The Dutch Boeier

Text and Photos by E.H. Bon

In the Netherlands, as in the United States, there has been a renewal of interest in traditional wooden craft. This interest, which began in the 1950's, has been manifested in the building of new boats to old models, and the renovation and restoration of original craft whenever possible. As can be expected in a country with the diverse maritime heritage of the Netherlands, there are many different types of craft that could be classified as "traditional." Unfortunately, there are few restorable original boats of any type to be found. Take the *boeier*, for instance.

The boeier is a type of yacht intended for pleasure sailing, and in the past it was built in several parts of the Netherlands. It was developed from a family of freight-carrying double-ended sailing barges fitted with leeboards that, until a few decades ago, could be seen on all the numerous inland waterways of the Low Countries. Boeiers were built until the early years of the present century, when most yachtsmen lost interest in them in favor of keel yachts introduced from other countries. Only a few of the original boats still exist, mainly in the province of Friesland, where traditions lingered longer than elsewhere in the Netherlands. Boeiers were not built from drafted plans, so, for someone interested in building an authentic new one, the only way of obtaining lines has been to take them off an existing model, and since the 1950's a number of boeiers have been so measured.

In 1973 I became the owner of PHOENIX, one of the last surviving wooden boeiers from the province of Holland. She was originally named the PIET HEIN, after the popular seventeenth century admiral of that name, and she was built at the Het Jacht (the Yacht) shipyard in Amsterdam in 1898. The owner and master shipbuilder of this yard was Nicolaas Adrianus Bernhard, a member of a family with a long shipbuilding tradition. Of the many boeiers built at Het Jacht—at first of wood, later also of steel—only one wooden specimen besides PHOENIX is known to exist—the LUDANA, built as the OLGA in 1898. This boeier still exists in England, though in a state of considerable neglect.

Other than having a list of successive owners, I know little of PHOENIX's long yachting career. Her original name was changed in 1923, for reasons unknown, to MIAMI. Under this name she was a frequent entry in the yearly regattas held in the yachting centers of the Netherlands. After World War II her name was changed, once more, to PHOENIX. When I bought her in 1973 her age was showing through her brightwork. After her state was compared with old photographs, it was apparent that her original rig had been cut down and that much of her original woodcarving had disappeared. But she was still fit enough to sail, and her accommodations were cozy and livable. So we decided to sail and cruise her during the sailing season and to restore her gradually during the winter months. Each spring she was a little fresher, stronger, and brighter than the preceeding one.

PHOENIX's restoration was straightforward but time consuming. A tentative five-year plan was drawn up, and I was fortunate to be able to engage Mr. Willem Strofberg of Leimuiden, a veteran shipwright of great experience and ability, to work on her. Most of the boatstock in PHOENIX is oak, and supplies for her restoration were obtained from France, where quantities of ancient and completely seasoned inland oak are sometimes available from salvaged buildings. (I might add here that while oak is a wonderful material for shipbuilding, its resistance to rot is low, especially in fresh water, where PHOENIX spends much of her time.) Constant care is required to prevent mildew and fungi from starting their destructive action.

During five successive winters at the yard of Mr. Strofberg, the following

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items in PHOENIX were renewed: bow planking, stem, keel, breasthooks in the bow, a few frames, one floor timber, the mast thwart, and the tabernacle. Part of the *boeisel*—the planks above the wale—was also replaced. Since the seam between the boeisel and the wale was worn beyond caulking, a stealer plank was inserted all around. After all that work, PHOENIX is now in fine condition.

The day-to-day maintenance of a vessel like PHOENIX is relatively easy, contrary to what one might expect. The exterior woodwork only needs a single coat of good-quality varnish each year after the old varnish has been given a light rubbing down with fine sandpaper. We take a yearly trip to the tidal flats in the north of Holland and Germany, and the

change from fresh to salt water helps to combat rot and marine growth, and the salt bleaches the teak deck. For the rest of the maintenance, it is a question of keeping the interior well ventilated and dry, and the bilges clean. Frequent sailing keeps a wooden boat alive, as the motion refreshes both the air and the bilgewater inside.

The boeier, though similar in concept to the Dutch working craft, was designed and built exclusively for pleasure sailing, so the requirement to carry loads obviously did not exist. Length and draft were the only limiting factors. That the boeier did not evolve to the extreme "skimming dish" forms of the ninteenth century American centerboarders is perhaps due to Dutch common sense, which held that a yacht, next to being able to sail well and win races, should also be easy to handle, and be pleasant and comfortable to live in.

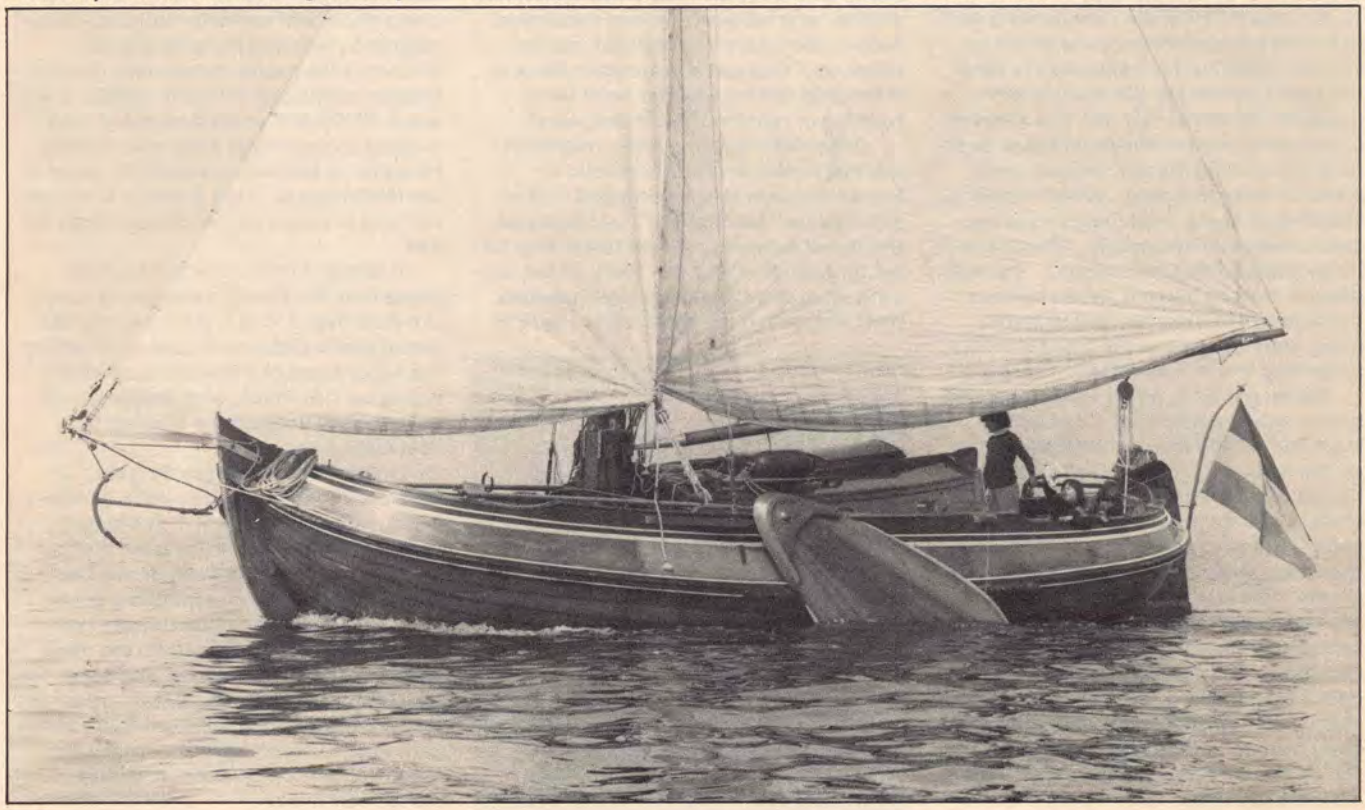
Sailing a Boeier

PHOENIX is quite stiff in a breeze despite the complete lack of ballast, except for the mast counterweight and the engine. But don't delay reefing and take care handling the sheets in a strong, gusty wind. When she was raced under her original rig, a certain amount of inside ballast would have been carried.

Under her present cruising rig, PHOENIX is somewhat sluggish in light airs, though it is remarkable how well she ghosts along in a breath of wind.

Tacking up a 100-foot-wide channel is no problem, although the helmsman must know the boat's habits well. The secret is to keep the ship moving and to drop the leeboards at exactly the right moment, which is just when she starts gathering leeway. If the board is let go earlier, it will float up again; if too late, it won't go all the way down. I have to admit that I learned much of this only during the season when the engine was ashore for an overhaul. The experience very much increased my admiration for a boeier's sailing ability.

The order "Ready to go about" not only warns the cook to look out for the crockery, but also alerts the *fokkemaat* to go forward to tend the foresail and another crewmember to watch the leeboards. At the command "Ree," the helm is put down while the man on the foredeck takes a turn around the weather shroud with a short lanyard attached to the clew of the foresail. As the vessel shoots up into the wind and the pressure on the foresail eases, this lanyard is tautened as much as possible and held fast. When the ship is head to wind, the foresail is thus held aback, which helps the turning movement. At the same time the crewmember looking after the leeboards loosens the hauling part of the weather leeboard tackle, keeping a turn around the cleat, ready to let go. The fokkemaat has to judge the exact moment to let go the foresail clew. This must happen just before the vessel has reached the heading of the new tack, as in that case the sheet will slam fully across the deck along the horse and not remain stuck somewhere amidship. Letting go too early means that the sail will keep slatting about, loosening the hitch of the hauling part of the sheet, which means



everything will have to be set and trimmed again on the new tack. If it is done right, coming about requires no effort at all. It is a joy to see a little girl of ten perform as an expert fokkemaat on a large boeier of Lemsteraak!

On board PHOENIX, the hauling part of the leeboards tackles leads aft to the cockpit, enabling the helmsman to drop the board if need be. On busy canals, however, he leaves this task to a member of the crew, as the helmsman has enough to do calculating his new course in the midst of other shipping. When handling Dutch-type boats, maneuvers must proceed slowly and inexorably. They have to be anticipated well beforehand. It simply doesn't work to find out, when halfway through a turn, that the new tack will bring you right across the bows of an approaching tow of heavily laden barges.

When cruising, going to windward requires only the attention of the helmsman, but during races, the fokkemaat is on the foredeck, holding the foresheet in his hands with a turn on the block, constantly trimming the sail according to each shift in the strength or direction of the wind. With the wind aft, the foresail is boomed out to windward in the usual manner. When the wind is not too strong, a loosely cut spinnaker or *jager* is then set on the jibboom and boomed out with a longer spar. This sail can also be used when reaching. The clew may reach from the end of the jibboom to well aft of the mast, so gybing may be risky when it occurs unawares.

The leeboards are hoisted up on a broad reach. In PHOENIX it may even pay to pull up the board with the wind on the beam in order to reduce water resistance, but I would not recommend this in a ship with a bottom that is really flat, like a *botter* or a *schouw*. As was mentioned before, the tack of the mainsail can be triced up. This can be especially helpful if the ship carries weather helm when running or reaching in a strong wind.

Other sail-reducing tricks may be attemped during such circumstances: Either the peak may be dropped or the sail may be "scandalized" by letting go the throat halyard; the reef tackle may be set up (without tying in a reef); or the topping lift may be hauled in, spilling wind from the sail. If the wind really starts to blow, the mainsheet must be hauled in to tie in a reef or two. When a double-reefed main and a reefed foresail are still too much, the lowering of the foresail brings great relief. Thus the vessel will hold her own in a force-8 wind, although going about will normally only be accomplished by wearing the ship around. With only the reefed foresail set, the leeboards raised, and the helm lashed to leeward, PHOENIX drifts downwind easily, making an enormous wake to windward. However, a lee shore is never far away in the Netherlands. That is why it is wise to carry an oversize anchor always ready for use.

It appears from several timed passages that PHOENIX's maximum speed is a little over 7 knots. At 7.2 knots, the speed factor (maximum speed divided by the square root of the waterline length) would be 1.4, which most people would not consider her capable of when they first looked her over.

Under her present cruising rig, PHOENIX handles quite well in a force-7 wind, with a double reef in the mainsail and a single reef in the foresail. Racing under these conditions requires a seasoned crew and careful handling of the sheets. Going to windward really becomes exhilarating then, with the mast bending, the lee rail under, and spray flying sky-high. Under these circumstances, it is sometimes easy to forget that you are sailing in a museum piece—especially when you are just inching through a competitor's lee!

Measuring Phoenix

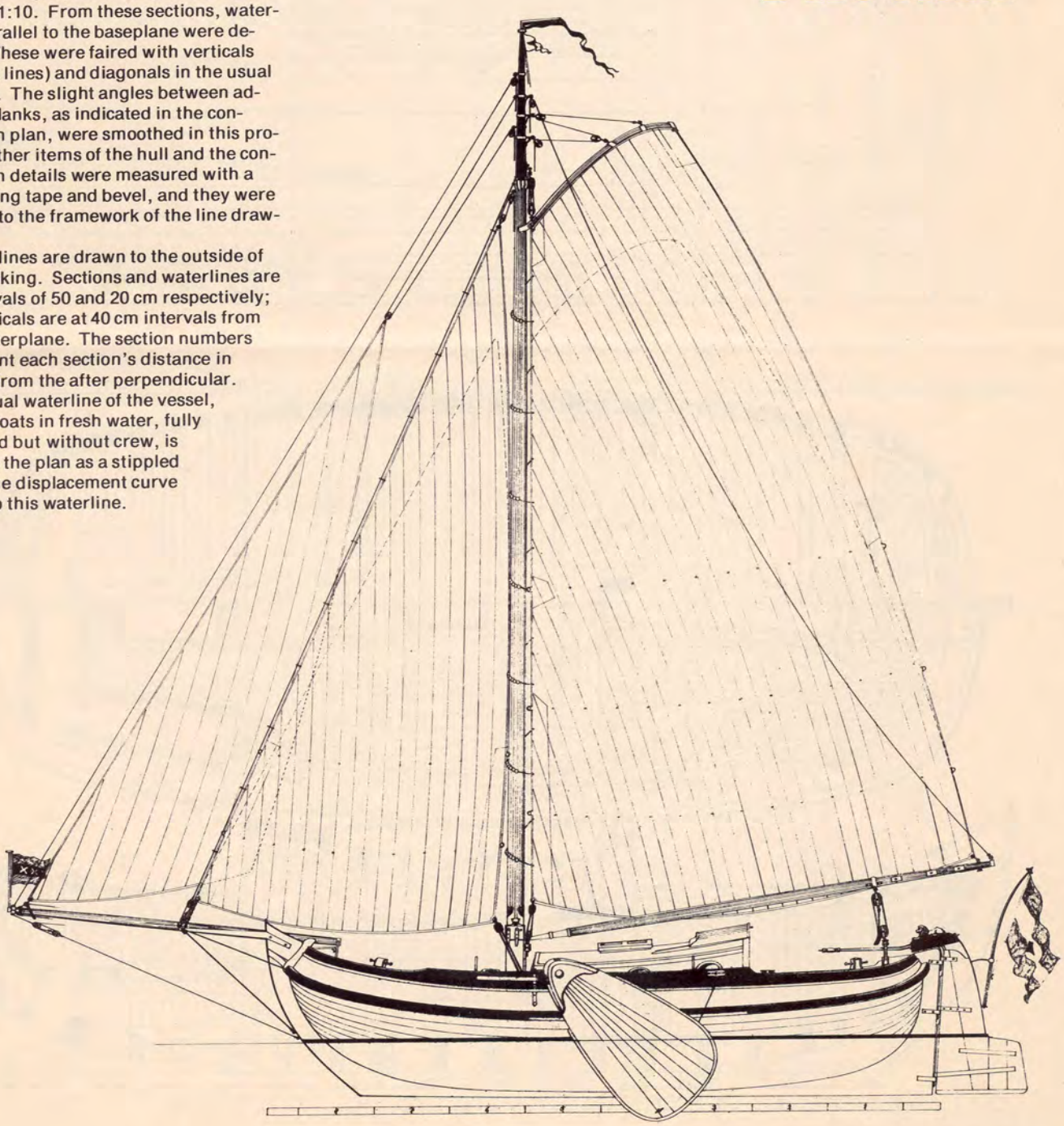
One of the first things I did after acquiring the PHOENIX was to take off her lines. I did this so others could build a new ship from the plans if they so desired and also because in the back of my mind I was thinking about building a model of her. I took off her lines in the winter of 1973-74, when she was hauled out for her first period of restoration, and the resulting plans are reproduced here.

Sections were marked on the keel at intervals of 50 cm, measured from the after perpendicular. Horizontal battens were fixed at these points in the base plane, perpendicular to the centerline. On these battens, distances of 10 cm were marked starting from the centerline. The vertical distances between these points and the outside of the hull planking were measured on the port and starboard sides, averaged, and then plotted on a scale of 1:10. From these sections, waterlines parallel to the baseplane were derived. These were faired with verticals (buttock lines) and diagonals in the usual manner. The slight angles between adjacent planks, as indicated in the construction plan, were smoothed in this process. Other items of the hull and the construction details were measured with a measuring tape and bevel, and they were fitted into the framework of the line drawing.

The lines are drawn to the outside of the planking. Sections and waterlines are at intervals of 50 and 20 cm respectively; the verticals are at 40 cm intervals from the centerplane. The section numbers represent each section's distance in metres from the after perpendicular. The actual waterline of the vessel, as she floats in fresh water, fully equipped but without crew, is given in the plan as a stippled line. The displacement curve refers to this waterline.

Length between perpendiculars	8.96m	29'5"
Length, waterline	7.70m	25'3"
Beam		
(outside planking below wale)	3.50m	11'5¾"
(greatest)	3.76m	12'4"
Displacement		
(without crew)	7700kg	16975 lbs.
Sail area		
(cruising rig)	54m2	581 sq.ft.
(original rig)	68.0 m2	732 sq.ft.
(mainsail)	38.8m2	417 sq. ft.
(foresail)	18.6m2	200 sq.ft.
(jib)	10.6m2	114 sq.ft.
Height mast head above waterline		
(cruising rig)	11.8m	38'8½"
(original rig)	13.50m	44'3½"
Total length of mast		
(original rig)	13.78m	45'2½"
Height above waterline, mast lowered	2.30m	7'6"

The sail plan, drawn on a scale of 1:20, was derived from an original draft of a boeier of 9 metres length from the old yard of Bernhard. The placement of the mast and the lengths of the boom and gaff correspond exactly with those of PHOENIX, although the present mast is 1.5 m (about 5 feet) shorter than the original one. I am sure that this draft represents the PHOENIX as originally rigged. The present "cruising" rig is indicated in the plan as a stippled line.



Details

The traditional model of the working sailing ships of the Netherlands is broad and shallow, with full ends. Surprisingly enough, this model was the result of the search for speed. The great beam was necessary to obtain stability to carry a large rig, which also had to be lofty to catch the wind on rivers and canals lined with trees and buildings. The draft was limited by the shallowness of inland waterways and offshore tidal flats. Length and beam were also limited by the extensive system of locks in the Netherlands.

To obtain the displacement needed to carry maximum load, the bow and the stern were built with very full lines. Ease of handling was an additional requirement born from the economic necessity of having a small crew. It is interesting to study the various ship types of the Netherlands and note how the complex requirements were provided for in practice. To me it is evident that, given the building material existing at the time these craft were developed, modern nautical theory could not have come up with better solutions.

The lines of the PHOENIX show the characteristics of the boeier in the latest stage of its natural development and are based exclusively on tradition and the lessons taught by practice. Nautical theory, hydrodynamics, strength calculations, and the like, although at the time already highly advanced in big shipbuilding, were not applied. Most boeiers were in fact built without a model or molds, the frames being set up and faired by eye. It is said of Nicolaas Bernhard that he was the first boeier builder to make drafts of his projects.

The lines show a hull of extreme width in relation to depth and length. The great beam is carried forward and aft well into the ends of the vessel, so the upper planks of the sides converge at the stem and the sternpost at an angle of nearly 90 degrees. A heavy *berghout*, or wale, makes the sheer and is the line of extreme width of the hull. Below the wale, the hull shape quickly loses its stubbiness, as can be seen in the easy-flowing curves of the buttock lines. The displacement curve (projected jointly with the diagonals) is especially instructive in this respect: It shows a remarkably fine entry and a smooth run aft. As can be imagined from the lines, the fullness of the ends above the waterline results in an enormous increase in stability when the hull is heeling.

The S-shape of the frames near the keel is a refinement of the hull model introduced in the boeier during the latest stage of its development. Undoubtedly it eases the flow of the water and increases windward ability. However, it also increases the draft by some eight inches. In my view this indicates that at the time when the latest boeiers were built, draft was not felt to be as crucial a constraint as it was earlier, when mechanical dredging of the waterways was still unknown.

The great amount of external deadwood at the base of stem and sternpost is another typical feature meant to increase lateral resistance. In fact, PHOENIX is not as extreme in this respect as other yachts of her type, where the forward end of the keel is carried forward for some distance outside the curve of the stem. Modern research into the sailing qualities of the Dutch-type yacht has confirmed that this *loefbijter* (literally, luff-biter) considerably improves windward performance.

All major construction features are given in the plans, therefore the following remarks may suffice: The keel is an oak beam, 10 cm (4″) thick, about 14 cm (5½″) wide and 7.20m (23′7″) long, extending 8 cm (3⅛″) outside the rabbet at the main section (no.5). It is fastened to the deadwood, stem, and sternpost with semicircular bands of wrought iron, which are sunk into the wood and fastened with iron rivets. This is a very old method of fastening timbers and can be seen in antique ship models. The keel, stem, and stern pieces taper out to a thickness of about three inches.

The hull planking and the boeisel are of oak, 30mm (about 1¼″) thick. The frames and floor timbers are sawn from crooks of 8 and 10 cm (3⅛″ and 4″) oak. The heads of the frames are either bolted to the wale or are continued to the underside of the deck. The space between the frames (in general about 35cm or 1′ 2″) is occupied by intermediate frames, which are not connected to the keel. Below the waterline the frames and floor timbers are connected with treenails to the planks; the floor timbers are bolted to the keel with long iron drift bolts. The deckbeams are supported by a wide clamp, which is bolted to the heads of the frames. The clamp is interrupted by the heavy hanging knees that support the mast thwart. The *boeisel* or upper planking consists of a wide plank, which is doubled above the deck. The deck planking, the cabin trunk, and the roof are teak, which is a departure from the traditional oak, indicating that when the vessel was built, money was no constraint. The sides of the cabin trunk are shaped from massive teak logs of at least 10 by 50 by 300 cm (4″x20″x10′).

The mast is stepped in a tabernacle, where it can pivot on a bolt for lowering. It is counterbalanced by a weight consisting of a number of 1″ steel plates bolted to the mast heel. A long hatch in the foredeck called the *uitwip* allows this weight to swing upward when the mast is lowered. This system, invented early in the eighteenth century, makes the lowering of the massive 9″ spar child's play. The mast was originally unstayed. It is made of a type of fir that was formely imported from the Baltic port of Riga. Nowadays, this tough and flexible wood cannot be obtained, and new masts are therefore usually made with laminated spruce planks. Such laminated masts cannot be bent without starting the glue seams, so shrouds and stays have become indispensable.

It is clear that the lofty rig combined with the great stiffness of the hull puts enormous strains on the mast step. Its construction is therefore a marvel of solidity. The tabernacle consists of oak planks of 9 x 23 cm (3½"x9"), the lower ends of which are let into a step that is bolted to three floor timbers. Lateral support is provided by a thwart 10 by 60 cm (4"x23½") running across the full width of the vessel. This plank is connected to the heads of a set of closely spaced frames with two pairs or heavy hanging knees (one pair is made of wrought iron). The thwart was originally a massive oak timber, but to avoid dismantling the deck and the forward part of the cabin trunk during restoration, it was replaced by an assembly of six 4"x4" oak beams bolted together.

The leeboards or *zwaarden* are 5 cm (2") thick. They are built of edge-bolted oak planks. The outer surface is flat; the edges on the inner side are rounded. Around the edges a wrought iron stave of triangular section is fastened with galvanized iron nails. The boards pivot around a bolt let in the head piece. This bolt carries an eye at its inboard end which fits over a hook that is connected to an iron bar bolted to the deck. The position of the leeboard can be adjusted by moving the hook fore and aft along the bar. As can be seen in the drawing, the whole leeboard is free to swing outward from the side of the ship. When sailing close-hauled, the board on the lee side is lowered. As it is parallel to the tumblehome of the boeisel, its position in the water becomes practically vertical when the vessel heels, thereby increasing the board's depth and efficiency. The leeward component of the ship's movement presses the board against a rubbing strake fitted to the underside of the wale. The outer edge of this strake is not quite parallel to the ship's centerline, but toed in slightly toward the bow. This improves the effectiveness of the leeboard by increasing the hydrodynamic lift.

The cockpit is watertight; the sole slopes aft, where a pair of lead scuppers can drain out the water. The companionway is covered by a teak sliding hatch that conforms in shape very neatly with the smooth, S-shaped curve of the after part of the cabin roof.

The rudder is 6 cm (2¼") thick. Below the waterline this thickness is reduced aft to 3 cm (1⅛"). A wrought iron tiller is let into the head of the rudder. The tiller's section measures 45 by 45 mm (1¾" square), with beveled corners. It tapers forward to 30 mm (1⅛"), where a wooden hand grip is fitted to it with brass rings. A traditional gilded wooden lion ornaments the rudderhead.

PHOENIX's interior arrangement was not original when I bought her. It appears that formerly a cooking galley with a coal stove was fitted in the forward part of the fo'c's'le. At present there are two sofa bunks in the main cabin, an enclosed head on the after starboard side next to the companionway, and a galley with butane stove and sink on the opposite side. In the fo'c's'le there are two fore-and-aft bunks and one athwartships bunk. The great beam makes the accommodation very spacious, although the headroom, especially forward, is rather low. The interior woodwork is mostly teak and mahogany, all varnished except for the cabin roof and the underside of the deck, which are painted white.

Outside, the wood is all varnished with the exception of the following: Two wooden moldings fitted to the boeisel and following the sheer, are painted white. The upper part of the boeisel is black. The berghout, or wale, is also black except for a pair of parallel lengthwise grooves, which are white. The rudderhead is black. The Friesian boeiers are brighter in appearance, with red or green stripes, and gilded scrolls offsetting the raised central part of the boeisel, and gilded stars ornamenting the hawse holes. All of these color schemes and ornamentations are strictly traditional and may not be modified at will, if you wish your craft to remain authentic. There is much brasswork that has to be polished constantly. In the old days the iron fittings, such as the tiller and sheet horses, were rubbed down every day with water and sand until the metal shone like silver. Nowadays, paid hands being extinct, the iron is painted with aluminum paint.

Sometime in her career PHOENIX was fitted with an engine. The existing Gray Marine 4-cylinger gasoline engine was probably fitted shortly after World War II. It is bolted down on two fore-and-aft engine beds fixed to three floor timbers below the cockpit sole, as indicated in the drawings. An ugly hole, not shown in the drawings, is cut in the sternpost, and the leading edge of the rudder houses the propeller. There is a 50-liter copper fuel tank in the space below the tiny after deck, which seems to have been created for this purpose. Two 100-liter water tanks are fitted below the cockpit sole alongside the engine.

As compared with modern yachts, the rig of a boeier has several peculiarities, some of which may seem truly atavistic. A closer look, however, will reveal that the overall scheme reflects simplicity, strength, and ease of handling. Although new materials have nowadays been adopted in the rigging of traditional boats, boeier sails are still cut in the antique manner with a full belly, panels parallel to the leech, and a loose foot. The curved gaff of the mainsail is another typical feature. The reason for this shape is not purely one of aesthetics, as is commonly thought, but essentially one of practicality: The sail was originally made of flax, which stretches a lot when new. If such a sail, with its full, round cut, were laced to a straight spar, stretching would produce pronounced wrinkles at the throat and peak.

The tack of the jib is set up on a short iron bowsprit, called the *botteloef*, bolted to the stemhead and stayed with iron straps to the wales. A wooden jibboom can be carried alongside the botteloef, and a jib is set flying on it. Before entering a lock or a busy harbor, this boom is topped up with a topping lift to the masthead. As the boom's heel is set up on a removable fitting, it is easy to unship the boom completely. The forestay—originally a wrought iron bar, nowadays more likely a steel wire—is set up on the botteloef with a three-sheave luff tackle. The foresail is sheeted to an iron horse crossing the foredeck just forward of the mast. Thus, the foresheet does not have to be reset after going about. The loose-footed mainsail is fitted to the mast with short lengths of rope and wooden parrels called *kloten*. The tack is set up with a four-sheave (one double and two single blocks) tackle, which is slackened when reaching in order to give a nice belly to the sail. The clew can be "catted up" with a light tackle alongside the mast, which is a quick and easy way to reduce sail area. The boom can be topped by means of a topping lift or *dirk* which leads via a masthead block to a tackle set up on the tabernacle. As the masthead block is higher than the main halyard blocks, the sail can be hoisted on either side of the dirk. The absence of backstays and aft-leading shrouds makes the setting and lowering of the sail easy, even when the wind is aft.

The top of the mast is adorned with a permanent pennant, a five-inch red or blue ribbon, serving as a wind indicator. It can be from five to ten feet long, and is boomed out with a small stick revolving on a pin in the masthead. The national flag is flown from a flagstaff on the rudder. Don't ask a Dutchman why this stick is curved! He could only say that a straight pole would look simply awful. A small regional flag is often carried on the tip of the jibboom. In the sail plan I drew the flag of Amsterdam to honor the hometown of both PHOENIX and her owner.