STUDIES IN PRIMITIVE LOOMS.

By H. Ling Roth.

Part III.

6. Indonesian Looms.

The Indonesian loom belongs to the Pacific type of loom, two forms of which, the American and Ainu, have already been described in Part I. There appear to be three forms of loom in Indonesia, taking the area in a wide sense. They are the Dusun and Iban (Sea Dyak) loom, the Ilanun and Igorot transition loom, and the Cambodia and Malay loom. They all merge more or less into one another, and are therefore to be taken rather as various stages in the development of the loom than as perfectly distinct forms.

The following table gives dimensions and capacity of five such looms examined by me :—

Name of Tribe from whom obtained.	Museum where now placed.	Length, Beam to Beam, inclusive.		Width of Web.		No. of Warp per—		No. of Picks per—		Back Strap.	Material.	Heddle Leashes, continuous.	Repeat of Lay of Warp.	Form of Weft Carrier.
		In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.					
Dusun	British...	$26\frac{1}{2}$	67	12	30.5	38	15	28	11	Coarse cloth	Cotton	Spiral ...	Twos ...	Ab 1.
Iban ...	„ ...	$10\frac{9}{16}$	27	$11\frac{1}{8}$	28	110	43.4	37	14.7	Raw hide	„	„ ...	„ ...	Missing.
„ ...	Horniman	$23\frac{1}{2}$	60	$9\frac{11}{16}$	24.5	—	—	17	6.6	Rotan mat	„	„ ...	Sixes ...	Ab 1.
„ ...	Liverpool	30	76	$6\frac{1}{2}$	16.5	118	74	40	16	Missing	Silk ...	Alternate over-lapping	Eights...	Missing.
„ ...	Royal Soottish	$22\frac{1}{2}$	57	$5\frac{1}{4}$	13.3	—	—	—	—	„	„	„	Twenties	Ba.

The most primitive of these is the Dusun and Iban loom (Figs. 122 and 123). It consists of a warp beam attached to two upright posts, a breast beam attached to a back strap, several laze rods, a shed stick, one "single" heddle, a beater-in, a temple, and a spool. The warp is continuous, and the weaver sits on the floor. The breast beam is almost in the weaver's lap, whence the warp rises at an angle of about 35° up towards the warp beam (Fig. 123). As there is only a "single" heddle there are no treadles, nor does there appear to be any special loom frame, and the loom can be set up wherever there are a couple of suitable posts and a

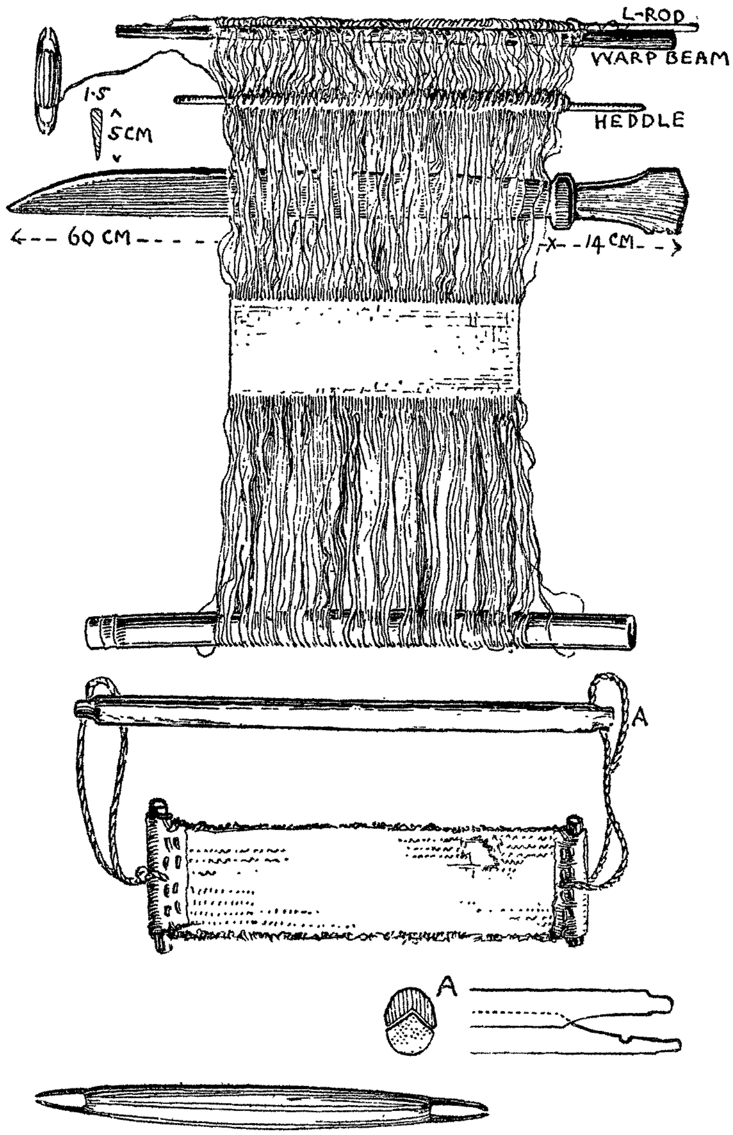


FIG. 122. DUSUN LOOM, BORNEO. BRIT. MUS.

suitable floor or platform. According to Hose and McDougall,[1] "The weaving is done only by the women, though the men make the machinery employed by them."

[1] *The Pagan Tribes of Borneo*, Lond., 1912, I, p, 221.

FIG. 123
IBAN (SEA-DYAK) WOMAN
WEAVING FROM HOSE & McDOUGALL'S
"PAGAN TRIBES OF BORNEO,"
LONDON. 1912. I, PL. 121.

Most of the webs commence with two heading rods. The Horniman Museum specimen has an extra rod over and parallel with the heddle rod (Fig. 124), evidently to be used as a handle or raiser. In most of the looms the warp and weft are both double ("sisters"). The British Museum specimen is provided with a temple[1]

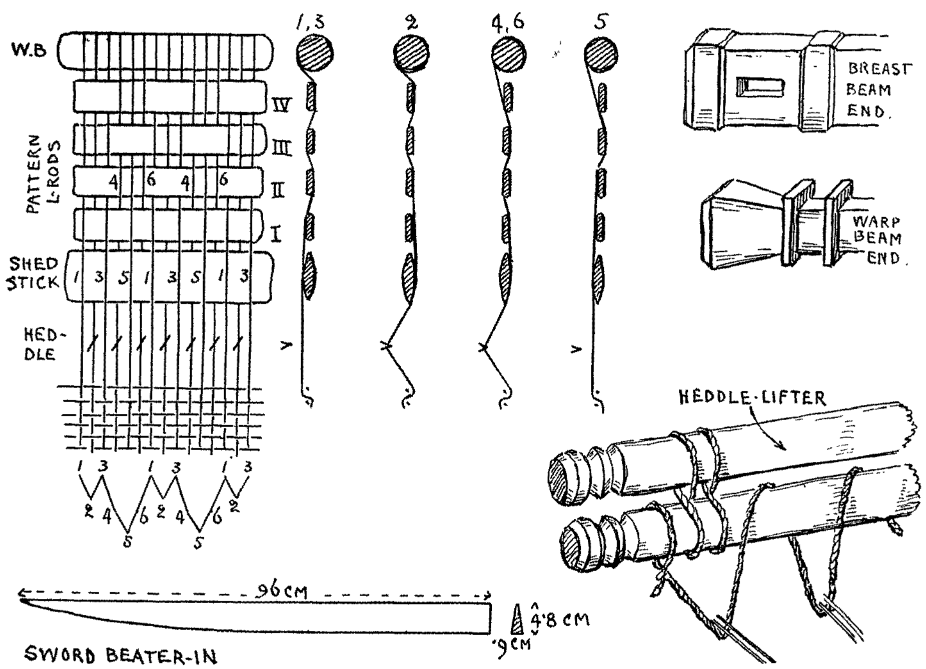


FIG. 124 IBAN LOOM & DETAILS. HORNIMAN MUSEUM

and has two warp beams; it has an insignificant brocade pattern woven-in on the wrong side, as well as a warp pattern scheme extending the whole width of the cloth, thus :—

Selvedge. mm.	Red ...57	L. blue 4	Yellow... 4.5	Gr. yell. 5	Dk. blue ... 2.5
Dark blue ... 2.5	Gr. yell. 3.5	Yellow... 4.5	L. blue 6	Red ...59	Selvedge
Light blue ... 2.5	Yellow... 4.5	Gr. yell. 3.5	Dk. blue 14	Gr. yel. 3.5	Total, 277 mm.
Yellow ... 2.5	L. blue 4	Red ...58	L. blue 6	Yellow... 2.5	(= 105 ins.)
Green-yellow 3.5	Dk. blue 14	Gr. yell. 3.5	Yellow... 4	L. blue 2.5	

The coloured warp is a characteristic of these looms. In the specimen in the Liverpool Museum the figured pattern is woven-in similarly on the wrong side and follows the laying of the warp, which repeats in eights as shown in Fig. 125, nearest to where the work has been left unfinished. There is another figure pattern further away (not shown), which does not agree with this warp-laying. The warp at the

[1] A loom from Sermata Island, between Timor and Timor-laut, in the British Museum, is provided with a similar temple but quite flat, 12 mm. broad and 4 mm. depth of point.

selvedge begins with red and follows on with blue and white, then red in the centre for a width of 14.5 cm. (5¾ inches), and then white, blue, yellow and red to the opposite selvedge. The weft is gold, blue, white, and green yarn.

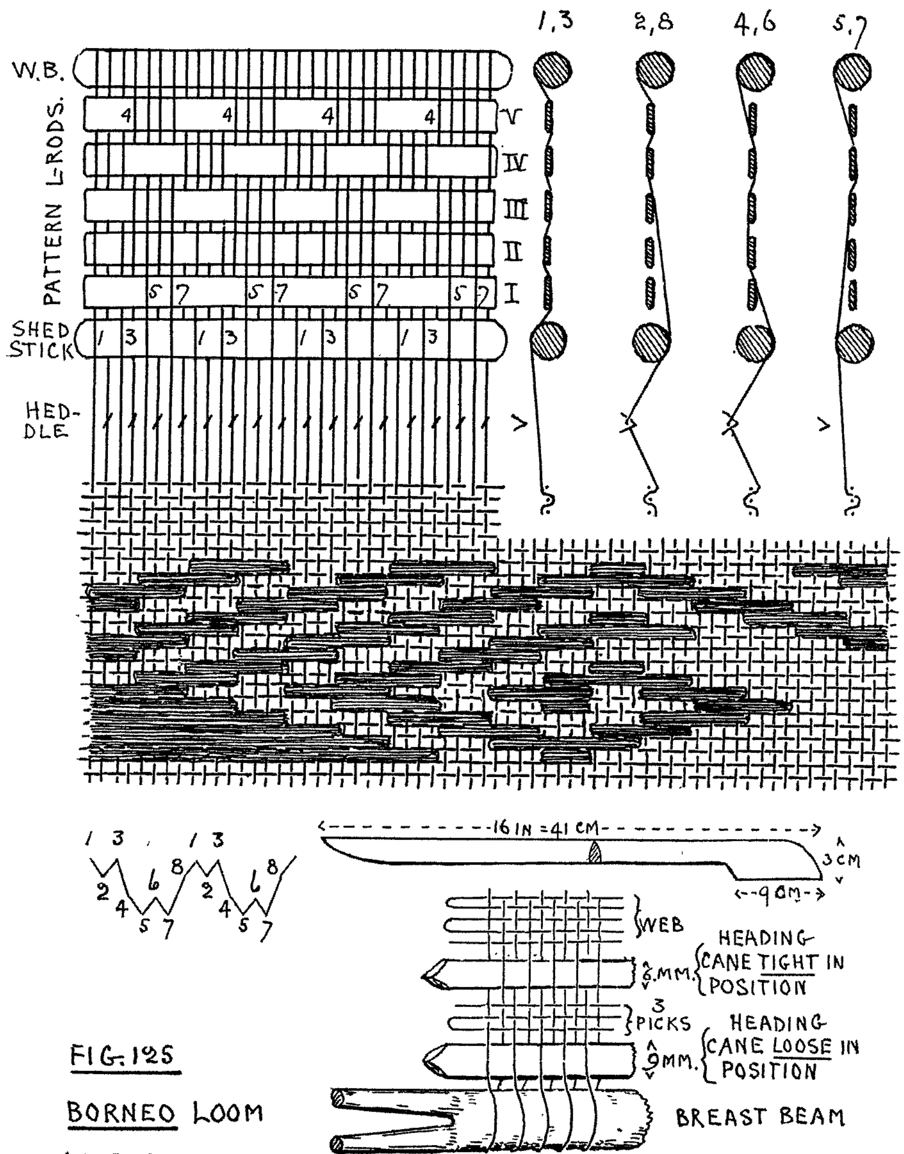


FIG. 125

BORNEO LOOM

LIVERPOOL MUS.

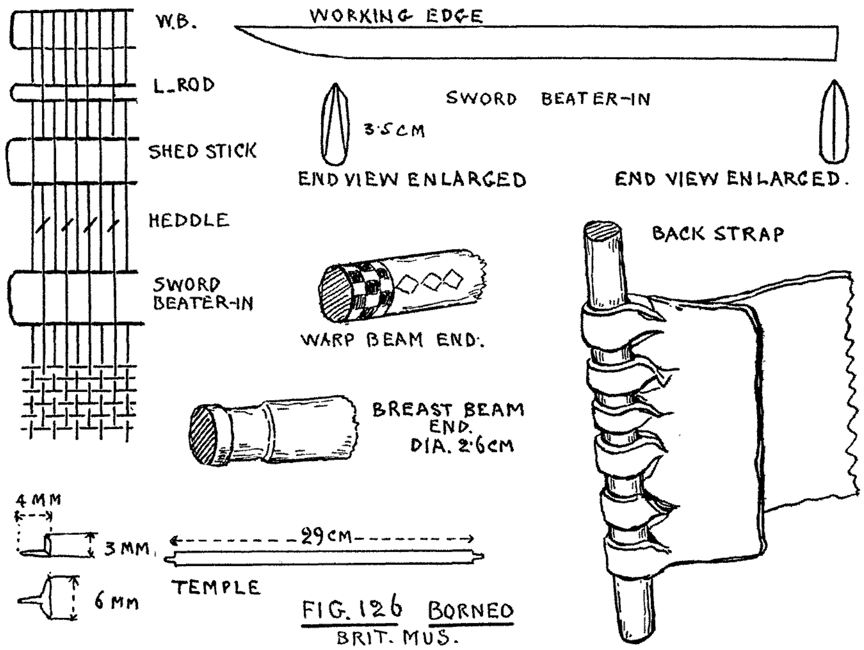


FIG. 126 BORNEO
BRIT. MUS.

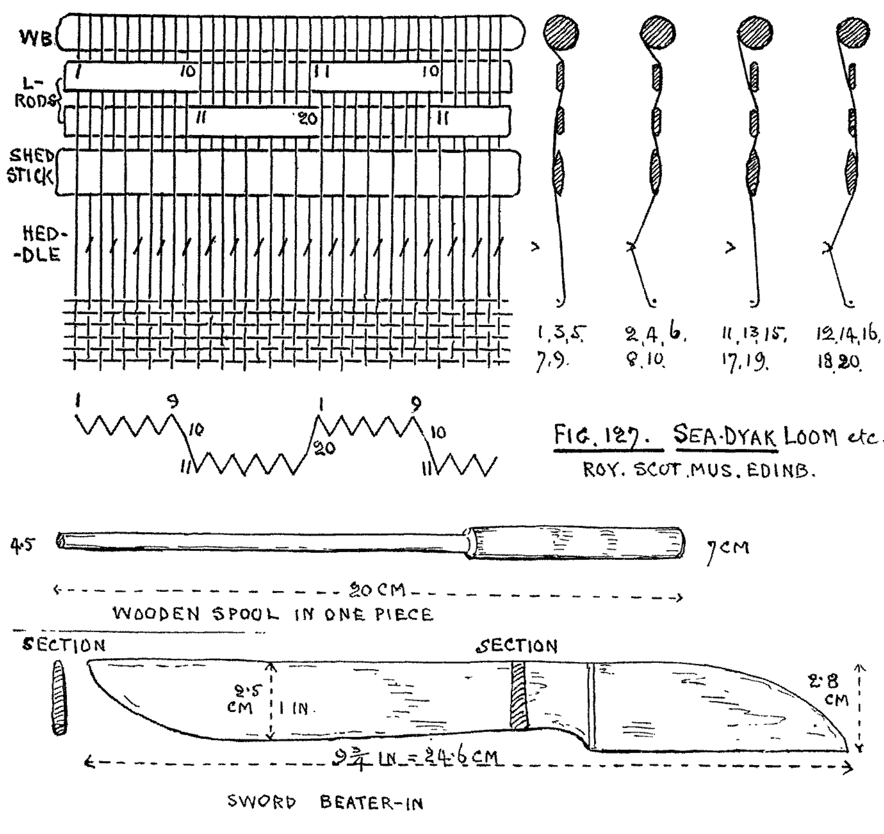


FIG. 127. SEA-DYAK LOOM etc.
ROY. SCOT. MUS. EDINB.

A similar loom (Fig. 125A) is found in Sumatra, whence H. O. Forbes brought one from Moeara Doea in 1873, now in the British Museum. The particulars are :

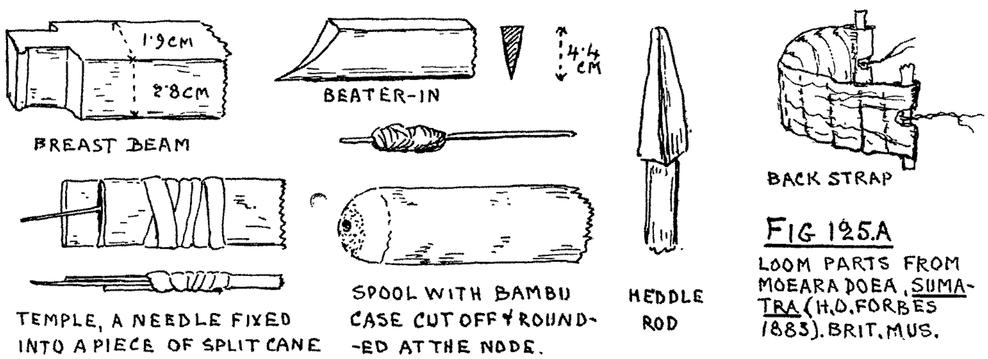


FIG 125.A
LOOM PARTS FROM MOEARA DOEA, SUMATRA (H.O. FORBES 1883). BRIT. MUS.

length, beam to beam inclusive, 32½ inches (or 82.5 cm.); width of web, 17 inches (or 43 cm.); 136 warp to the inch (or 53.5 to the cm.); 32 picks to the inch (or 12.6 to the cm.). Warp and weft twisted; leashes continuous, alternate, overlapping. Breast beam rectangular in section; warp beam of wood 1¾ inches (or 4.5 cm.) in diameter. There is no reed. The temple consists of a flat piece of cane with needle inserted in a split at both ends, and reminds one of the similar American tool (Figs. 36 and 37.) The warp is coloured in bands of red, yellow, and blue, a further pattern on blue ground being made in the centre, 4¾ by 5 inches (or 12 by 12.7 cm.), by means of white, red, crimson, and yellow yarns, the ends of which are cut off on the surface when done with. There are two heddles, one for the general weave and one for making the border. The back strap is composed of a piece of bark, 15 by 5 inches (or 38 by 12.7 cm.), padded on the inside by cotton wool sewn into a bag of coarse cotton. The ends of the strap are strengthened by pieces of cane to which the beam ends are attached.

This form of loom is also found in the Philippine Islands, among the Ifugaos, Tingiaus, etc.,[1] in Assam, in parts of Burma among the Karens, and also in Tibet, but somewhat modified. Hose and McDougall[2] tell us as regards Borneo that weaving "is the only craft in which Ibans [Sea Dyaks] excel all other peoples," although my necessarily more limited experience leads me to the conclusion that Ilanun weaving far excels that of the Iban. Hose and McDougall continue: "Their methods [*i.e.*, those of the Iban] are similar to those of the Malay and have probably been learnt from them." Here, too, I must differ, for as we shall see directly, the loom used by the Malays proper is a more advanced article than that used by the Ibans, and if the Ibans had learnt from the Malays I think we are more likely to have found among them an imperfect or

[1] See Worcester, *Philippine Jour. Sci.*, I, No. 8.
[2] *Op cit.*, I, p. 220.

degenerate form of loom, rather than a more primitive one than that used by the Malays. In the same way that the house building of the Kenyahs, and the padi cultivation of the Klemantans, are both inferior to these arts as practised by the Kayans, from whom the Kenyahs and Klemantans are thought to have learnt the arts.[1] The Ibans probably brought their loom with them from Sumatra. The Dusuns are probably of Philippine origin, and hence the survival of this primitive loom amongst them. They possess a considerable amount of Chinese blood, and from this one would be inclined to think they might have adopted an improved method of weaving, in the same way as they have improved their cultivation by adopting the plough. But the Chinese who settled among them probably took Dusun wives to themselves, and as weaving is women's work in these parts, and there were no Chinese women to show them better, the primitive loom has survived; and as a corollary, but as a side issue here, ploughing being men's work the Dusun were taught by the Chinese men how to plough, and that tool has been retained.

An observation of T. Chapman, quoted by me,[2] runs as follows: "At present there are only two kinds of looms: the *tumpoh*, at which the weaver sits on the floor and uses his hands only; and the *tenjak*, at which the weaver sits on a bench and uses hands and feet, the latter working the treadles. The cloths are much better and closer woven on the *tumpoh* looms. Both looms are picturesquely clumsy and the work slow." Here Chapman is referring to the Iban loom and to the Malay loom, which, as he indicates, show wide divergence from each other. The Iban may, no doubt, have learnt from the Malay in occasionally adopting the latter's loom, and to say that what they know of weaving they have learnt from the Malay can only refer to what they have learnt of weaving *on* Malay looms, while the superior work produced on their own looms shows they are not yet conversant with the methods of the later intruder.

The Bhotiyas loom, Darjeeling (Fig. 128), shows some advance on the Iban and Dusun loom in being provided with three single heddles instead of one. Apart from this and the heavy composite beater-in, it is similar to the Borneo specimens, but is also provided with a cloth beam, or second warp beam, according to one's point of view. The warp, which is spun wool, is only partly continuous and is arranged as follows: No. 1 warp starting from the cloth- or No. 2 warp-beam, goes its round over the breast beam across the three heddles, three shed sticks, laze-red and warp beam until it reaches the second warp beam from the opposite direction, when it starts the return journey, getting back as No. 4 warp. The same laying holds good for No. 2 warp, which returns as No. 3. The length of the loom, *i.e.*, breast beam to first warp beam inclusive, is 9 feet 10 inches (or 3 m.), and the width of the cloth is 17 inches (or 43 cm.). The shed sticks are bevel-edged, about

[1] Hose and McDougall, II, p. 244.
[2] *Natives of Sarawak*, II, p. 30.

1½ inches (or 3.8 cm.) wide and 27 inches (or 69 cm.) long, the middle one being slightly curved like a boomerang. The laze rod consists of a piece of cane about ½ inch (or 12.7 mm.) in diameter, round which every warp is wound once

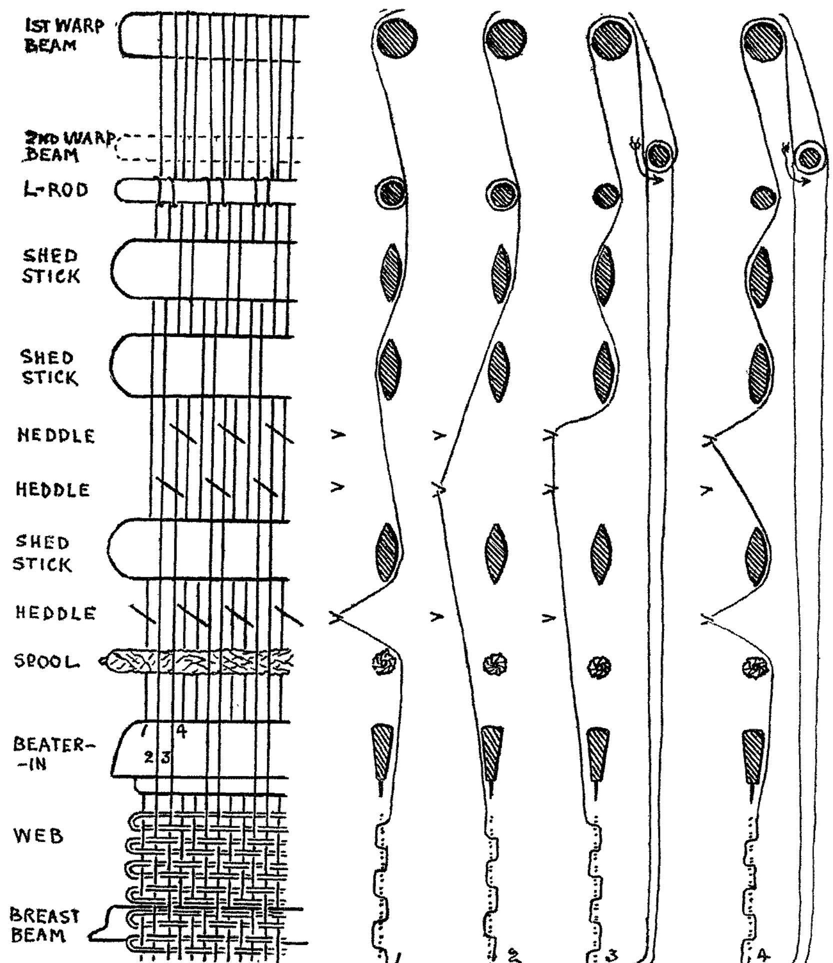


FIG. 128. BHOTIYA (INDIAN) LOOM BANKFIELD MUSEUM.

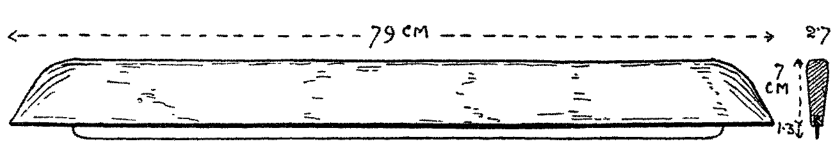


FIG. 129. BHOTIYA SWORD BEATER-IN. BANKFIELD MUSEUM

so that the rod can be rolled backwards and forwards, and still keep the threads in position. There are three spools of the Aa form about ⅜ inch (or 9.5 mm.) in diam. and 24 inches (or 61 cm.) long, and when completely filled the ends are likewise covered.[1] The weft is double ("sisters") and the warp is single. The heddle leashes, which are spiral, naturally require to raise two warp threads in every leash to make the pattern. The beater-in (Fig. 129) consists of a heavy piece of wood 31 inches (or 79 cm.) long by 3¼ inches (or 8.2 cm.) wide, very thick at the back and tapering to the front, where it is provided with a piece of wrought iron (*not* hoop iron), let in lengthwise and protruding about ½ inch (or 12.7 mm.) beyond the wood. This blade, like the back itself, is wedge-shaped in section. The heaviness of this tool may be necessary as a very coarse wool has to be beaten in. The edge of the iron, the back of the beater-in, and both edges of all three shed sticks, are deeply serrated from friction in the working. The temple is cut out of a thin strip of cane shouldered and pointed at both ends.

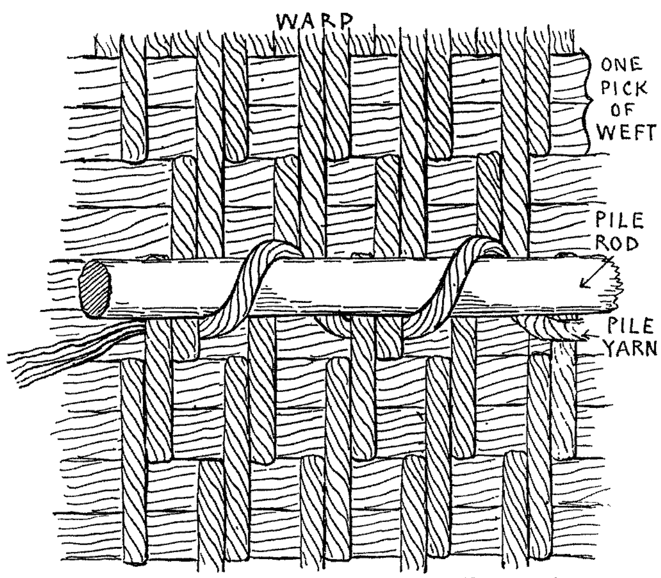


FIG. 130. PILE MAKING ARRANGEMENT ON A BHOTIYA (INDIAN) LOOM. BANKFIELD MUSEUM

Another Bhotiya loom, which I saw at work at the Coronation Exhibition in London in 1910, is now likewise in Bankfield Museum, and is fitted up for making rugs or pile cloth. It is provided with a ball of weft instead of a spool of weft. In other respects the two looms are similar. The length from beam to beam inclusive was about 18 feet (about 5.5 m.), with continuous warp, and the angle of rise of the warp from the weaver was somewhat under 30°. The method of inserting the pile is shown in Fig. 130. It may be likened to that of a heddle with very thick three-ply leashes, which gets overtaken by the weaving and is left two picks behind, after which the rod is withdrawn and the upstanding loops cut along the whole length,

[1] A like form of spool is found on the Sermata loom already mentioned. Note, p. 326.

with a resultant pile. The rug on this loom was about 3 feet (or 1 m.) long, and several are made at intervals on one warp laying and beaming. When I pur-

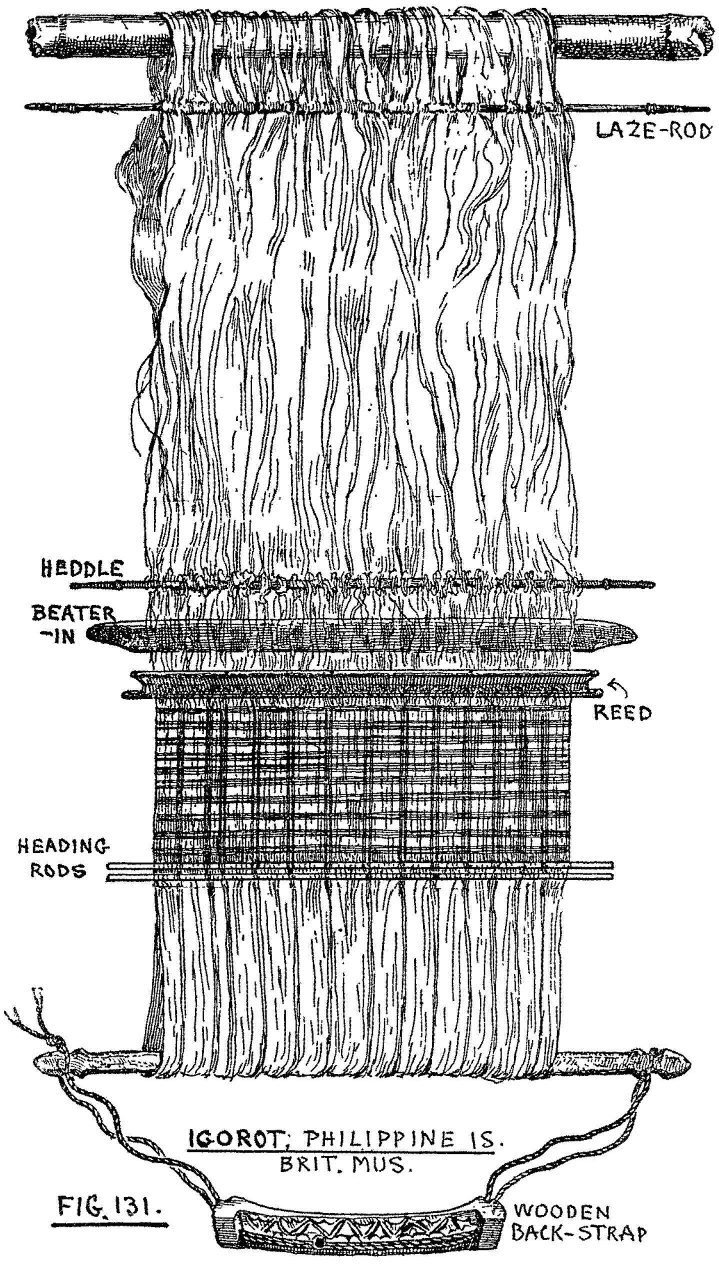


FIG. 131.

chased this specimen the heavy beater-in was not included in the sale, as I was told it was an heirloom without which the weaveress could not work, and a replica was of no use to her as it did not and could not possess the qualities of the original. I had to content myself with the replica, and concluded it to be a case of weavers' ritual.

The Bhotiya loom is evidently the same as that described by Moorcroft and Trebeck as being in use among the Northern Ladakis.[1] The Igorot and Ilanun looms are a step in advance of the Iban and Dusun and Bhotiya looms in so far that they possess reeds.

An Igorot loom in the British Museum, obtained from Mount Isarog, Luzon, by Jagor (see Fig. 131), consists of a breast beam, two heading rods, one "single" heddle, a beater-in, two laze rods, a warp beam, four spools, and a wooden back strap or yoke. Length from beam to beam inclusive 42 inches (or 1.07 m.); width of web 15 inches (or 38 cm.). The warp, which is continuous, consists of a fine non-spun fibre (? *musa*), and so does the weft. There are 62 picks to the inch (or 24.4 to the cm.), and 28 warp (sisters) to the inch (or 11 to the cm.) In the web there is a wider space between every two warp threads than between every two picks, the picks being all equidistant. As in the Bhotiya and Ilanun looms the warp is wound round one of the laze rods (see Figs. 128 and 134). The pattern, an Oxford shirting design, is obtained by means of dark blue warp and weft at regular intervals. The spools are thin pieces of cane of varying lengths, viz., 38.5, 42.5, 44.5 and 52 cm. long respectively, that is to say they extend for the full width of the web and over; three of them have form Ab1 and one approximating form Ab3. The heddle rod and laze rod ends are curiously pointed, like a round spear head. The heddle leashes are continuous, alternate, overlapping, and consist of strong doubled fibre.

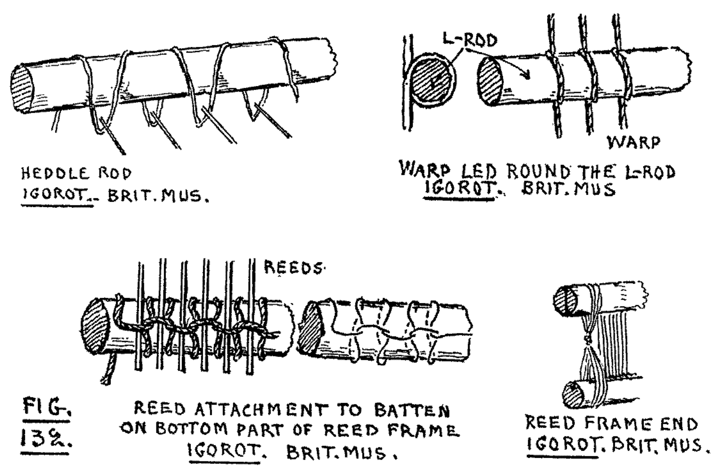


FIG. 132.

The reed frame consists of two pieces of cane—a top piece and a bottom piece; the teeth are of fine cane whose ends fit into a groove in the bottom piece, where

[1] *Travels in the Himalayan Provinces of Hindustan* . . . 1819–1825, London, 1841. ii, pp. 72–74.

they are fastened in position by means of some strongly twisted fibre which passes between every one of them, *i.e.* through the dents, and round one or two slips of cane, placed on either side along the groove. The upper ends of the canes fit loosely *without* any tying up into the upper part of the frame, which has been split in two to receive them.

A loom from Sangir island (Fig. 132A) between Celebes and Mindanao, obtained by the British Museum in 1872 (M. Steller), is similar to the Igorot loom. The

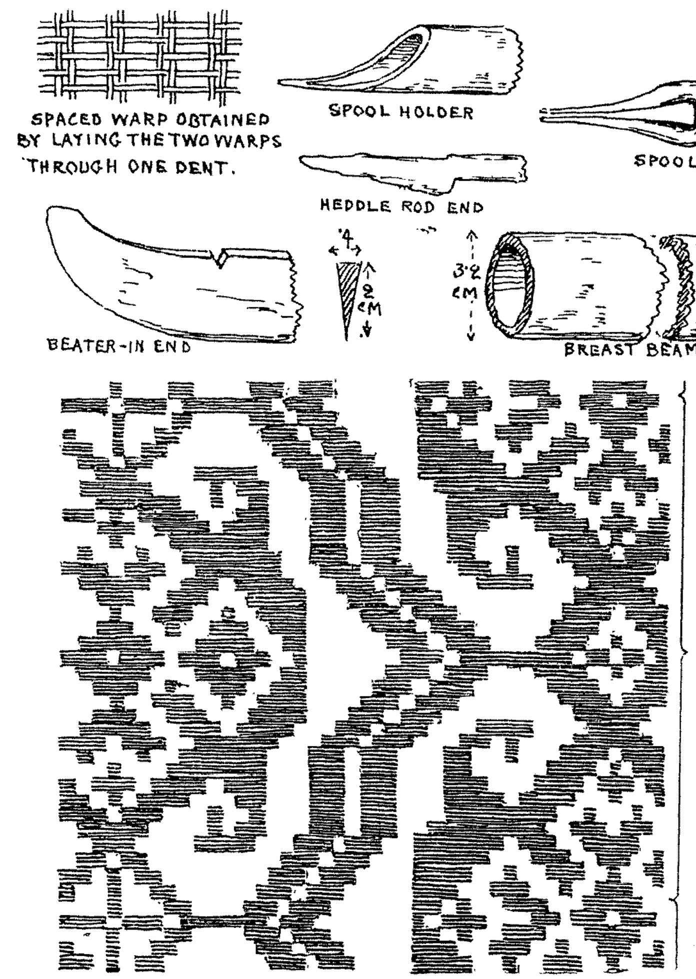


FIG. 132 A
SANGIR ISLAND LOOM PARTS AND PATTERN. BRITISH MUS. (M. STELLER 1872)

particulars are as follow: length, beam to beam inclusive, 27 inches (or 68.5 cm.); width of web, 8¾ inches (or 22 cm.); 42 warp to the inch (or 16.5 to the cm.); 40 picks to the inch (or 15.7 to the cm.). The whole fabric is of non-spun fibre. The warp is made to keep in pairs by passing two of them through one dent. A piece of non-spun plaited fibre about 5 mm. broad appears to have been used as a back strap.

There are two heddles with non-spun, continuous, alternate overlapping leashes. Non-spun leashes are rare. There is an elaborate brocaded pattern woven through the web in broad bands of blue and red alternately, the bands being of varying width of 3½ inches (or 8.9 cm.). Besides the fine small reed fixed top and bottom with fairly stiff canes and quite rigid, there is also a small light beater-in. There are three spools, one each for the red, blue and buff weft, and as in the Ancient Peruvian loom (Fig. 40) and the Okale loom (Plate II) and the Borneo loom (Fig. 125), this loom is provided with pattern laze rods.

The curious fact about these looms is that in addition to the reed they are furnished with a wooden sword beater-in as well.[1] Regarding this coexistence of reed and beater-in on one and the same loom, Meyer and Richter[2] say that "strictly speaking where the loom has been enriched by a reed the beater-in is superfluous, in the same way as our looms possess a reed, but no beater-in. The latter has been retained as a survival in order to give the reed efficient support (*festen Rueckhalt zu geben*) and to serve at the same time as a beater-in as before, which means that the beater-in was partly at least put to a new use." They say also that we must have more definite information as to the local use of the beater-in, on looms provided with a reed, in various parts of the Archipelago before we can adopt a definite conclusion on the point. Failing the advent of such information I offer the following explanation:—The canes of the reed are not fastened to the upper bar of the reed frame (and the same absence of top fastening occurs in the Ilanun loom about to be described) and as a result when hard pressed these canes come away from the top bar, which necessitates the retention of the wooden beater-in with the object of its performing its work as before. But owing to the presence of the reed the beater-in cannot do the whole of the work it did before, and instead of assisting the reed and being thus put to a new use, the reed takes some of its work from the beater-in. When the canes of the reed are fixed top and bottom they have sufficient rigidity to beat-in, and seem then also made stouter, and the wooden beater-in being no longer necessary gets gradually discarded. The coexistence of these two tools on one and the same loom therefore indicates a transition state, in which the primary use of the reed appears to be that of a warp spacer, before the discovery was made that it could be used as a beater-in as well. I do not think the absence of top fastenings on the reed is a sign of decadence, for the reason that the tool is not likely to have come into use full-blown, but by degrees and as a warp spacer form at first.

[1] C. M. Pleyte (*De Inlandsche Nijverheid in West Java*, Batavia, 1912, pl. viii) figures a loom from Zuid-Banten, with both reed and sword (beater-in). The details are not very clear, but if the reed is as flimsy as it looks the surviving presence of the more primitive beater-in is accounted for.

[2] *Webgeraet aus dem Ostindischen Archipele mit besonderer Ruecksicht auf Gorontales in Nord Celebes*, Ethnographische Miszellen, Dresden Museum, ii, No. 6, p. 47.

As a matter of fact, J. A. Loeber[1] says: "In Borneo there is to be found a very primitive form of this reed. It looks like a rake without the handle and betrays its purpose without any doubt." He tells us specimens from South and East Borneo can be seen in the Ethnographical Museum, Leiden, and one from Borneo in the Grassi Museum, Leipzig. He gives an illustration of such a warp spacer which is reproduced in Fig. 133 as nearly as possible, but his illustration is far too minute—

FIG. 133.

WARP SPACER ON A BORNEO LOOM. FROM J.A. LOEBER JR: WEVEN IN NEDERLANDSCH-INDIE. AMSTERDAM. 1903. P.30.

it is only 23 mm. long—for us to do more than to agree that it does represent a warp spacer, and to add that probably several warp threads pass through one dent, instead of every warp thread having a dent to itself. Whether the dents are produced by cutting notches in the stick or by the insertion of pegs is not clear from the illustration, but as Loeber says it looks like a rake, pegs must be inferred.

In the Cambridge Museum of Archæeology and Ethnology there is an Ilanun loom from the Tampassuk district of British North Borneo, brought home in 1915 by Ivor H. N. Evans (Figs. 134, 135 and 136). It consists of breast beam, reed, two "single" heddles, two laze rods, warp beam, back strap, beater-in, and seven spools. Length, beam to beam inclusive, 25 inches (or 64 cm.); width of web, $33\frac{7}{8}$ inches (or 86 cm.); 42 warp to the inch (or 16.5 to the cm.), all single; 42 picks to the inch (or 16.5 to the cm.), all treble ("sisters"). The breast beam is 50 inches (or 1.27 m.) long and more or less square, 4 by 3.8 cm.; the warp beam is 5 cm. square. The heddle rod and leashes are similar to those on the Igorot loom (Fig. 132). One laze rod is 3 cm. in diameter, the other is 1.4 cm. in diameter. The back strap (Fig. 134) consists of a piece of raw hide on the outside; the inside or concave surface is covered with red cotton cloth and this again is covered with a piece of green hide with a pattern cut out of it like fretwork.

There is one large transverse spool and six small spools (Fig. 136) for carrying the embroidery weft in mauve, orange, yellow, red, green, and white. The warp laying repeats itself after every sixth thread. As the embroidery runs for every two and every four threads of warp (equals 6 threads) there is a correspondence between the warp laying and the brocading, from which one may conclude that the laying is intended as a guide to the brocading.

[1] *Het Weven in Nederlandsch-Indie Bull. Kolonial Mus. te Haarlem,* No. 29, December 1903, p. 30.

The reed is similar in principle to the Igorot reed, that is, the canes are not fastened at the top and are very fine, and perhaps on account of their fineness, or to compensate to some extent for their want of top-fastening, or perhaps even as

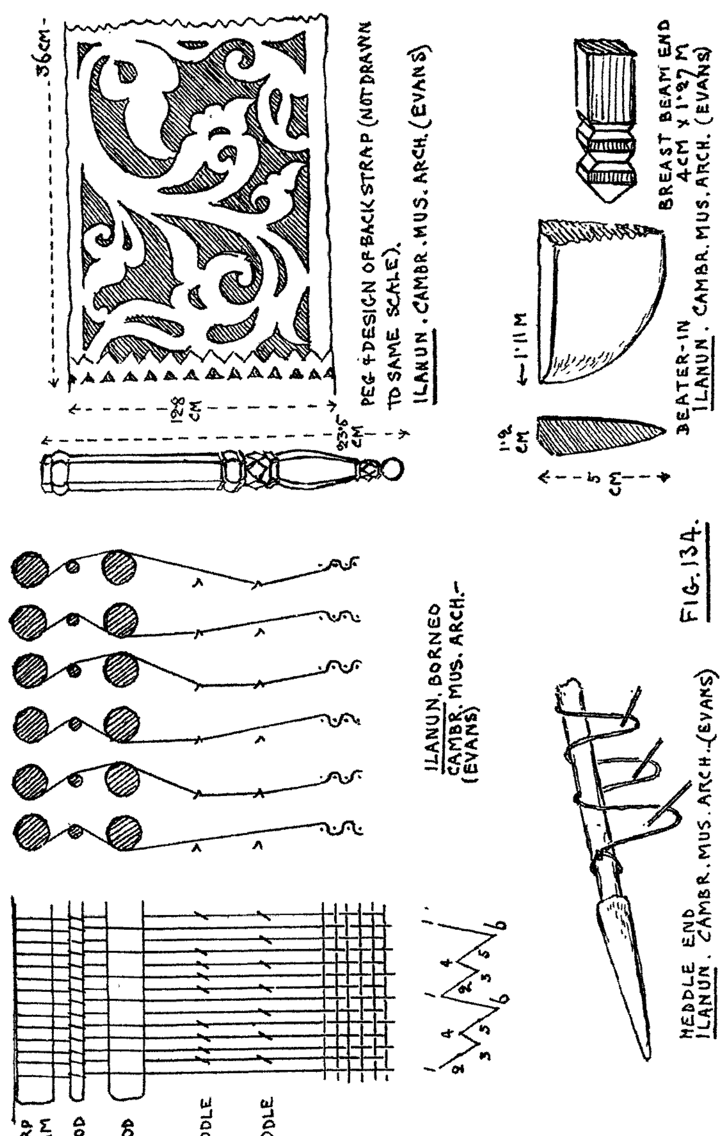


FIG. 134.

a step towards such fastening, the canes are loosely looped together for a distance of 3 cm. at one end and 7 cm. at the other end (Fig. 135). Altogether the reed frame is more elaborate in construction than the Igorot one, while the loose looping at the

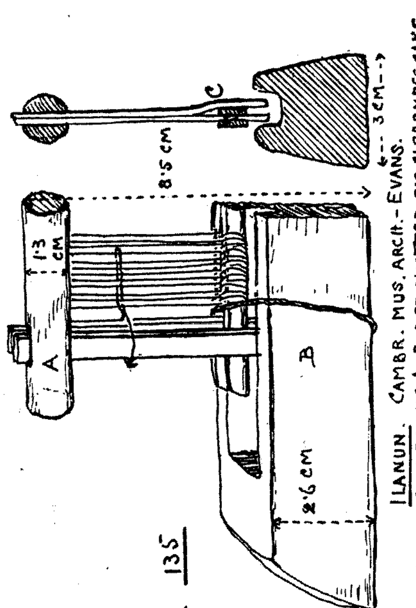
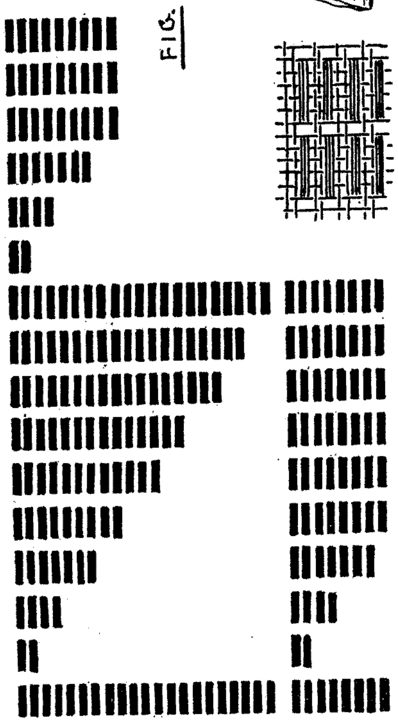
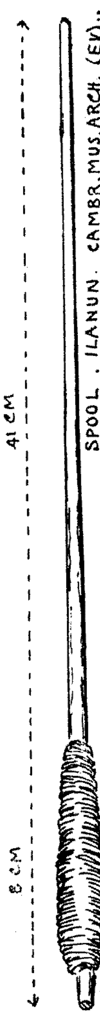


FIG. 135.

ILANUN. CAMBR. MUS. ARCH.—EVANS.
THE STRING CONNECTING A & B ARE OMITTED FOR CLEARNESS SAKE.

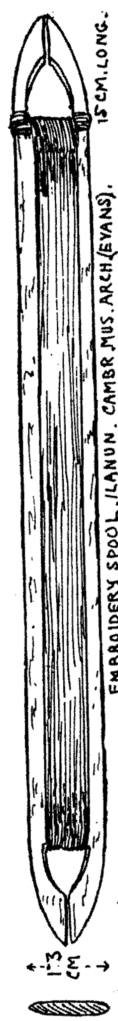


ILANUN. CAMBR. MUS. ARCH.—EVANS.



SPOOL. ILANUN. CAMBR. MUS. ARCH. (EV).,
USED IN THE USUAL BAMBU SHEATH.

FIG. 136.



EMBROIDERY SPOOL. ILANUN. CAMBR. MUS. ARCH (EVANS).

ends is a step in advance. With this we approach a completion of the chain of evidence of the evolution of the reed, for the next step is the making of a complete frame in which the canes are fastened top and bottom. To summarize it we have :—

(*a*) The Borneo warp spacer—a pegged rod allowing two or more warp threads to pass through every dent, with which the old sword beater-in is used quite independently.

(*b*) The pegged rod prevents entanglement, thereby assisting the progress of the work. This advantage is increased by having a dent for every warp, which in its turn necessitates finer pegs or canes, so that the increased number shall still fit into the same limited space. A finer yarn with more warps to the inch likewise necessitates finer pegs or canes.

(*c*) The finer canes are found to be too pliable, and require a top support, which is given by means of a groove in an upper bar.

(*d*) This step is followed by the perception that, in addition to its original function of a warp spacer, the now incipient reed frame could be made to act as a beater-in, with advantage to the evenness and closeness of the web. To do this the fine reeds must be fastened in the top bar as well as in the lower one, and as the frame becomes more rigid it adopts the secondary function, and the sword beater-in is ultimately discarded.

The *raddle*, or, as the Scotch call it, the *evener*, used as a warp spacer in laying out the warp, will probably have had a similar development to that of the reed.

The development thus described practically overcomes the difficulty referred to long ago by Tylor[1] of not being able to follow changes of one and the same people at different times, and satisfies the canon laid down by Karl Pearson[2]—that steps of sequence should be drawn from the usage of one tribe or group of tribes—for we see this evolution going on at this day among more or less allied peoples in one more or less restricted area.

The African herring-bone stick (Fig. 98) may have been evolved out of the old Roman spaced slot-rod found at Gurob, Egypt, which Flinders Petrie conjectures to have been a warp spacer. The distance in time from Egypt to Borneo is considerable, and if this Roman warp spacer has migrated eastwards it has had not only ample

[1] *Researches into the Early History of Mankind*, 2nd ed., London, 1878, p. 159: "It happens unfortunately that but little evidence as to the early history of civilization is to be got by direct observation—that is, by contrasting the condition of a low race at different times, so as to see whether its culture has altered in the meanwhile."

[2] *Grammar of Science*, 2nd ed., London, p. 359: "To find sequences of fact—a growth of evolution expressible by a scientific law—we must follow the changes of one tribe or people at a time." His objection does not affect the question of the evolution of the shuttle either, for we find, as is the case with the reed, all its successive steps in a very circumscribed area.

time for its travels, but also ample time in which to alter or improve itself. That such alterations do take place we have plenty of evidence, and for our purposes we may cite as an example the case of the Santa Cruz loom. This, as I will show later on, in travelling from Indonesia to its present limit, has traversed almost as many miles as the Roman warp spacer must have traversed if it did go from Egypt to Indonesia. The Santa Cruz loom, in a probably much shorter space of time, has considerably altered and, to some extent, improved itself, and we should expect some alteration in the Roman warp spacer. But the possible alteration from sawn slots to pegs is not much to find after a lapse of nearly two thousand years of travel, and as we see the evolution of the reed now going on in the East there is no need to search far afield for its origin. The fact that we have before us all the stages of this evolution in a restricted area makes it quite likely that the Borneo pegged stick warp spacer (Fig. 133) is indigenous to Indonesia, and this view is in accordance with the general evidence which tends to show that one birthplace of weaving was in this part of the world.[1]

An incomplete model of a Bugis loom in the Cambridge Museum of Archæology and Ethnology, brought home by W. W. Skeat, belongs to the same form as that of the Igorot and Ilanun looms, being supplied with a "single" heddle and a reed. But the remarkable points are the method by which the warp is fixed on the breast beam and the curious grooving of the warp beam. The breast beam is made of two longitudinal blocks (Fig. 137), one being tongued and the other grooved longitudinally, which when fitted together hold the warp very securely. It cannot be revolved like a roller breast beam, because in section the two parts together are

[1] Having used the words *sley* and *batten* (Part II, bottom of p. 144) without defining them, I have been asked by a vigilant student to explain their meaning. Mill managers, loom tuners and weavers, use the word sley and reed as synonymous terms for that collection of reed canes (or reed wires in modern looms) which in their frame act as warp spacers and beaters-in, the workpeople generally using the word sley in preference to the word reed. They call the upper horizontal part of the reed frame the *hand-tree*, but Fox (*The Mechanism of Weaving*, London, 1911, p. 467) calls both the upper and lower part of this frame the *rib*, while others call these parts battens. Fox also gives the name sley to the shuttle box beam attached on power looms to the lower part of the frame (*op. cit.*, p. 326, Fig. 169). Definitions from practical men are not always alike. The beating-in of the weft "is performed by what is termed the lay, which carries the reed dividing the warp threads. The lay performs two distinct functions, the beating up of the weft and carrying the shuttle" (Thos. R. Ashenhurst, *A Practical Treatise on Weaving and Dyeing*, Huddersfield, 1893, 5th ed.). "The batten consists of two flat pieces of wood into which grooves are cut for the reed or sley, which is fixed in by iron or wooden pins, and is suspended from the capes of the loom" (Alf. Barlow, *The Principles of Weaving*, London, 1878, p. 62). Formerly the whole reed frame, together with the two supporting side pieces and cross top piece, was known collectively as the batten; nowadays it is known as the *going part*. The word batten marked on the reed (Fig. 113) is used in the ordinary sense of a thin strip of wood, and in this instance to indicate that this portion of the frame is not the same as the heavy horizontal piece below it. The word side-battens mentioned on p. 144 is used also in the sense of a strip of wood. Being here on the subject of reeds, I may point out that on p. 147, line 4 from top, the indication to Fig. 115 should be to Fig. 117.

rectangular, that is to say, it has flat sides like a board, and can only be turned over from side to side so that the tension of the warp is not delicately adjusted, and must

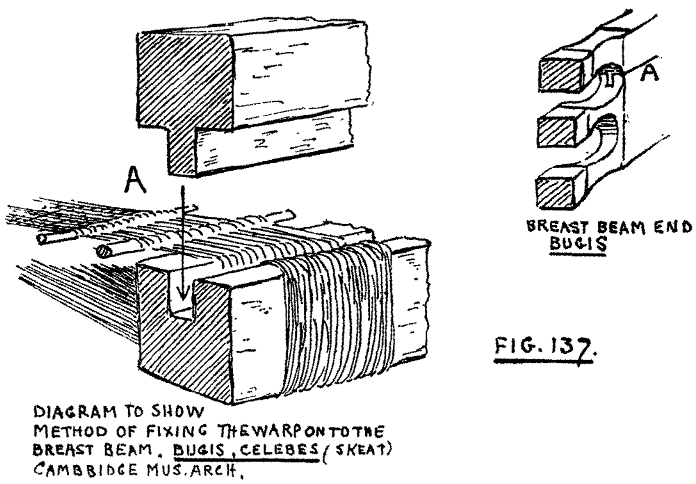


FIG. 137.

in most cases be too taut or too slack. This flat-sidedness constitutes a transition towards the Malay and Cambodian loom, which we shall have to deal with directly. In principle it is somewhat similar to the very primitive African vertical mat loom beams (Fig. 50, etc.), which are likewise not revolvable, but have a groove cut length-

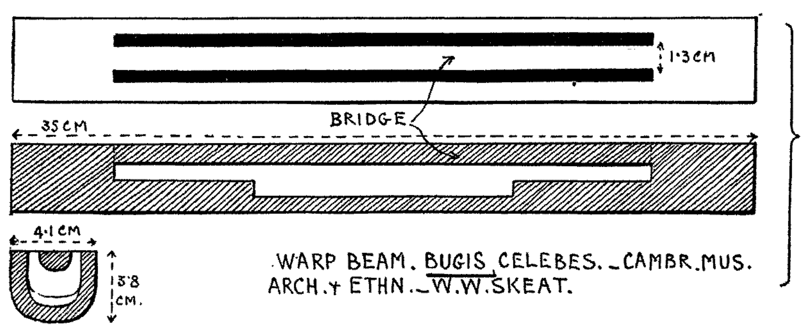


FIG. 138

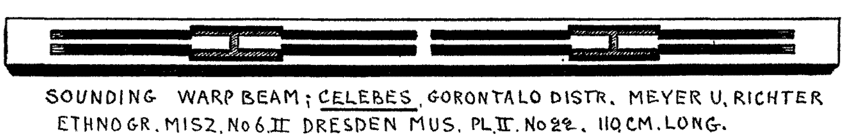


FIG. 139.

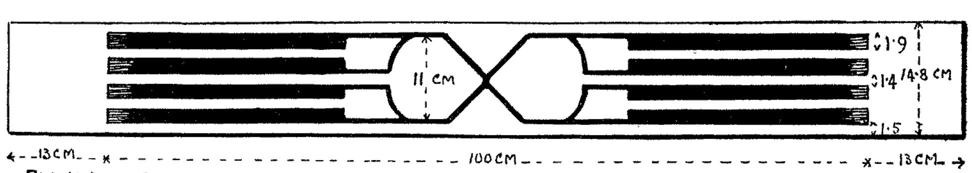
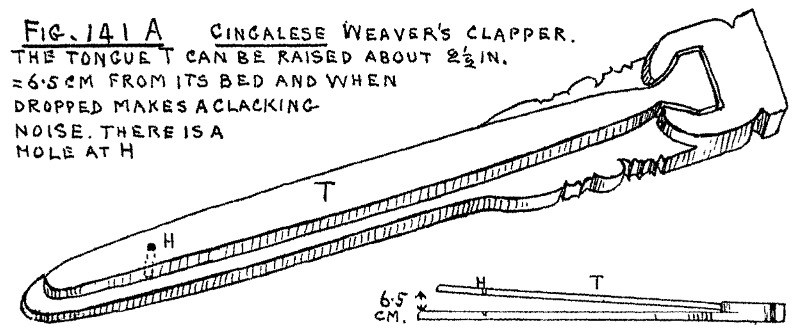
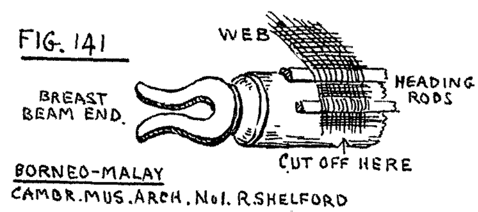


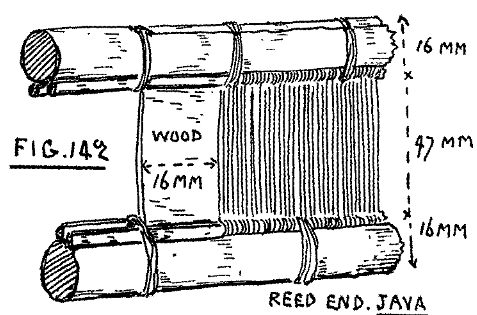
FIG. 140. SOUNDING WARP BEAM, JAVA LOOM. MANCHESTER MUNICIPAL TECHNICAL SCHOOL.

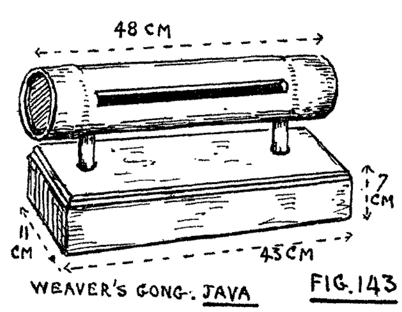
wise, into which the warp is pressed and held down tightly by a rod pressed and tied down on top to prevent it from slipping. Meyer and Richter[1] illustrate a similar breast beam from Gorontales in Celebes.



The warp beam of the Bugis model differs also in another respect from warp beams met with outside this region. It has two longitudinal grooves which join under the separating piece left, forming it into a longitudinal bridge (Fig. 138). A more advanced form of this grooving is illustrated by Meyer and Richter as belonging to the Celebes loom just referred to, in their Plate II, No. 22 (see Fig. 139). In the Gorontales illustration the resultant two bridges are cut up into four tongues enlarged at the loose end, and the authors speak of the whole as a *Laerm Vorrichtung* (signal-, rattle- arrangement). A still more complicated form of this warp beam exists on a Javanese loom in the Manchester Municipal School of Technology (Fig. 140). It has six loose tongues, which vibrate with every movement on the loom, and strike against the back, making a rattling noise. I think the arrangement has something to do with the ritual of weaving, for Mr. W. Myers, M.Sc., lecturer in the textile testing







[1] *Op. cit.*, Pl. II, No. 13.

department, informs me that when the loom was received the donor (whose name has been unfortunately forgotten) explained that every time a pick was made the Javanese weaver struck a bambu gong (Fig. 143), placed alongside, a sort of swishing blow with the sword beater-in. There are signs of wear on top of the gong, the striking of which can have nothing to do with the weaving, and which I would suggest is an act to propitiate or warn some spirit. In connection with this sounding warp beam there is an instrument bound up with some loom parts from Ceylon, in the British Museum, which may possibly likewise have something to do with weavers' magic (Fig. 141A). The tongue, which lies flat on its base, can be raised $2\frac{1}{2}$ inches (or 6 cm.) at the loose end, and makes a loud clacking noise when dropped. The hole H may have served to hold a knob.

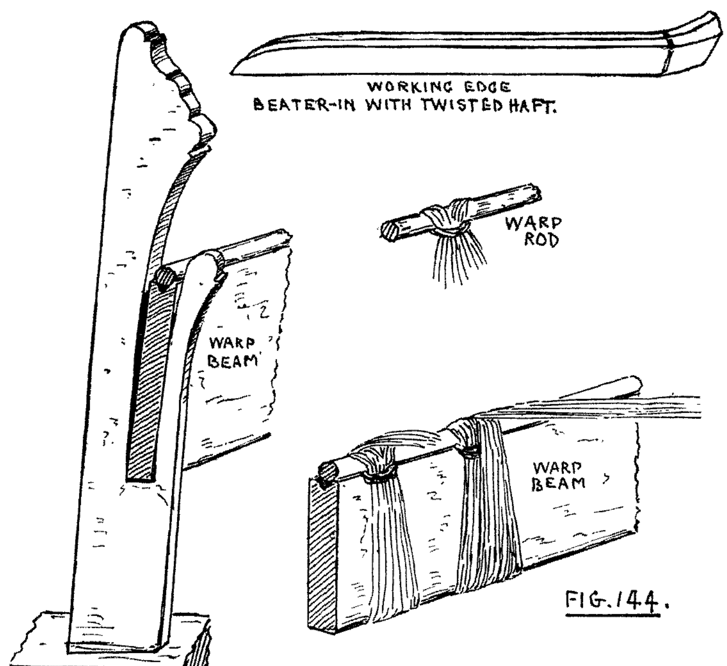


FIG. 144.

WARP BEAM & ATTACHMENT.—BORNEO-MALAY
CAMBR. MUS. ARCH.—R. SHELFORD. No. 1.

We now come to the Malay, Javanese, and Cambodian forms, a class of loom provided with a reed, and whose characteristic is the flat warp beam already referred to, combined with the rudiments of a loom frame.

The model of one of these is in the Cambridge Museum of Archæology and Ethnology. It was brought home by the late R. Shelford, who called it a "floor loom." It has the warp board fitted into a slot in the front edge of each of a couple of posts (Fig. 144). The warp board is provided with one "single" heddle and a shuttle of form Bb1. The canes in the reed frame are fastened both top and bottom, and not at bottom only. The sword beater-in has a bent haft, somewhat like the handle of a kris.[1] The back strap is of wood. With the presence of the back strap and the single heddle the necessity for any loom frame has not yet become apparent, although the two warp posts form a beginning.

A similar form of loom is illustrated in Fig. 145, copied from that of a Bali weaver by Nieuwenhuis, in the periodical *Nederlandsh-Indie.* In this the warp board posts or supports are slotted from the top down the middle and not at the front edge. In another model (Fig. 146), also brought home by Shelford, the warp beam fits into a pair of posts swung from the top of the loom frame, which look as though they had originally been on the ground, as shown in Fig. 144. In a Pahang loom model given me by Leonard Wray, and at present in Bankfield Museum, these hanging

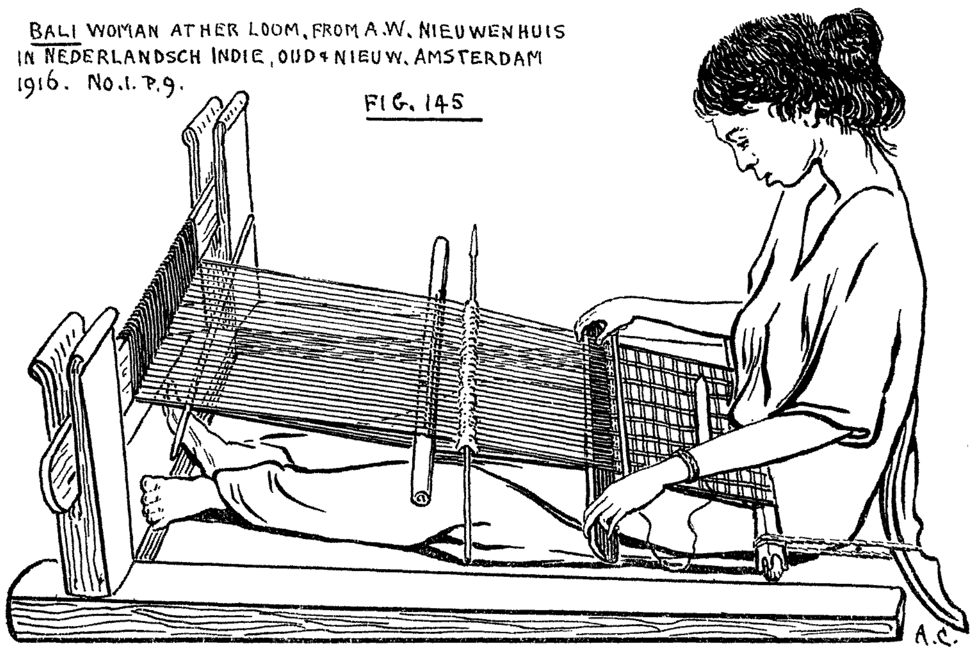


FIG. 145

supports have become elongated arms provided with oblong openings at their ends (Fig. 148) into which the warp board fits. This arrangement *looks* very like that of the "going part" of our hand looms.

A still further development is to be seen in a Kelantan loom model brought home by W. W. Skeat, now in the Cambridge Museum of Archæology and Ethnology, in which the arms or side battens have disappeared altogether, leaving only the ends, furnished with the warp beam openings, which are held up by cord (Figs. 147 and 149). It will be noticed in one of the Malay and Bali arrangements (Figs. 146

[1] A model Malay loom in the British Museum from the Rani of Sarawak has a similar beater-in.

and 147), that the warp emerges, so to speak, from the lower edge of the warp board, while in another Malay loom (Fig. 144) the warp comes away from the upper edge.

In Raffles' *History of Java*, Plates, 1844, pl. IX, we are given an illustration of a loom, native name *tenunan*, from that island, which, while lacking somewhat in clear detail of the parts, gives us an intelligible idea of the whole (Fig. 150). On the other hand, Meyer and Richter give us fairly clear details of the parts of one loom, but curiously enough omit any illustration of the loom as a whole (even omitting details of the warp-board supports), so essential for arriving at a correct notion of what the loom is like. In this respect the full-sized loom from Java in the Manchester

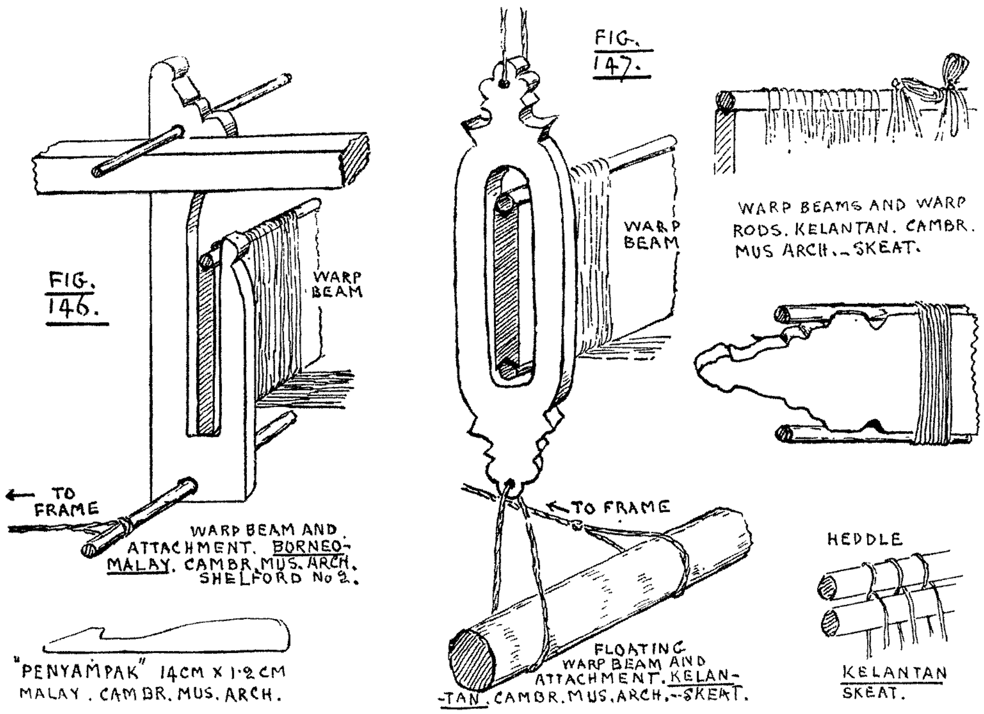


FIG. 146.

FIG. 147.

Municipal School of Technology, already referred to, may be examined with advantage. Set up it is very similar to the one depicted by Raffles. The approximate length of warp is about 100 feet (or 30 metres). It consists of the warp board, already described, supported on slotted posts, a breast beam, reed, " single " heddle, laze-rod, shed sticks and wooden back strap,[1] temple wanting (Fig. 151). There are 82 warp (" single ") to the inch (or 32.3 to the cm.) and 49 picks (threefold) to the inch (or 19.3 to the cm.). Although a primitive loom, the work is equal in every way to the best that can be produced on any loom, the selvedge is excellent and the

[1] Of the same shape as that of the model Malay loom in the British Museum, referred to in note, p. 345.

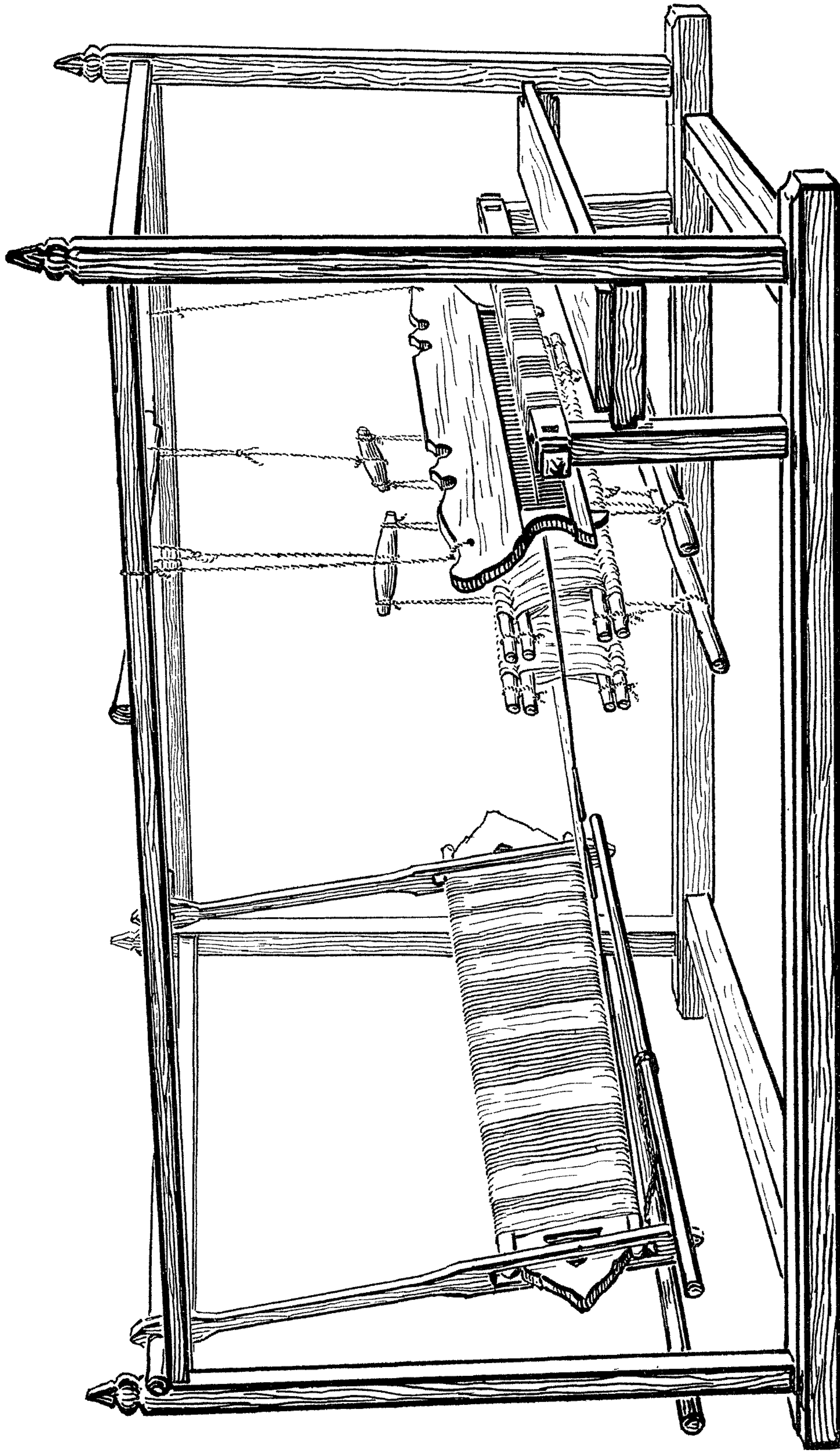
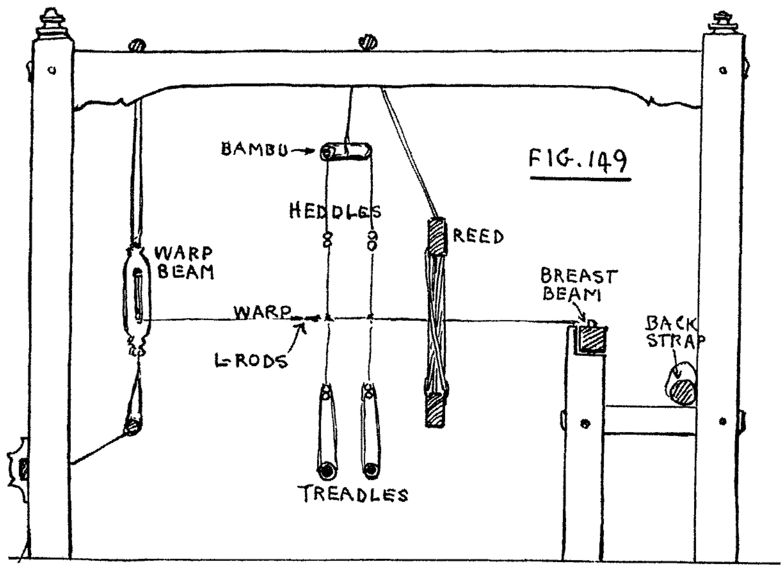
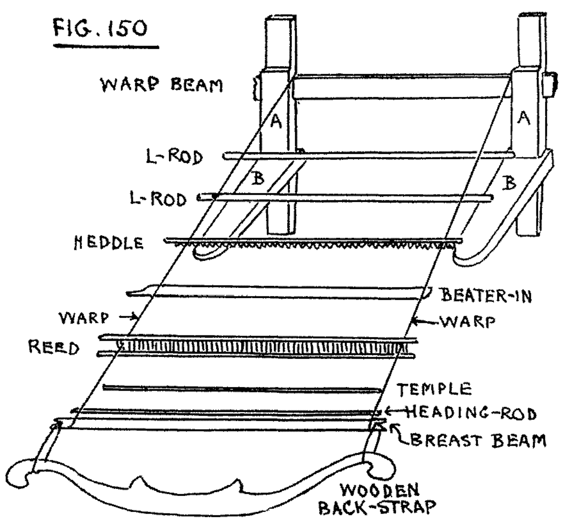


FIG. 148 PAHANG MALAY LOOM. _ BANKFIELD MUSEUM (LEONARD WRAY)



KELANTAN, MALAY.— CAMBR. MUS. ARCH.— W.W. SKEAT.



JAVA LOOM — RAFFLES' HIST. OF JAVA, PLATES, 1844 PL. IX. — FOR THE SAKE OF CLEARNESS ALL BUT THE SELVEDGE WARPS HAVE BEEN OMITTED (THE NOMENCLATURE IS MY OWN).
AA WARP BEAM SUPPORTING POSTS SET IN THE GROUND UP TO THE BASE OF BRACKETS BB.

web fine and even throughout. Apart from the figured pattern in the cloth itself, the brocade of gold thread—gold (?) tape wound round a two-fold yellow yarn—

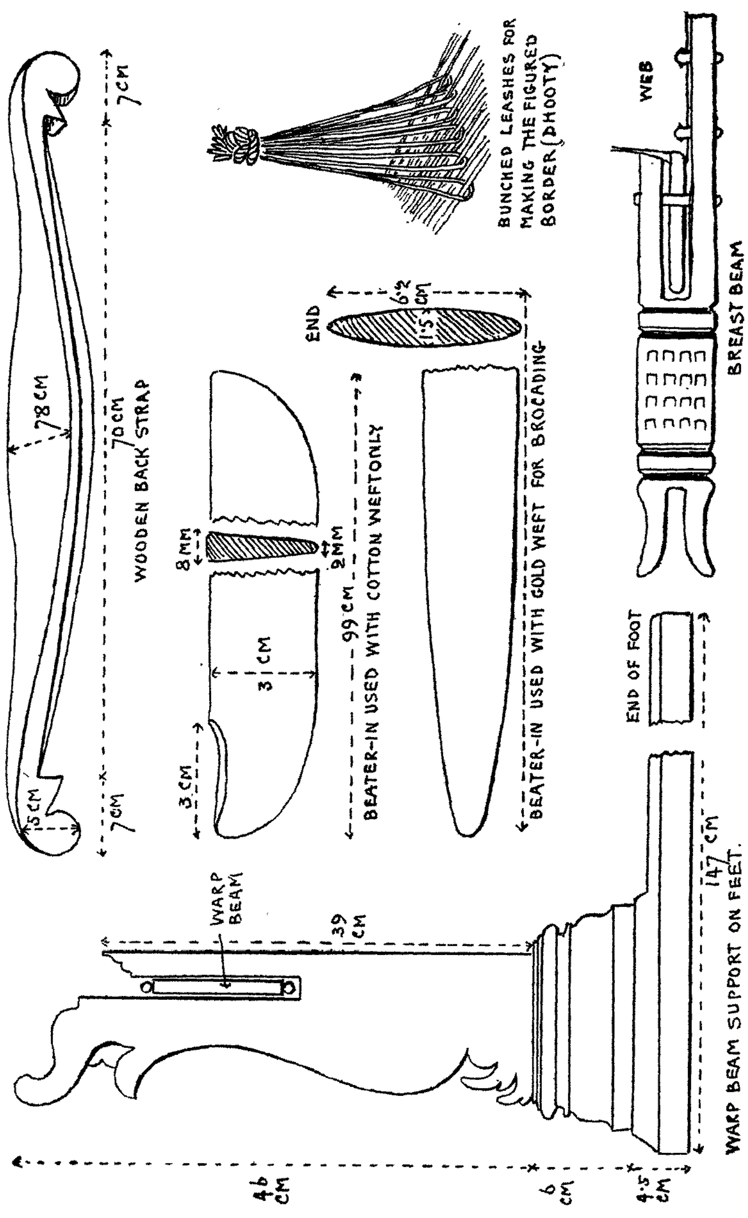


FIG. 151. JAVA LOOM, MANCHESTER MUNICIPAL SCHOOL OF TECHNOLOGY

necessitates a second set of heddles, and for making the dhooty (figured border) there is what is known as a dhooty bobby, a set of heddle leashes bunched, but without any rod, as in the African mat loom (Fig. 59) and the African cotton loom

(Fig. 87).[1] Separate hard wood polished sword beaters-in are used for the figured pattern and for the brocade pattern. The reed is well and neatly made, the canes are fastened top and bottom and show considerable elasticity. The laze rod is of hard palm rind with the ends spear-shaped as in the Ilanun loom (Fig. 134). The shuttles belong to type Bb1, the gold-thread spool being topped with a carved knob.[2]

A flat warp board similar to those above described, but placed horizontally instead of vertically, is met with in Cambodia and is illustrated by J. S. Black[3] without any explanation in the text. I have reproduced it in Fig. 152 and the reproduction is, I hope, accurate in general, but owing to the smallness of the original the details cannot be correctly given. The points in this illustration which strike one immediately are the *downward* slope of the warp *away from* the weaver and the more or less flat position of the warp board, this board or beam being apparently not supported on posts, but fastened in position by means of cordage. It is probable that the flat outwardly sloping position of the warp board indicates the original position of this class of warp beams, such position being the least developed. The provision of double heddles and treadles renders some sort of framework necessary, in fact they are the cause of the existence of the framework, which appears to be made up of two distinct parts, viz. (1) the portion supporting the heddles and reed in which is placed the weaver's seat, and (2) the portion which supports the warp board or beam. Apparently these two portions are quite distinct, but have come together, forming perhaps the origin of the loom frame.

[1] Absence of rod is also mentioned by Harrison, 20, *op. cit.*, p. 48, with regard to the Lengua, South American, loom.

[2] Wm. Marsden mentions two forms of looms in Sumatra (*History of Sumatra*, London, 1783, p. 148), but neither of his descriptions is clear. He says: "Some of their work is very fine and the patterns prettily fancied. Their loom or apparatus for weaving (*tunnone*) is extremely defective, and renders their progress tedious. One end of the warp being made fast to a frame, the whole is kept tight, and the web stretched out by means of a species of yoke, which fastens behind the body, as the person weaving sits down. Every second of the longitudinal threads passes separately through a set of reeds. like the teeth of a comb, and the alternate one through another set. These are forced home at each return of the shuttle, rendering the warp close and even. The alternate threads of the warp cross each other, up and down, to admit the shuttle, not from the extremities, as in our loom, nor effected by the feet, but by turning edgeways two flat sticks which pass through. The shuttle, *toorah*, is a hollow reed, about 16 inches long, generally ornamented on the outside and closed at one end, having in it a small bit of stick, on which is rolled the woof or shoot. The silk clouts have usually a gold head. They use sometimes another kind of loom, still more simple than this, being no more than a frame in which the warp is fixed, and the woof darned with a long small pointed shuttle. They make use of a machine for spinning the cotton very like ours. The women are expert at embroidery, the gold and silver thread for which is procured from China, as well as their needles. For common work their thread is the *poolay* before mentioned, or filaments of the *pesang* (*musa*)."

[3] "A Journey round Siam," *Geographical Journal*, VIII, 1896, p. 435.

It seems that the formation of the complete loom frame out of two independent portions is due to the considerable development of the warp board supports, which

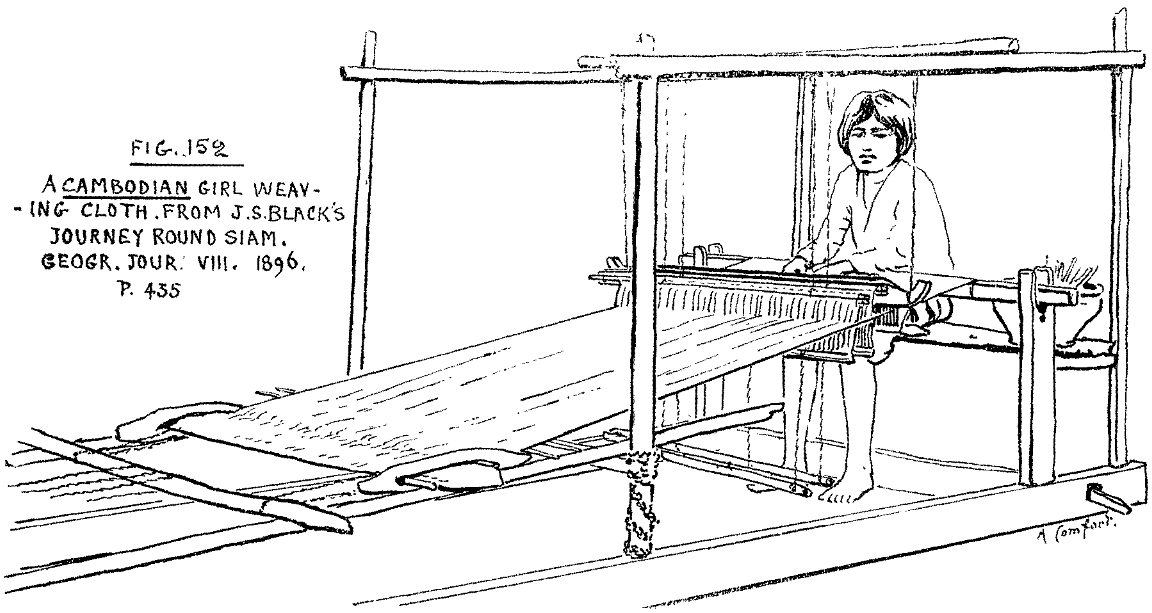
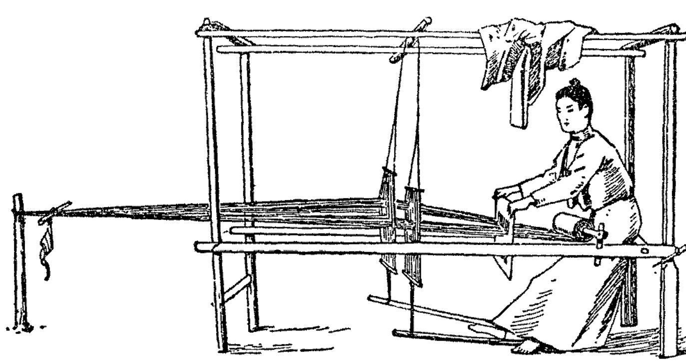


FIG. 152

A CAMBODIAN GIRL WEAVING CLOTH. FROM J. S. BLACK'S JOURNEY ROUND SIAM. GEOGR. JOUR. VIII. 1896. P. 435



MÜHSO WOMAN WEAVING A CLOTH.

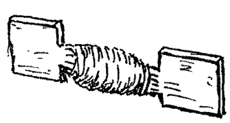
FIG. 153. COLONEL R. G. WOODTHORPE: SOME ACCOUNT OF THE SHANS. JOUR. ANTHR. INST 1896 XXVI. P. 20.

we do not find outside Indonesia. The illustration (Fig. 153) of a Mühso loom as given by Colonel R. G. Woodthorpe[1] may at first sight appear to controvert the

[1] "Some Account of the Shans and Hill Tribes of the States on the Mekong," *Jour. Anthrop. Inst.*, 1896, p. 20.

fact that the frame is made up of two distinct portions, but the appearance of this Mühso loom indicates rather artificial than natural growth. That is to say the growth has been due to exotic influences. Thus the warp post points to a survival of the Pacific type of loom, and the free reed to a period previous to that of the frame which would be adopted with the double heddles and treadles when the latter were copied from the Chinese. We have something similar in the Ashanti loom (Fig. 107), where a heavy stone, placed at some distance from the frame, serves as a warp beam; but, as has been pointed out, this loom grew up under exotic (European) influence.

FIG. 154.



WARP BEAM FROM CAVENDISH'S KOREA LONDON 1894. COL'D PLATE P.P. 52-53.

KOREAN WEAVER. FROM A COLLECTION OF NATIVE DRAWINGS OBTAINED BY H.M. BECHER, ABOUT 1850. BRITISH MUSEUM.

FIG. 154.A.

This flat warp beam is found also in Japan and Corea (Figs. 154, 154A), being, however, modified in both countries to the extent that the centre portion is cut away until the tool looks like a short square bladed canoe paddle. The object served by the flatness of the beam is not very clear. To a people devoid of mechanical genius, who are unable to make use of a round beam because they evidently could not invent a cross-head to prevent unwinding, a flat board would be sufficiently heavy to keep its position, and that position would be assured somewhat by a slope, as shown in the illustration of the Cambodian loom (Fig. 152). On the other hand, with this sort of beam the tension is not so easily regulated. On all looms provided with more or less squared, instead of round, beams the beams can only be turned the exact distance of the centre of one of the four sides to the centre of the next side, there being no intermediate shades of distance to get the exact amount of tautness required in the warp. This want of means of adjustment may be the explanation of the survival of the back strap with complete loom frame as seen in the Kelantan loom (Fig. 149).

There are a few small points to call attention to in the loom frames. The Pahang

Malay loom (Fig. 148) is supplied with the usual complete harness for working the heddles (whipple trees and not pulleys being in use); the treadles consist of two pieces of bambu placed transversely to the warp, forming a convenient foothold. In the Cambodian loom (Fig. 152) the harness appears not to be so far advanced as

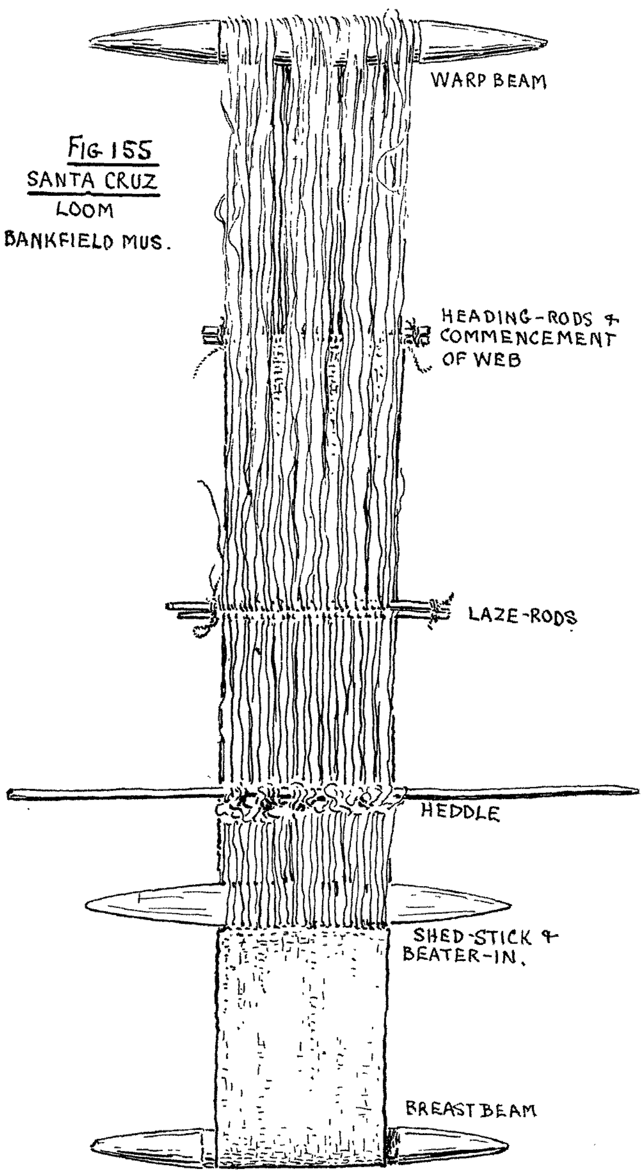


FIG. 155
SANTA CRUZ LOOM
BANKFIELD MUS.

yet, and unfortunately is not as clearly shown in the original as could be wished, but the indication is to a loose cord passing from one heddle over cross pieces on top of the loom frame, and down to the other heddle. The treadles appear to be similar to those in Fig. 148, and in the Kelantan loom (Fig. 149) the upper cord joining the heddles passes through the natural hollow of a piece of bambu supported on the top of the frame.

Belonging to the Indonesian series is the well-known Santa Cruz form of loom, chiefly remarkable for the long distance it has wandered away from what was presumably its original home. The loom is, as we shall see, not by any means limited to the island of Santa Cruz, but is found on the route to this group from the eastern outskirt of Indonesia.

The specimen in Bankfield Museum (Fig. 155), which is quite typical, consists of breast and warp beams, two heading rods, four laze-rods, one "single" heddle, sword beater-in and spool. The heading- and laze-rods are narrow strips of cane $\frac{1}{4}$ inch (or .6 cm.) across the flats; the heddle rod is of wood $22\frac{3}{4}$ inches (or 63 cm.)

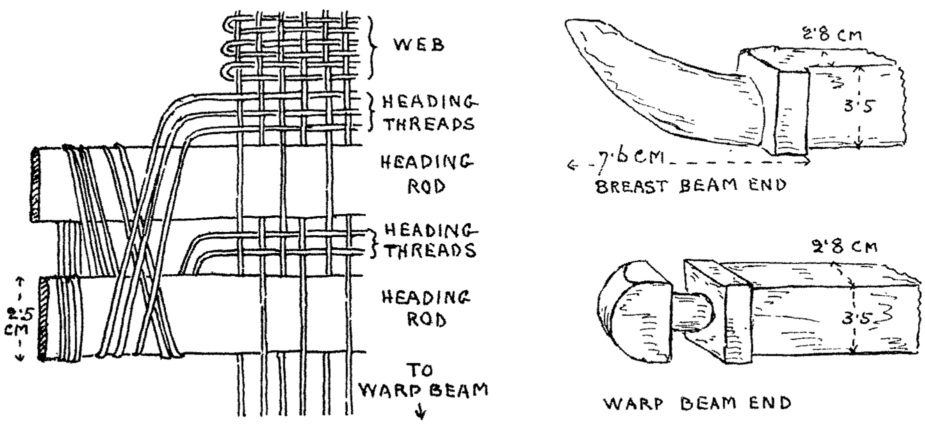
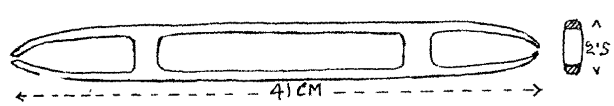


FIG. 155 A. SIKIANA (STEWART IS.) 1905. BRIT. MUS.



SANTA CRUZ., BRIT. MUS.

SPOOL SANTA CRUZ. BR. MUS.

long, the leashes being made of twisted fibre and are continuous, alternate overlapping. The beater-in is of hard wood fairly well polished, flat and oval and tapering from the middle to a fine edge all round, measuring $\frac{1}{4}$ inch (or .6 cm. in thickness, $1\frac{13}{36}$ inch (or 4.6 cm.) in breadth, and $15\frac{1}{2}$ inches (or 38.4 cm.) in length. The warp consists of split non-spun filament, the end of one filament being knotted on to the end of the next, and so on, by means of which any length is obtainable. The weft is also of non-spun filament, said to be banana fibre. In the process of weaving both warp and weft—although in many parts the former is still splitting—are all single; that is to say we do not find two or more filaments acting as one warp as is the case with the Kwa Ibo and Ba-Pindi, African, looms. At the start the first pick is a piece of twisted fibre acting almost as a heading rod. In the use of non-spun filament, both as weft and warp, this loom shares the peculiarity with Ainu, Igorot, and African looms, etc. The spool is form Ad1.

A somewhat modified form is that of the Sikiana loom in the British Museum, obtained in the year 1905. The fabric is of non-spun fibre, with a good selvedge and an Oxford shirting pattern obtained by means of white warp and red and blue weft, the bulk of the warp and weft being of the natural buff colour. The noticeable parts are the heading arrangement (Fig. 155A), which somewhat unusual form

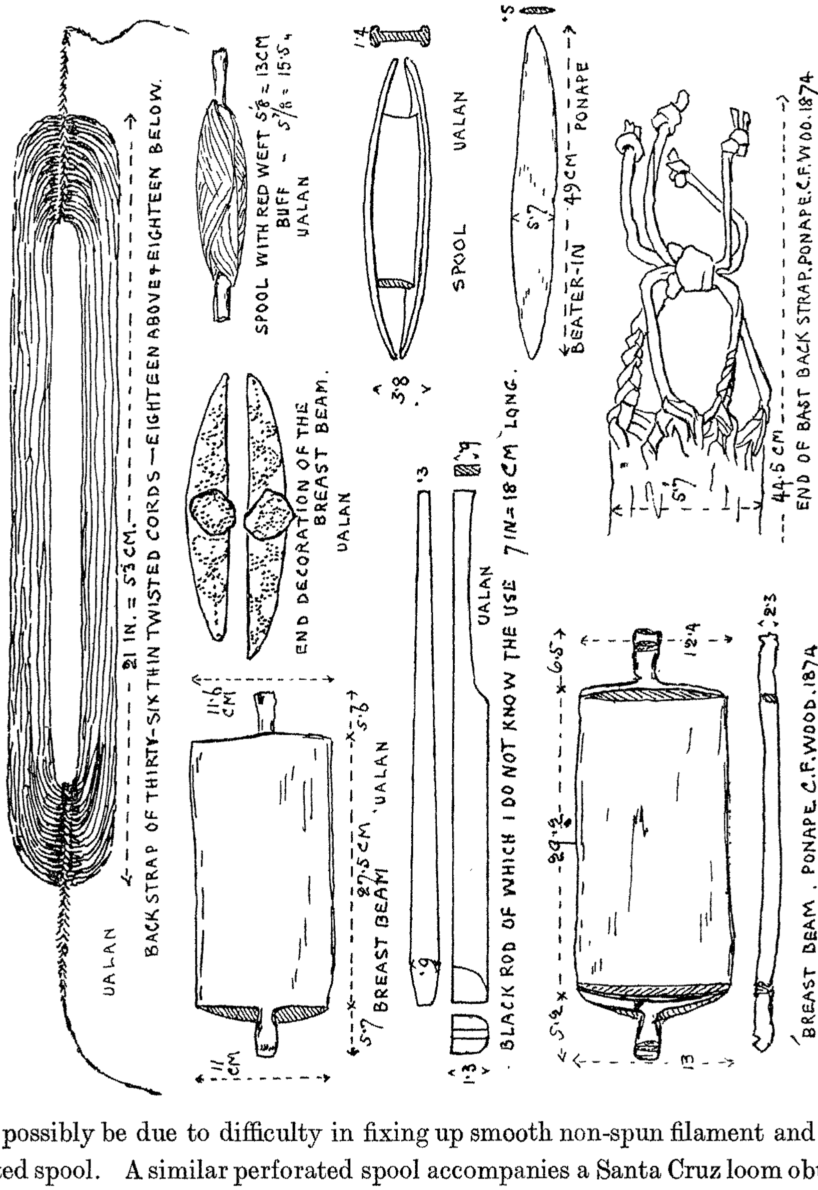


FIG. 156. LOOM PARTS FROM THE CAROLINE ISLANDS. BRITISH MUSEUM.

may possibly be due to difficulty in fixing up smooth non-spun filament and the perforated spool. A similar perforated spool accompanies a Santa Cruz loom obtained in 1891 from A. Lister Kaye. There are other specimens of Santa Cruz looms in the British Museum which do not call for special attention, except that on the last-mentioned loom there is a leash cord winder, form Ba, and that, although the handle of the beater-in is broken, it may be like the handle in Figs. 165 or 167.

We now turn to the Caroline Islanders' loom. It is, unfortunately, the case that we are rarely favoured by travellers with any particulars of the preparation or laying of the warp which precedes the beaming or putting the warp on to the loom. In part this is due to the fact that in very primitive weaving the warp is laid on the beams of the loom as soon as there is a sufficiency of yarn. In the Caroline Islands, however, the method of laying the warp is so noticeable that the process has been recorded by several travellers. The first known description of the process is illustrated in a coloured plate in the atlas to Duperrey's *Voyage of the "Coquille,"* Paris, 1836, in which can be seen the warping bench and its peculiar grid. To explain the method of working it will be as well to examine first a piece of the fine matwork, made with non-spun fibre, which has been laid on this warping bench by means of the grid. The beautiful piece of work in question was obtained by C. F. Wood in Ualan and brought to the British Museum as far back as 1874.

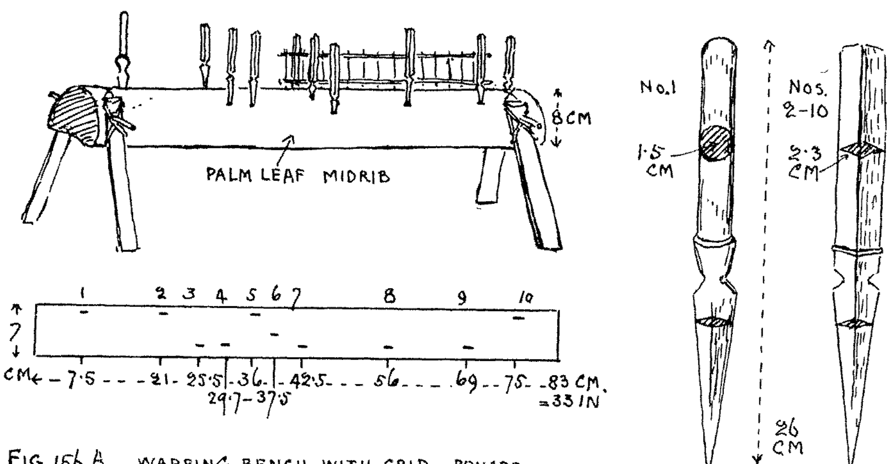


FIG. 156 A. WARPING BENCH WITH GRID. PONAPE, CAROLINE ISLANDS. BRITISH MUSEUM. (C. F. WOOD)

The piece (Fig. 156B) may be divided up into the following sections (omitting the inch length of heading), viz.: I, 15½ to 16 inches (or 41 cm.) long, with a red warp and alternate 2 picks of brown and 2 picks of buff throughout. II, 37 inches (or 94 cm.) long, in which the warp arrangement is 2 red, 2 buff, 2 red, 12 buff, repeated 18 times for the width of the web; for a length of 33 inches (or 84 cm.) the picks are 4 buff and 2 brown repeat, and for a length of 4 inches the picks are all buff. III, 10 inches (or 25.5 cm). long, the warp all buff with five patterns obtained by means of brown and red weft (Fig. 156C). The sections I, II and III are joined together by a simple knotting of the corresponding warp threads, and in doing this the worker has not been very careful or skilful enough to make the joint tally with a pick. That is to say, the joint passes askew along the picks over as much as ½ inch (or 1.25 cm.) out of the parallel; this may, perhaps, be due to the difficulty of making so many ties side by side, but the difficulty can be overcome as shown at the end, for the joint there does run parallel with the pick. In another beautiful piece of similar work a belt formerly belonging to a Ponape chief, named Ometha, there are five warp-jointings, of which only one is perfect.

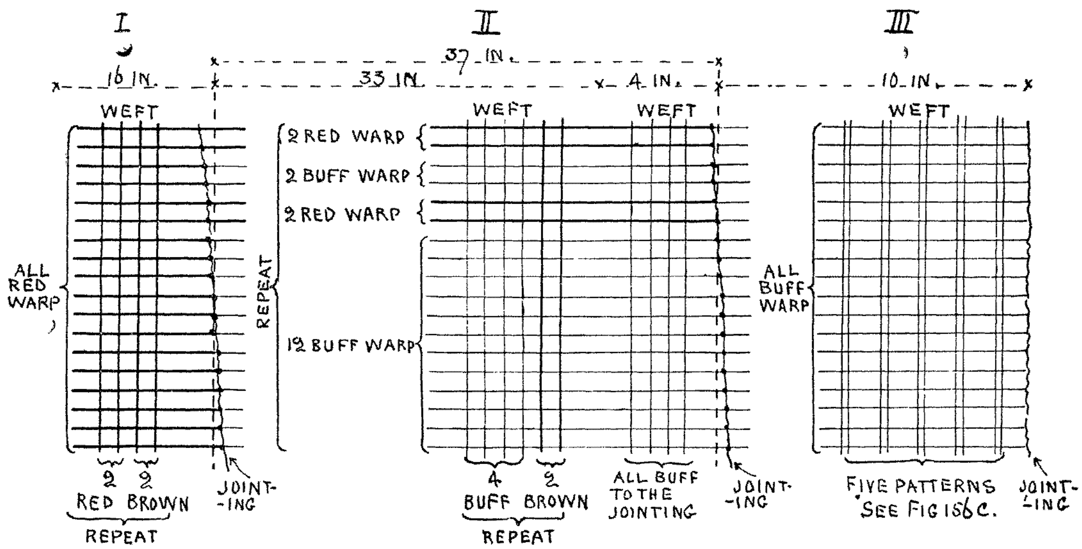


FIG. 156 B. DIAGRAM TO SHOW THE WARP SECTIONS ON THE PONAPE BELT, BRIT. MUS.

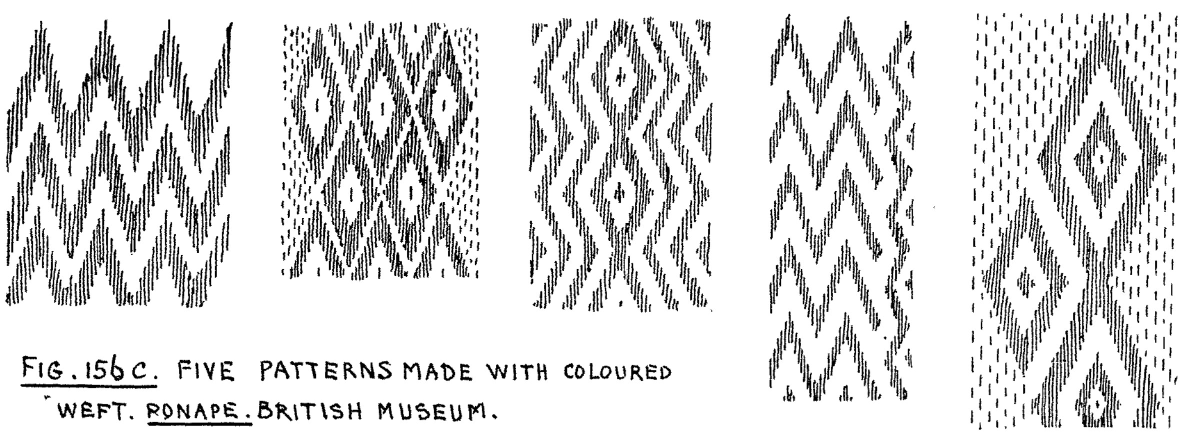


FIG. 156 C. FIVE PATTERNS MADE WITH COLOURED WEFT. PONAPE. BRITISH MUSEUM.

It is in order to regulate the length of the sections I, II and III, or as many more as may be necessary, to give the worker the measured length of warp required for the pattern essentially produced by the warp and not by the weft, that the grid comes into use, the pegs on the bench being for the usual warping purposes. The

Coquille grid has sixteen spaces between the bars of the grid from end to end, and so has the British Museum specimen. Finsch's illustration[1] shows ten spaces; in the Hernsheim illustration[2] the particulars are too small to be enumerated. The Coquille bench has seven flat pegs and one round one. Finsch shows seven pegs, and the British Museum specimen has one round peg and nine flat (diamond section) pegs. The Hernsheim illustration shows six pegs.

My explanation does not tally with that of Finsch, who says: "Wie die Pfloecke die Laenge des ganzen Gewebes angeben, so das Heck die Laenge der gemusterten Endkante desselben, waehrend die Querstaebe des Heck wiederum die Laenge der einzelnon Querstreifen des Musters bestimmen (In the same way as the pegs indicate the length of the whole fabric, the grid gives the length of the patterns, while the bars of the grid settle the lengths of the individual patterns)." If the grid indicates the length of the patterned piece, *i.e.*, a section like I, II or III, a separate grid would be required for every section. It is the grid's bars, or two ends as the case may be, which regulate the warp lengths of the sections, which work is necessarily done on the warping bench. There is no necessity for, nor possibility of, regulating the length of the individual patterns like I 1, 2, 3, 4, and 5, because this is not done on the warping·machine but on the loom by means of a greater or smaller number of picks.

The particulars of a loom parts from Ualan (Strong's Island) in the British Museum are as follows: Beam to beam (warp beam missing), 37 inches (or 94 cm.); width of web, 6⅞ inches (or 17.5 cm.). The breast beams, which have an elliptical section, are provided with lugs at both ends. The ends of a painted one are peculiarly decorated apparently by filling up small holes with lime arranged in triangular patterns. One back strap is made of eighteen strands of twisted fibre, 27 inches (or 68.5 cm.) long from head to head; another back strap is 17½ inches long by 2¼ inches wide (or 44.5 by 5.7 cm.), and is made of bast, with the ends plaited into the necessary loops for beam attachment. There are two small spools, form Ba, one filled with black and the other with red fibre, which, like the warp, is non-spun; also a spool, type Ad1, body painted red and horns black. The Coquille illustration shows two spools of different shapes, one of which may possibly be similar to the New Britain modification (Fig. 161). It is accompanied by a short piece of hard wood, the functions of which are not clear to me and which may not belong to the loom. There is a much worn beater-in, which is similar to the one in the Coquille illustration.

According to Kubary,[3] as regards the looms of the Ruk and Mortlock Islands,

[1] *Ethnologische Erfahrungen*, Vienna, 1893, p. 220.

[2] *Sued-See Erinnerungen*, Berlin, 1883, p. 44.

[3] Schmeltz and Krause, *Die Ethnographisch-Anthropologische Abtheilung des Museum Godefroy in Hamburg*, Hamburg, 1881, p. 346.

the warp beam is fixed on to two upright posts. On St. Mathias' Island, north-west of New Hanover, according to R. Parkinson,[1] the weavers, who are women, in order to keep the warp taut, press their feet against the warp beam and their backs against the back strap, from which we may infer that on this island no upright posts are used on to which to attach the warp beam. On p. 548, however, the same traveller illustrates a man seated at a loom, the warp beam of which is fastened to a standing tree trunk. Florence Coombe[2] gives an illustration (Fig. 157) of a man at Santa Cruz engaged at a loom, the warp beam of which is fastened to two upright tree trunks. One must conclude that, as among the Ainu, the warp was stretched by means of the feet in some localities and by means of fixed posts

FIG. 157

SANTA CRUZ ISLAND WEAVER AT HIS LOOM. FLORENCE COOMBE'S ISLANDS OF ENCHANTMENT. LONDON. 1911. FACING P. 183.

in others. But whether the warp beam is tied to uprights or is kept in position by the feet, why in the specimens in the Cambridge Museum of Archæology and Ethnology, in the Norwich Castle Museum, in the Brighton Museum, in the Imperial Institute (which comes from Rotuma), and in all the specimens in the British Museum, should one cone-shaped end of the beam be more or less pointed and the other end have, as it were, its point bashed in or roughly flattened (Figs. 158, 166, and 168), as if the point had been hammered more or less flat ? In the Bankfield Museum specimen the bashing is not so marked, and one beam is shorter than the other, their lengths being 16 and 17 inches (or 41 and 43 cm.) respectively. While

[1] *Dreissig Jahre in der Sued-See,* Stuttgart, 1907, p. 334.

[2] *Islands of Enchantment,* London, 1911, plate facing p. 183.

the ends are tapered more or less to a point as just mentioned, the bodies of the beams are not cylindrical, but of a slightly rounded square in section[1], and this holds good of three of the other specimens referred to, the exception being the Rotumah warp beam, the section of which is rectangular. On the other hand, the New Britain specimen has both beams circular in section (Fig. 159), the breast beam having a neck to which to attach the back strap, the warp beam having a shoulder only. Schmeltz and Krause[2] speak of beams in the Lukunor group (Mortlock Island) as "about 97 cm. long, 16 cm. wide and 2 cm. thick" (38 inches by $6\frac{1}{3}$ by $\frac{3}{4}$), hence they must be rectangular in section, or board-shaped, and later on (p. 346) they quote Kubary, who says of the Nukuor (Carolines) warp beams: "The boards are made of hard wood, rectangular in shape, about 1 m. long, .2 m. broad and .03 m. thick (39 inches by $7\frac{3}{4}$ by $1\frac{1}{5}$)," the breast beam having lugs for the back strap, but the warp beam being without.

HAMMERED END OF BEAM, SANTA CRUZ

SECTION OF CENTRE OF BEAM SANTA CRUZ LOOM BANKFIELD MUS.

FIG. 158

Graebner[3] tells us of this Santa Cruz loom: "It is the old Indonesian loom as it exists in the Western Carolines and has been only altered in somewhat essential points in the eastern part of the archipelago, in Kusaie and Ponape." The alterations he explains in a footnote as consisting in the board-like expansion of the beams and the introduction of the heddle frame. He continues: "All the same the original type on Truk-Mortlock (Central Carolines) has experienced one, even if trifling, change in the alteration of one of the laze-rods into a cylindrical stick round which the warp is wound."[4]

Graebner has, however, not realized that the flat beam is a characteristic of one of the Indonesian forms of loom, and that cylindrical laze-rods with the warp wound round once are found in the Bhotiya loom (Fig. 128) and Ilanun loom (Fig. 134), so that instead of these details showing modifications in some parts of the Carolines they are, in fact, survivals. Hence it would seem to be in the eastern portion of the

[1] In F. Graebner's *Voelkerkunde der Santa Cruz Inseln* (published in Foy's *Ethnologica*, i, Leipzig, 1909, p. 123, Fig. 53) the middle portions of both beams are seen to be more or less square in section.

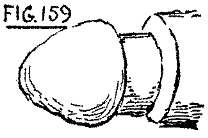
[2] *Op cit.*, p. 326.

[3] *Op. cit.*, p. 177.

[4] "Es ist der alte indonesische Webstuhl, wie er auch auf den West-Carolinen vorhanden und nur im oestlichen Teile des Archipels, auf Kuseie und wohl auch Ponape, in einigermassen wesentlichen Zuegen umgestaltet worden ist. Immerhin hat der urspruengliche Typus doch auch auf Truk-Mortlock eine, wenn auch geringe Umgestaltung erfahren, durch die Umwandlung des einen Faden-trenners in ein Rundholz, um das die Kettfaeden herumgeschlungen werden." His footnote runs: "Durch brettfoermige Verbreitung der Spannhoelzer und durch Einfuehrung des Staebchenrostes"

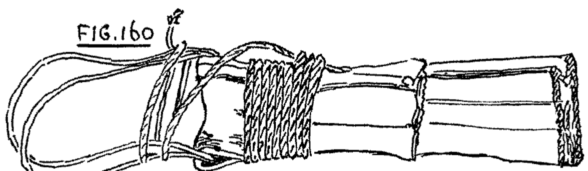
Carolines, Ponape and Kusai, that the flat beam has held its own, and in the south central portion, Lukunor and Nukuor, the cylindrical laze-rod has held its own. It seems, further, that in leaving the Carolines the beams have lost their board-like character and have assumed the square shape preparatory to adopting the more practical cylindrical form.

FIG. 159



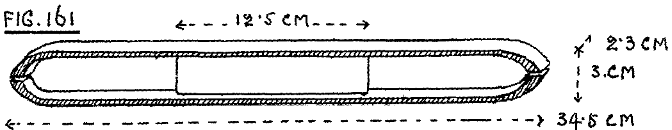
END OF BREAST BEAM. NEW BRITAIN. BRIT. MUS. FRANKS

FIG. 160



END OF BACK-STRAP (THICK TOUGH PALM LEAF). NEW BRITAIN. BRIT. MUS. FRANKS

FIG. 161

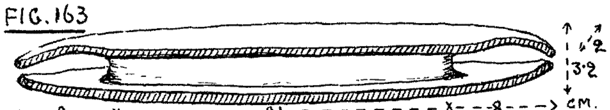


SPOOL. NEW BRITAIN. BRIT. MUS. FRANKS

FIG. 162

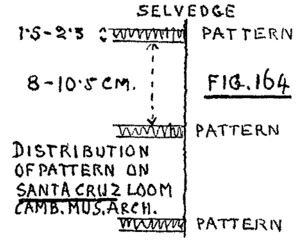
SANTA CRUZ HEDDLE

FIG. 163



SPOOL. SANTA CRUZ. CAMBR. MUS. ARCH

FIG. 164



DISTRIBUTION OF PATTERN ON SANTA CRUZ LOOM CAMB. MUS. ARCH.

FIG. 165

BEATER-IN. SANTA CRUZ. 1 CM. THICK. 5 CM. BROAD. 51 CM. LONG. CAMBR. MUS.

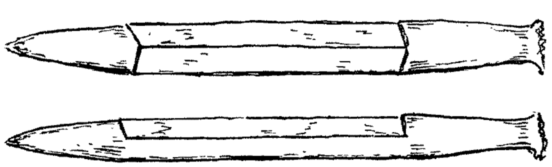
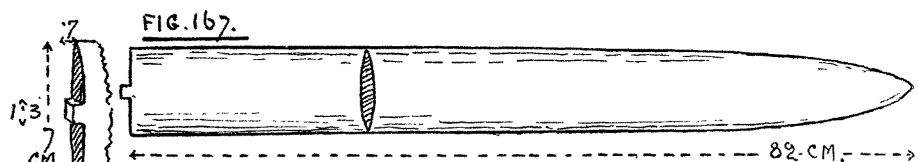


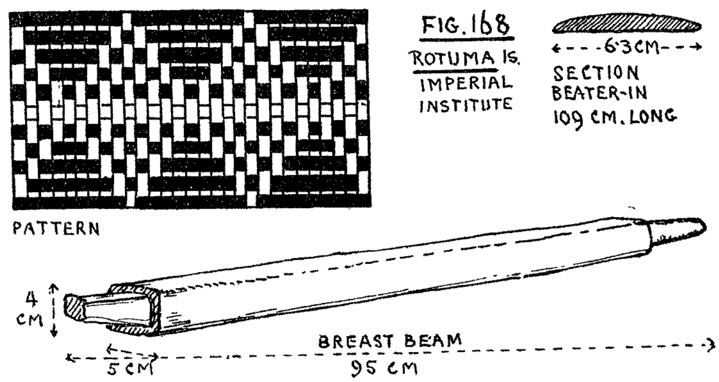
FIG. 166. BREAST BEAM / WARP BEAM OF SANTA CRUZ(?) LOOM TO SHOW HAMMERED ENDS. BRIGHTON MUS.

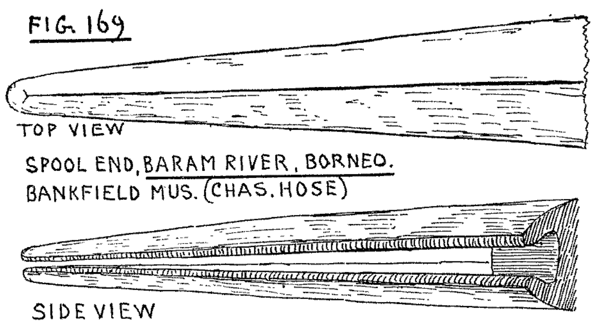
FIG. 167.

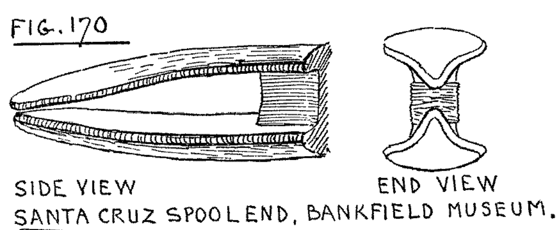


SWORD BEATER-IN. NEW BRITAIN. BRIT. MUS. FRANKS.

In the following table I have grouped together for purposes of comparison particulars of dimensions and other details of the looms examined by me. As regards dimensions, warps and picks to the inch, etc., they are pretty much alike, except the New Britain loom, which, as already pointed out, has cylindrical beams and differs further in having the spool square nosed (Fig. 161) instead of pointed as in the other cases (Figs. 163, 169, 170). Schmeltz and Krause[1] describe in words some of the Santa Cruz spools in the Godefrey collections without giving any illustrations,







which is not satisfactory, and I cannot find that they, or any other writers, refer to this form of spool end, although the Coquille illustration may possibly indicate a square-nosed spool end. The spool and the origin of the New Britain loom are out of the common and we need further information about it. It was purchased by the late Sir Augustus W. Franks for the British Museum, from a Norwegian captain.

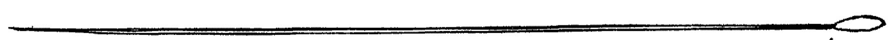
[1] *Op cit.*, pp. 326 and 345.

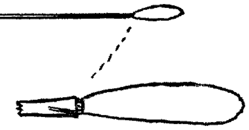
Origin of Loom.	Museum where now placed.	Length, Beam to Beam inclusive.		Width of Web per—		No. of Warp to the		No. of Picks to the		Section of Warp Beam.	Spool End.	Warp and Weft.	Heddle Leashes.
		In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.				
Santa Cruz ..	Bankfield ..	43	109	6⅛	15.6	21	8.3	23	9	Square ..	Taper to a point.	All of non-spun filament.	Twisted filament, continuous, alternate, overlapping.
,, ..	Cambridge ..	27½	70	16½	42	34	13.4	16	6.3	,, ..	,, ,,		
,, ..	Norwich ..	38½	98	20⅜	52	35	13.8	21	8.3	,, ..	—		
,, (?)..	Brighton ..	43⅓	110	35½	90	32¼	12.7	14½	5.7	Flat on 3 sides.	—		
Vera Cruz ..	British ..	19½	49.5	10¼	26	32	12.6	25	9.8	Square ..	Taper ..		
Sikiana ..	,, ..	49¾	126	21½	54.5	32	12.6	25	9.8	,,	—		
Santa Cruz ..	,, ..	30	76	7⅞	20	44	17.3	25	9.8	,, ..	Taper ..		
,, ..	,, ..	60	152.5	19¼	49	42	16.5	24	9.4	,, ..	—		
Rotuma ..	Imperial Institute.	52	132	—	—	25	9.8	19	7.5	Rectangular	—		
New Britain ..	British ..	28	71	25½	65	25	9.8	23	9	Circular ..	Flat-nosed..		

The Rotuma specimen (Fig. 168), which is a typical Santa Cruz loom, except that the warp beam is rectangular, appears to indicate that the loom has travelled further west than has been suspected hitherto. Rotuma is an island about 480 miles almost due west of Tukopia, where Parkinson has reported[1] its existence, this island lying E.S.E. of Vanikoro, Santa Cruz group, and N.W. of Vanua Levu, Banks Island. That is to say the loom must have travelled twice the distance it did earlier in its migration from Pikiram (Greenwich) Island to Nuguria (Abgaris) Island. Nothing so very great. Unfortunately the authorities of the Imperial Institute can only say they received it labelled from Rotuma Island. One of the patterns (Fig. 168) is somewhat similar to those illustrated by Graebner, but nearly all his pattern illustrations are so small as to be almost useless, which is rather curious as he lays stress on the patterns as evidence of migration.

The patterns on these woven mats are arranged in more or less broad bands (Figs. 164 and 168) embroidered over the picks by means of banana fibre coloured black on one side only, that is they do not show on the wrong side. There is a loose specimen of this coloured fibre with the Norwich Castle Museum loom. Fringes also arranged in bands by insertion are common and on some there are loops arranged apparently for supporting the mats, which may have given origin to the fringe decoration. A specimen of the embroidery needle is shown in Fig. 171.

FIG. 171. EMBROIDERY NEEDLE, SANTA CRUZ. IN THE POSSESSION OF MR A. LISTER-KAYE, FROM EDGE-PARTINGTON'S ALBUM.





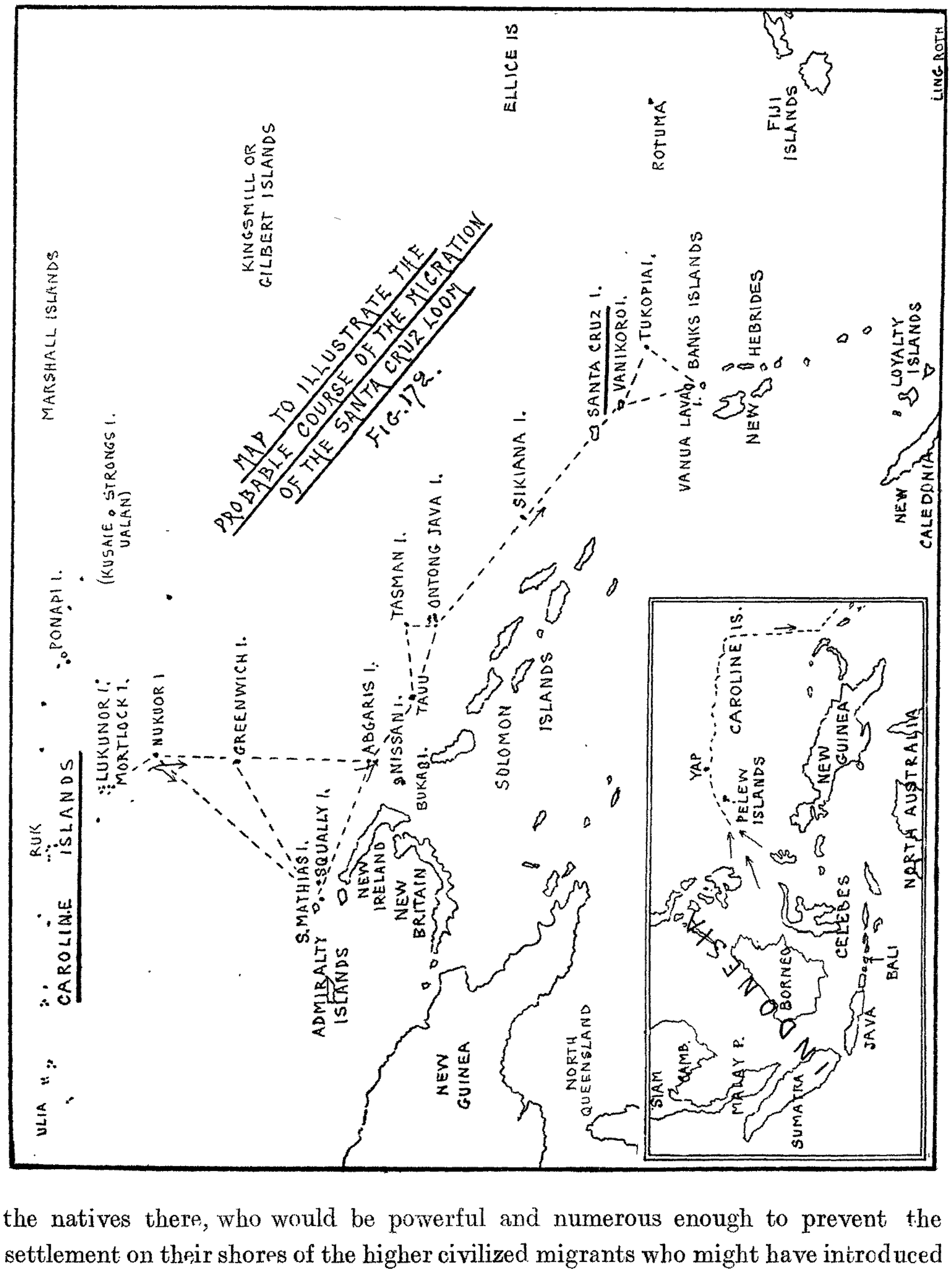
"LONG NEEDLE OF WOOD [38 IN = 96·5 CM] WITH LOOP OF COCO-NUT FIBRE PEGGED IN, USED FOR DRAWING THRO' THE BLACK THREAD WHICH FORMS THE PATTERN. THE FIBRE IS MADE FROM THE TRUNK OF THE BANANA SCRAPED DOWN AND BLEACHED."

The route by which this Indonesian loom reached so far east has been conjectured and studied by Codrington[2], Parkinson, Graebner and others, from whose works I have prepared the accompanying map (Fig. 172). It would appear to have come via the Pelews and Carolines, and supposing it to have traversed the shortest route it would have come from Nukuor via Greenwich (Pikiram or Kapinga-marangi) island and thence either to St. Mathias Island, and its neighbours Kerue and Squally islands, or to Abgaris (Nuguria or Faed) island, thence to Tauu (Mortlock) island to Tasman island (Nukumana atoll), to Ontong Java (Leventiua or Lord Howe's) island, Sikiana (Stewart) island to Santa Cruz group, thence to Banks Island, or

[1] *Op. cit.*, p. 343.

[2] *The Melanesians*, Oxford, 1891, pp. 20 and 316.

perhaps first to Tukopia, and thence to Banks Island. It will be seen that in the course of its migration it fringes the northern boundary of the Solomon Islands without establishing itself on them, a fact no doubt due to the ferocious nature of



the natives there, who would be powerful and numerous enough to prevent the settlement on their shores of the higher civilized migrants who might have introduced the loom. On the small outlying islands where the natives were fewer in number the immigrants would necessarily have more chance of settling and introducing their culture.

From all accounts, in the Pelews, if it ever did exist there, and in most of the Carolines, as well as in the islands which formed the stepping-stones of its migration, the loom has now disappeared. Codrington[1] more than thirty years ago recognised that it had vanished from Banks Island, a disappearance which Rivers[2] ascribes to the loss of ritual essential to the working of the loom. Rivers' corollary that ritual was therefore an essential factor in primitive weaving may be supported, if support be necessary, by the conclusion one must draw from the Bhotiya webstress' refusal to work with any but a certain beater-in as mentioned on p. 333, and by the apparent ritual in use with the Java loom as referred to on p. 344.

[Part IV—Conclusion—to follow.]

[1] *Op. cit.*, p. 321.
[2] *History of Melanesian Society*, Cambridge, 1914, ii, p. 444.