efficient measure. By this reason works were also done in this resput, which are not finished yet.

Additionally the possibility of the use of air bubble curtains as leader instead of a material intensified netting leader was studied theoretically. However it could be prooved, that such an equipment is not efficiently from the economical point of view, because the operating costs of an installation to generate an air bubble curtain are very high and the purchasing costs partly are higher than the costs of a leader made from net material.

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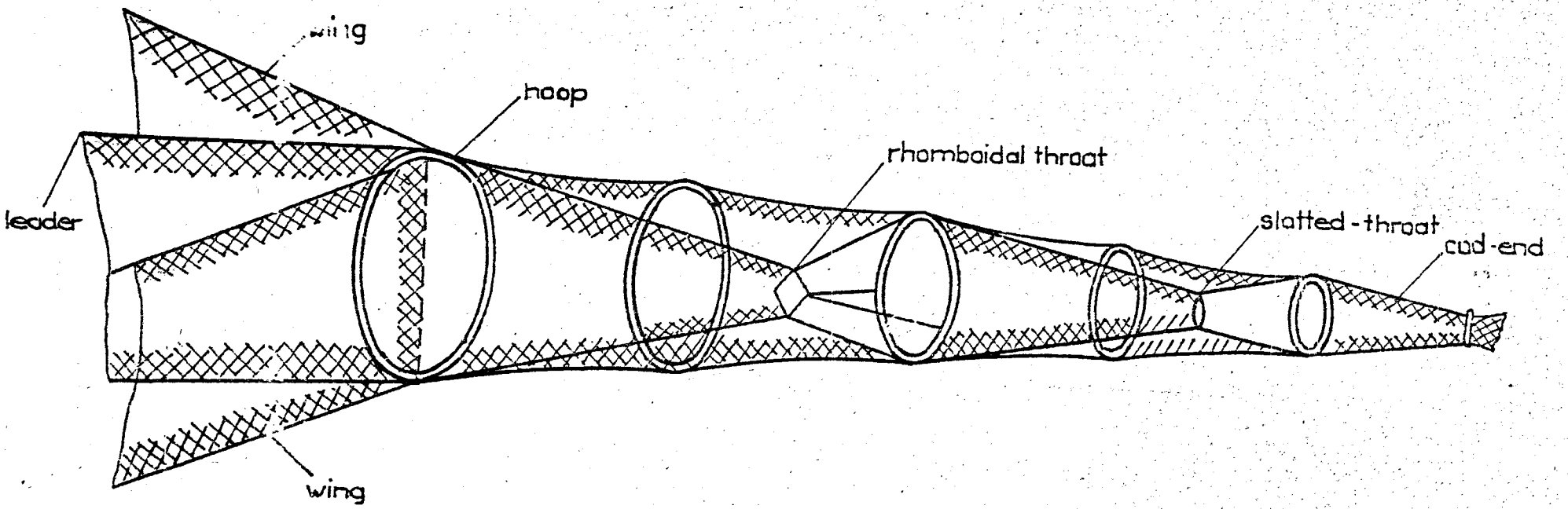

Fig. 1 Simple hoop net

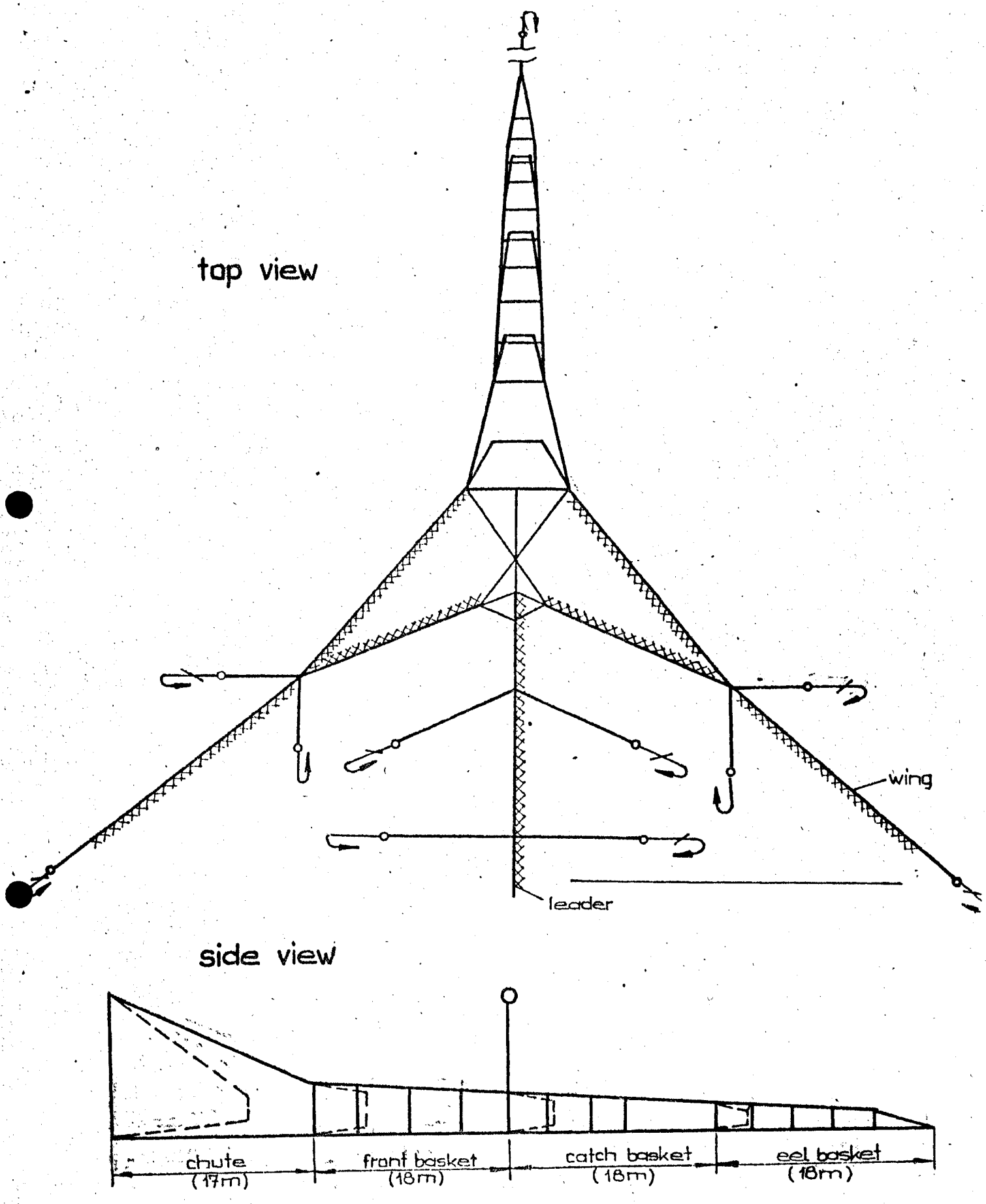

Fig. 2 Anchored hoop net

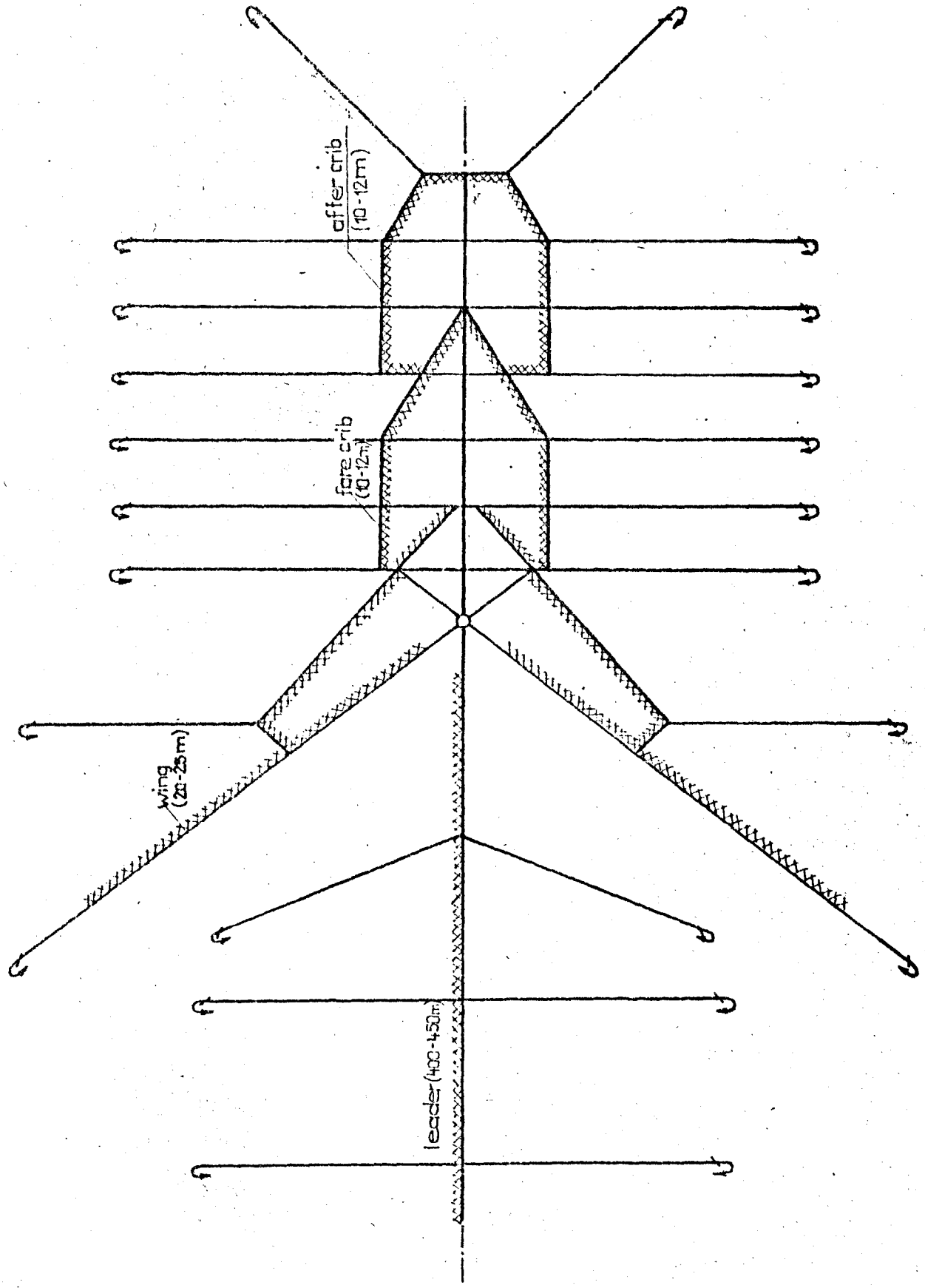

Fig. 3 Anchored pound net
(standard)

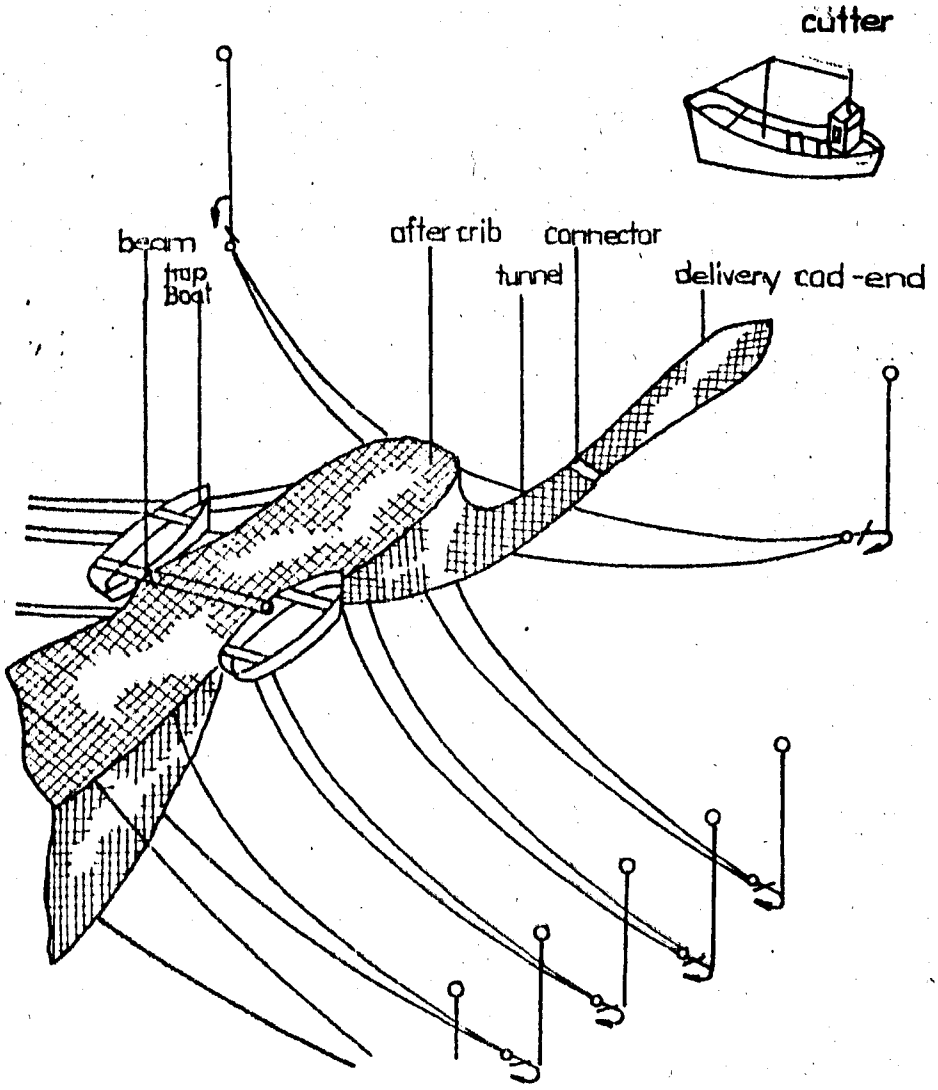

Fig. 4 Emptying the anchored pound net

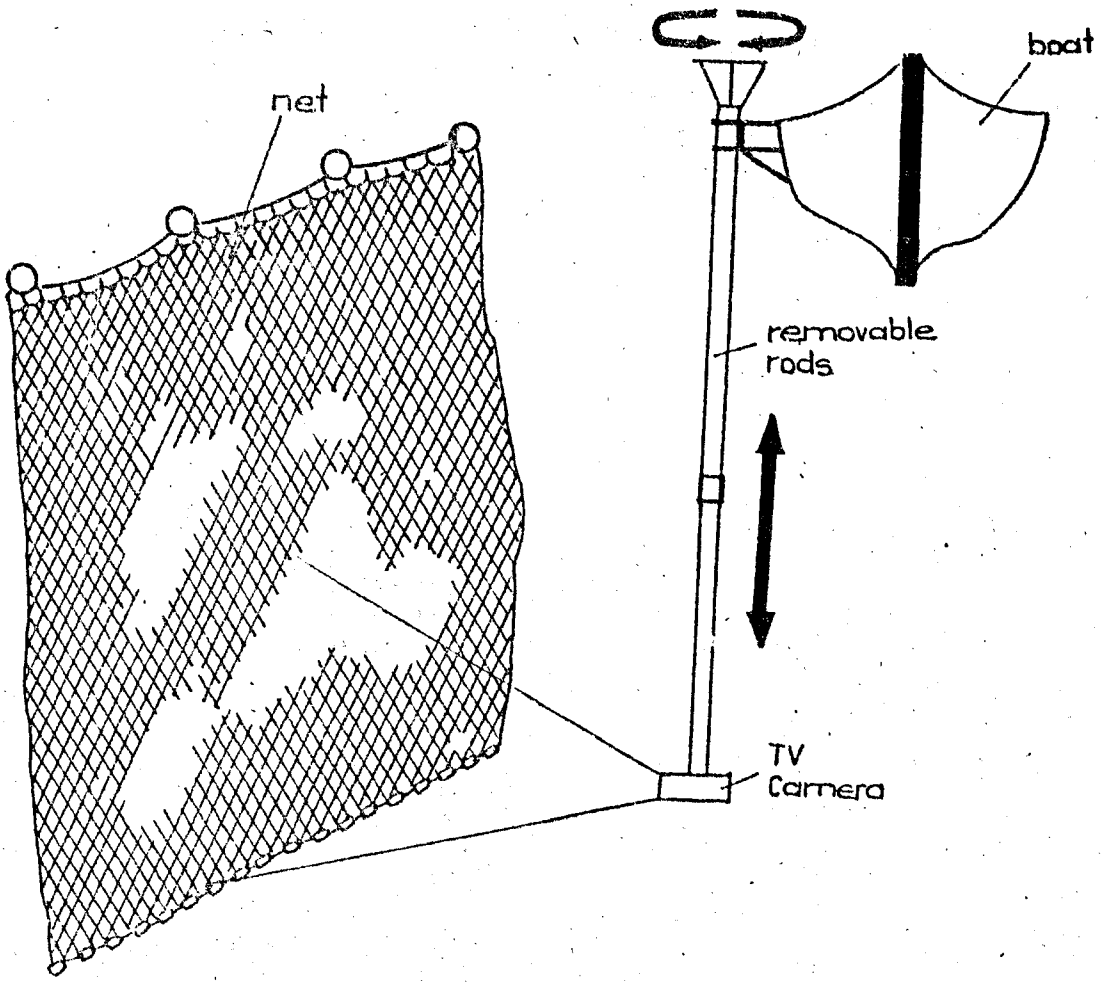

Fig. 5 Scheme of the UW-observation system