

of the class pualu would be referred to merely as *koko*. To one made of ahuawa the

name *koko ahuawa* was applied, while the chiefs' *koko* were never known otherwise than *koko puupuu*. The knots used in the structure of the *koko pualu* were the *ka*, and more rarely the *makili*. The mesh was always large and plain.

A variation of this form with a smaller mesh was employed to carry such articles as sweet potatoes, taro, etc., without the aid of an *umeke*. It was made with a *piko* and *hanai* as in the *koko pualu*, but instead of the *kakai* as shown in Fig. 108, a cord was run through the outer selvage of the bag, thus serving to close the opening and act as a handle. This implement was known as an *eke* or *laulau*.

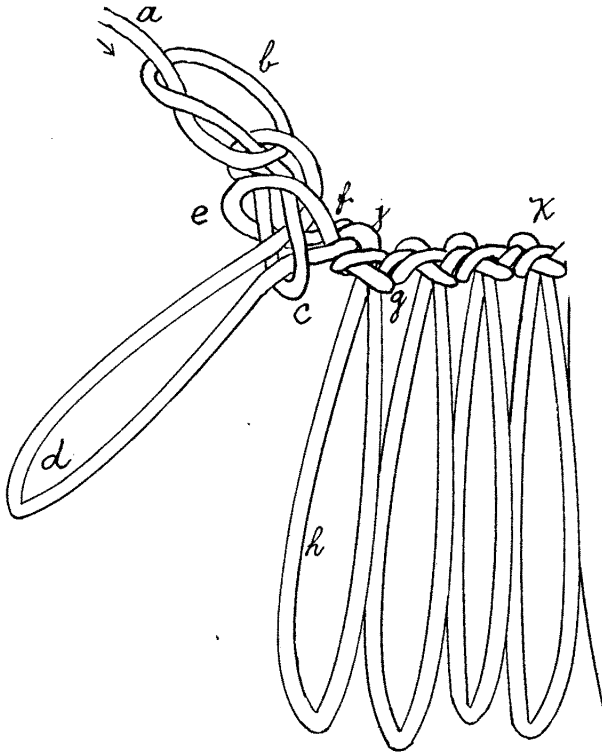


FIG. 129. PIKO M.

the alii, who were exceedingly jealous of their dignity, promptly punishing by death any presumption on the part of a plebeian in making personal use of such a *koko*.

One reason for which a *makaainana* might carry the *koko puupuu* for his own needs, was protection against robbery by the *kahu* of some alii for his master. A commoner carrying food in a *koko pualu* was always liable to have it appropriated by any one of higher rank than himself, since the *koko pualu* indicated that it was only the belonging of a *makaainana*; but the subterfuge of utilizing a *koko puupuu*, implying that the carrier was in the service of a chief, would protect the property unless the man were found out, when the consequences to himself would be

Koko Puupuu.—The *koko puupuu* was reserved for the sole use or service of

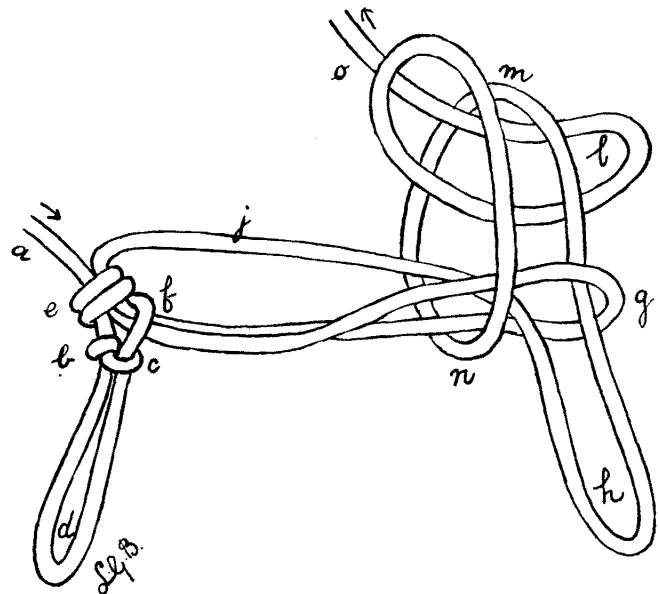


FIG. 130. PIKO N.

very disastrous. This koko took its name from *aipuupuu*,³⁸—the steward of a person of high rank, deputed to carry and care for the alii's food. The modern native gives the meaning of *puupuu*³⁹ in this connection as a complicated or thick knot, of which this koko is generally formed, but since some of the koko *puupuu* are of simple netting, Fig. 134, though of very fine mesh, it would seem that the derivation of the name came through the word *aipuupuu*, the explanation of which was contributed by a very old native fisherman.

The material in the koko *puupuu* is mainly *waoke*, but *coir*, *oloná*, and in later days *horsehair*, were also used. Frequently the *piko* and lower part of *hanai* are of *coir*, and the upper part and *kakai* of *waoke*, rarely *oloná*, Fig. 104 *c* and *d*, and 105 *b*, known as *pauku*. Occasionally two or more materials, generally *coir* and *waoke* alternate in rows, when the koko *puupuu* is termed *onionio* or *paukuku*. It is quite possible that *horsehair* succeeded *human hair*, which was used very extensively in the neat braid of the *niho palaoa* and for decorating fan handles.

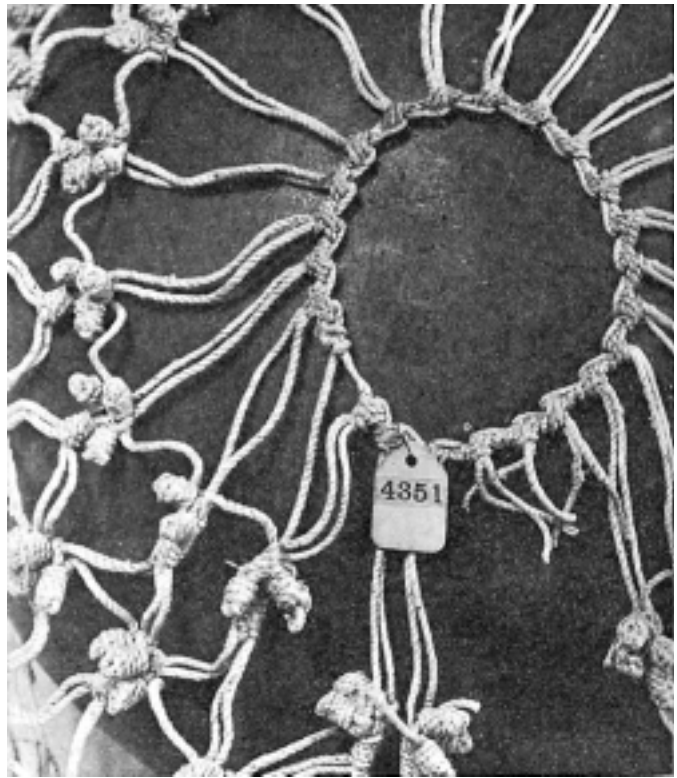


FIG. 131. PIKO N, HANAI G.

The knots in the *hanai* were either knitted or netted, taking for the application of the word knitted, a slip knot, or one that when formed may be undone by drawing on the last end of the cord. The knitted knot is shown in detail in Fig. 137 and following.

It might be here mentioned that enquiry among the older generation of living natives elicited almost no information concerning the manufacture and use of koko, particularly the koko *puupuu*, as these articles have been out of use for many years. One old man explained that he had seen his grandfather make them, but that he himself had had no use for them so did not take the trouble to learn. However, he could make good fish nets! There are a few natives in Honolulu who make koko for sale to tour-

³⁸ *Aipuupuu* = callous-necked. These men (class) were always recognized by a large callus on the shoulder, caused by the *auamo*, and were very proud of the mark denoting their office.

³⁹ *Puu*, *puupuu*, *pu* and *pupu*, in Hawaiian are very closely allied. *Puupuu* and *puu* mean, in short, "Any round protuberance belonging to a larger substance." (See Andrews' Hawaiian Dictionary.)

ists, but they unfortunately did not acquire the art by inheritance, merely having picked it up by unravelling some old specimen.

It was particularly desired to learn the exact process of the native knitting and the names of such styles of hanai as E, F, H-N, and failing native sources, a thorough search among old voyages was carried out, with poor results. Only two works mention

the existence of the koko. Freycinet wrote of the nettings for gourd bowls:⁴⁰ "Après le repas, on pose un de ces plats sur l'ouverture de la calebasse qui contient la poé, et le tout est surmonté d'un couvercle, qui n'est aussi qu'un morceau de calebasse; le tout est enveloppé et assujetti dans un filet à larges mailles, qui sert à le suspendre."

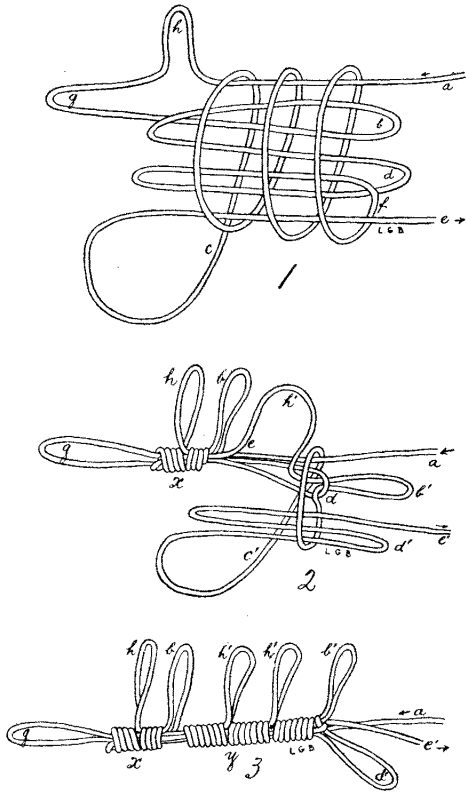


FIG. 132. PIKO O.

Wilkes gave several illustrations of the methods of carrying, and remarked:⁴¹ "... they [calabashes] are surrounded by a net made of fine twine or sennit of the cocoanut."

It might appear that the knitted knot, the puu, was a conception entirely Hawaiian, for none of the other members of the Polynesian race seem to have possessed such a knowledge. However, some doubt has occurred to the writer as to whether it was even native. The koko noticed in the narratives just mentioned, as a reference to the volumes will show, were koko pualu and of course netted, while some

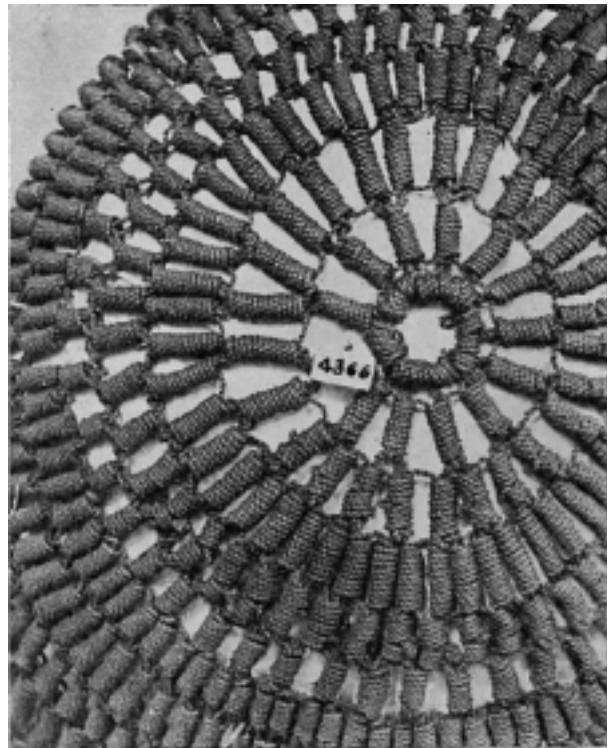


FIG. 133. PIKO O, HANAI D.

⁴⁰ Freycinet. Voyage autour du monde. Historique, Tome II, pp. 582; Atlas, pl. 86.

⁴¹ U. S. Expl. Exped. Narrative, Vol. IV, p. 96, plate opposite p. 55, and other illustrations.

of the koko puupuu, Figs. 115, 147 and 148, were surely too remarkable to have escaped observation. All the older natives conversed with and enquired of claimed that the

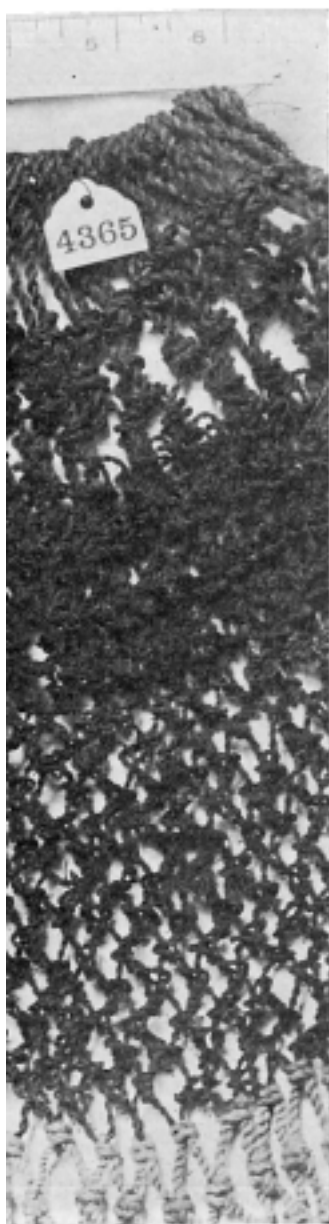


FIG. 134. HANAÏ A+B.

puu was very ancient—long antedated the advent of Captain Cook. Still, too great reliability cannot be placed on these claims when the history of the Eskimo netting needle mentioned among the tools is considered. A comparison of the puu with the knot commonly known as the hangman's knot will show that the former is but a slight modification of the latter. Foreign sailors have closely associated with the natives since 1778, and the sailor with his knowledge of knots on the one hand and the native on the other eager to learn the foreigner's ways would make it a simple matter to introduce a new method into their work. A koko puupuu of waoke in the Museum, No. 9050, and another of oloná, found in the possession of a

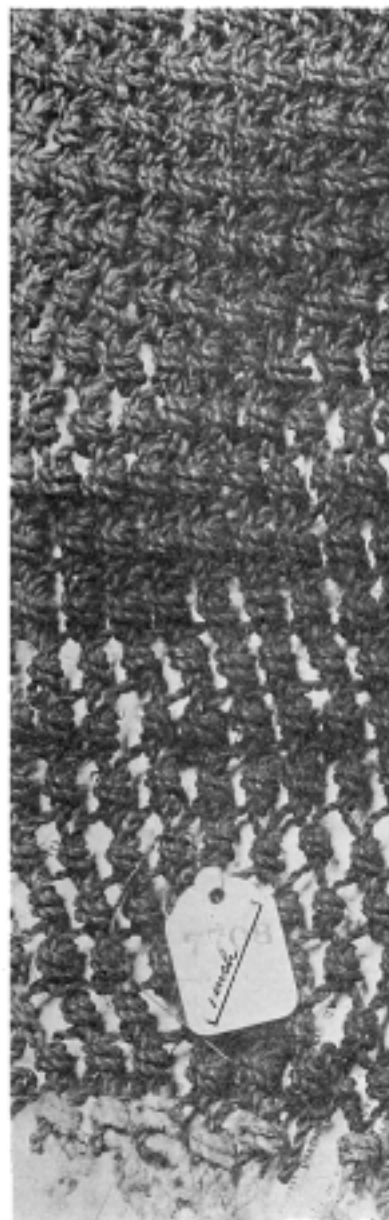


FIG. 135. HANAÏ B.

gentleman in Honolulu, were begun in the native way with Piko F, but had the hanai made of simple knitting, Fig. 151, and finished with a row of the puu. It is known that the natives were taught plain knitting by the missionaries, who came here in 1820, and proved

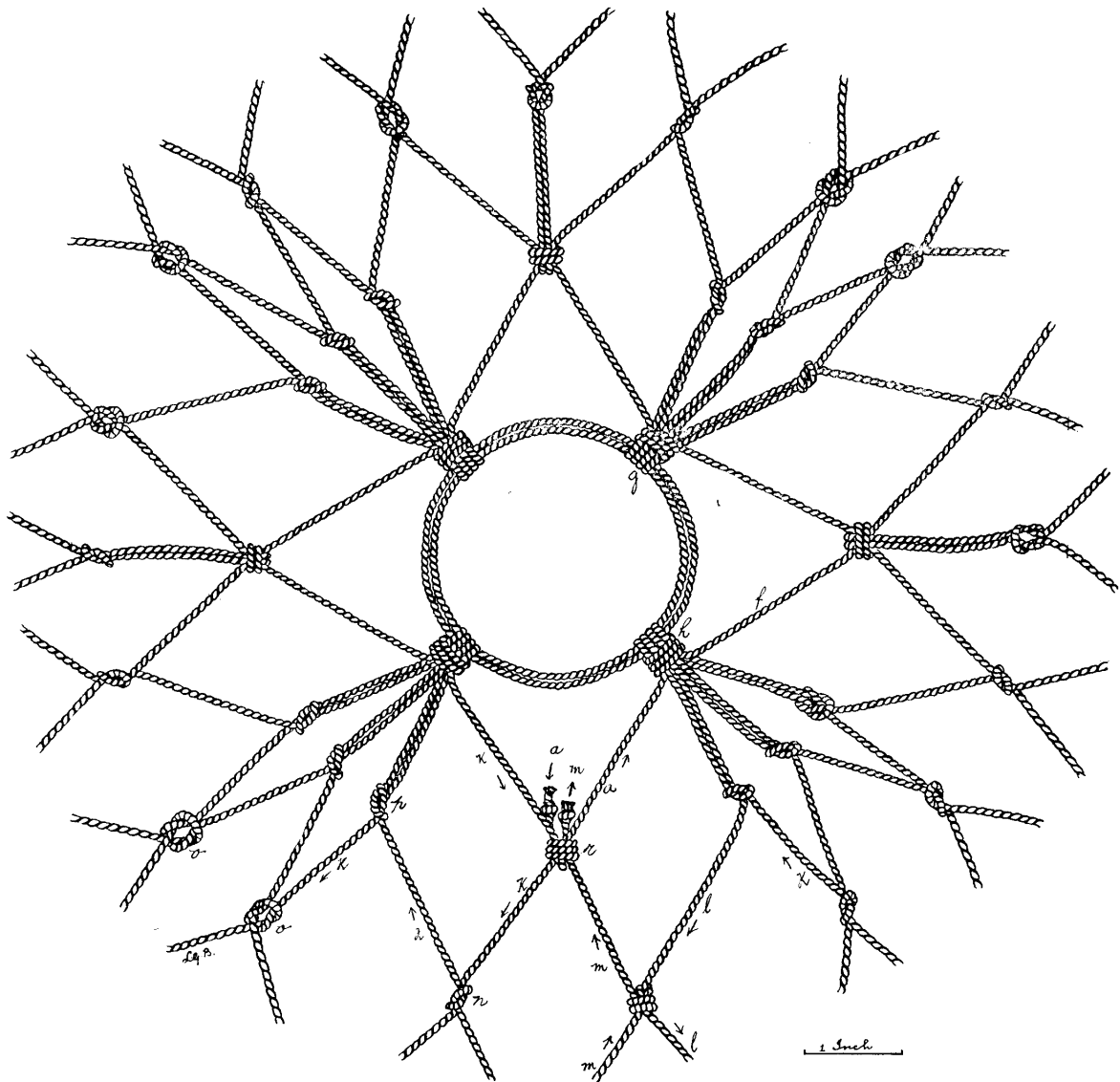


FIG. 136. HANAI C, PIKO D.

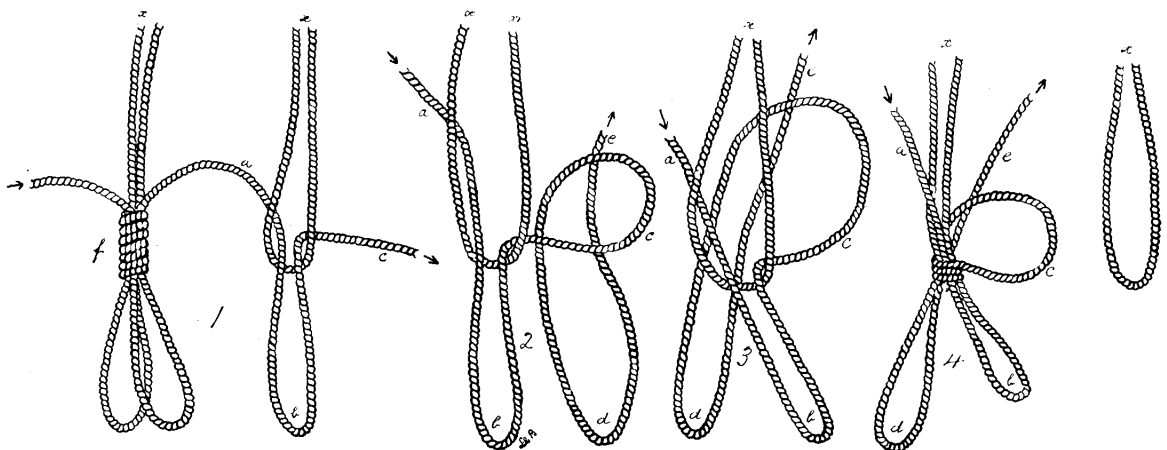
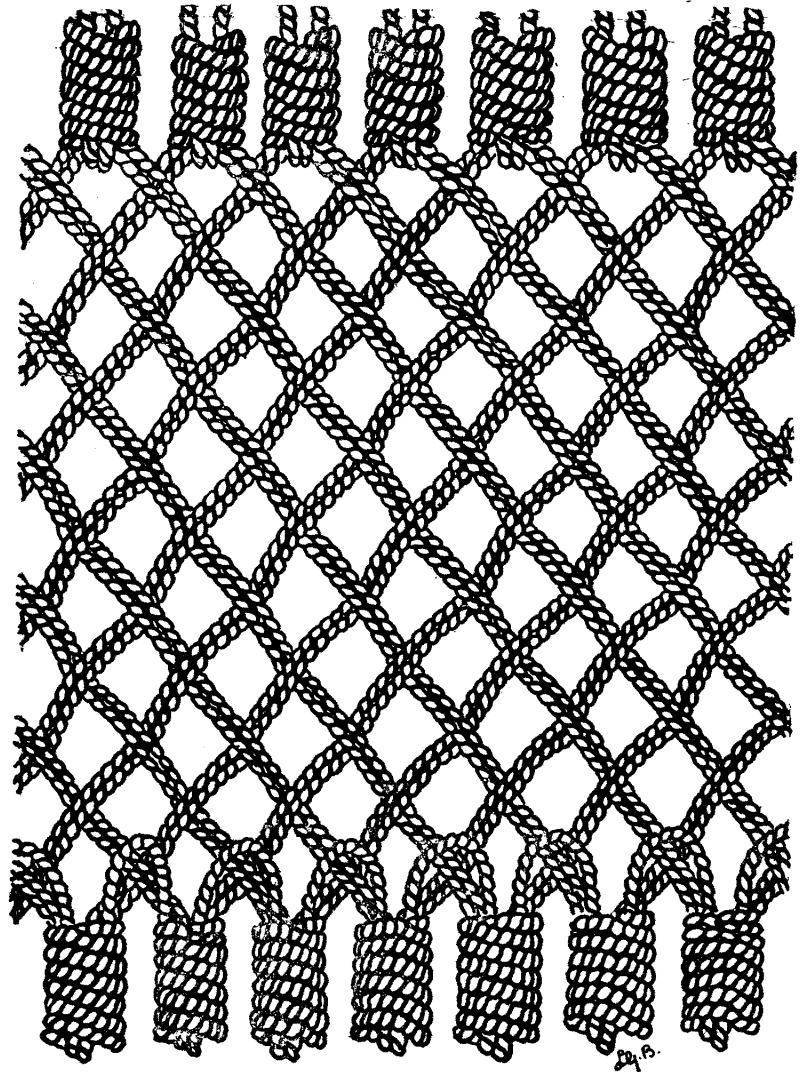


FIG. 137. HANAI D.

apt pupils. It may be that the natives owe the knowledge of the puu to Juan Gaetano's Spaniards of about 1550, as with the shapes of their remarkable feather helmets.

However, no matter what the origin, even if the knot were of foreign introduction, the natives had seen its adaptability to their work, and by their adoption of it into the manufacture of their articles, they have surely given it a domicile sufficiently Hawaiian.

There are many attractive patterns in the koko puupuu, to which no native in these days is able to attach any significance or name. One old native, after being questioned in vain, remarked disgustedly: "The haole (foreigners) want all the time to put a number or a name on everything, but these to the natives were just koko." It was thought by the writer that the different grades of alii (which were multitudinous) might be entitled to distinct styles of koko, and without doubt, the greater the chief, the better was the koko. Certain chiefs



1 Inch.

FIG. 138. HANAI E.

were entitled to a particular form of tabu (or kapu) and in their presence, or when their food was carried by, the common people were required to fall on their faces, sit or kneel, according to the order of the tabu. It seemed quite feasible that certain of the koko might designate the rank of the owner by the pattern and so make it known to the people, but Dr. Alexander, a recognized authority of matters Hawaiian, stated that for the purpose of proclaiming the degree of chiefship, a crier was sent before the

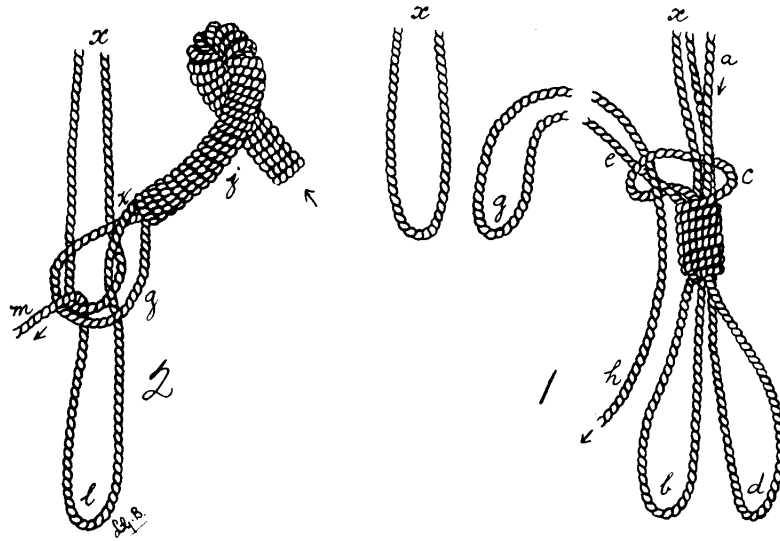


FIG. 139. HANAI F.

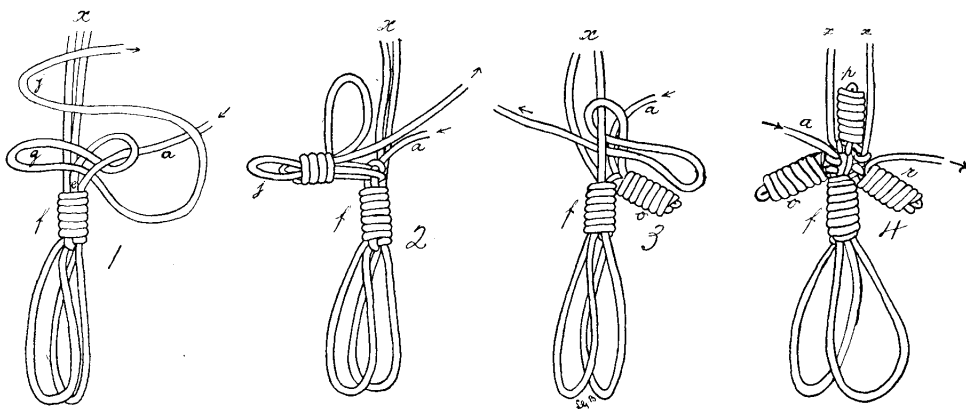


FIG. 140. HANAI G.

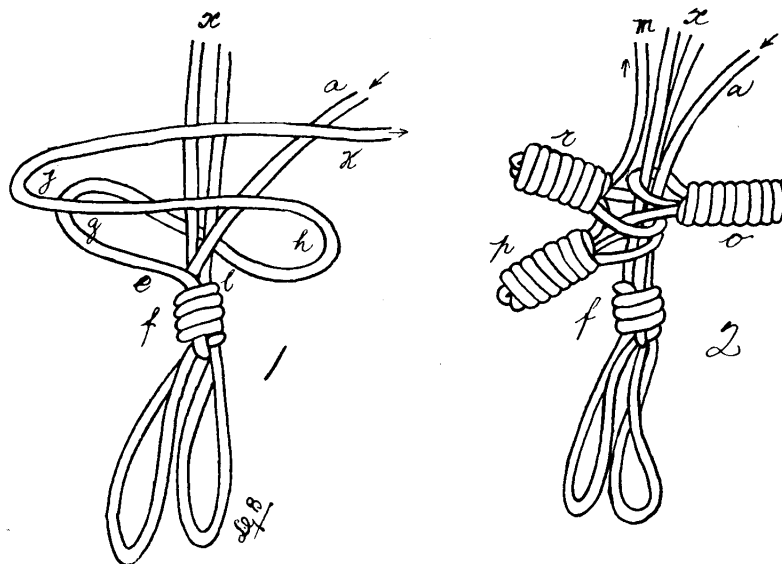


FIG. 141. HANAI G.

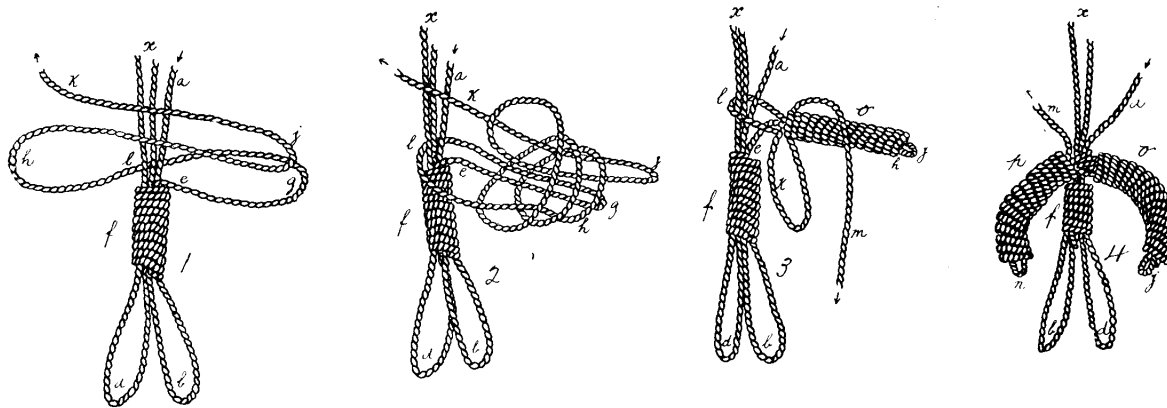


FIG. 142. HANAI H.

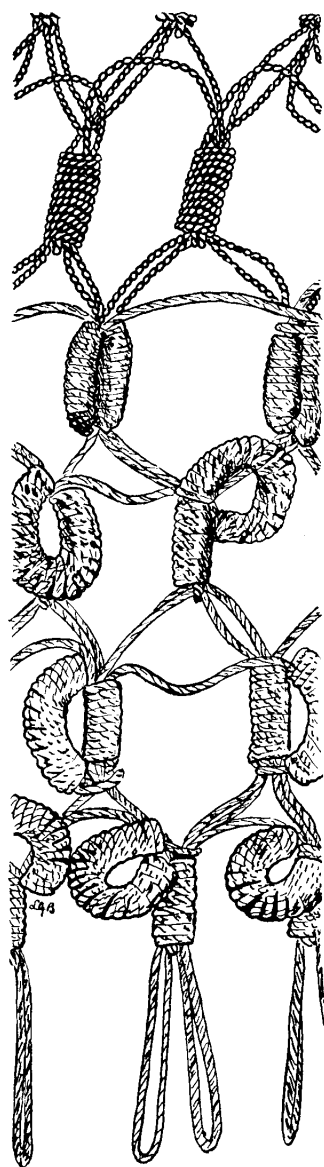


FIG. 143. HANAI H.

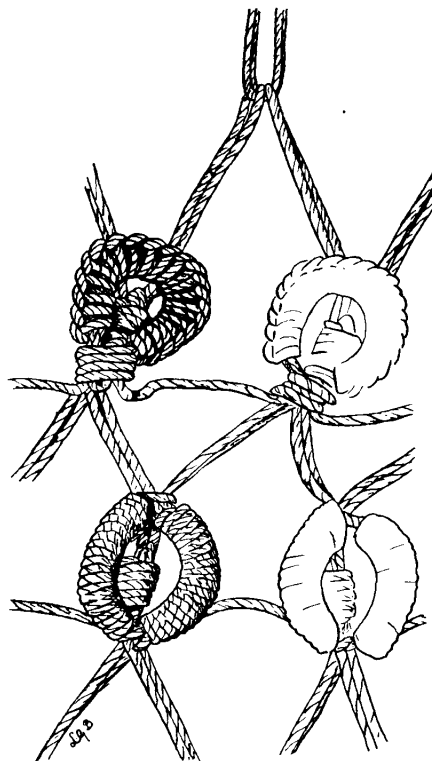


FIG. 144. HANAI H+J.

aiupuupu. An old fisherman claimed that by the creak of the koko on the umeke as the aiupuupu walked, the people could tell when the koko of a chief were approaching.

Tyerman and Bennet referred to this custom:⁴² "So stately, too, was the royal etiquette, during his reign [Kamehameha I] that whoever happened to meet the king's calabash of water, as it was brought from the spring to the house, was required to unrobe, and lie down upon the earth, till the bearer of the vessel had gone by."

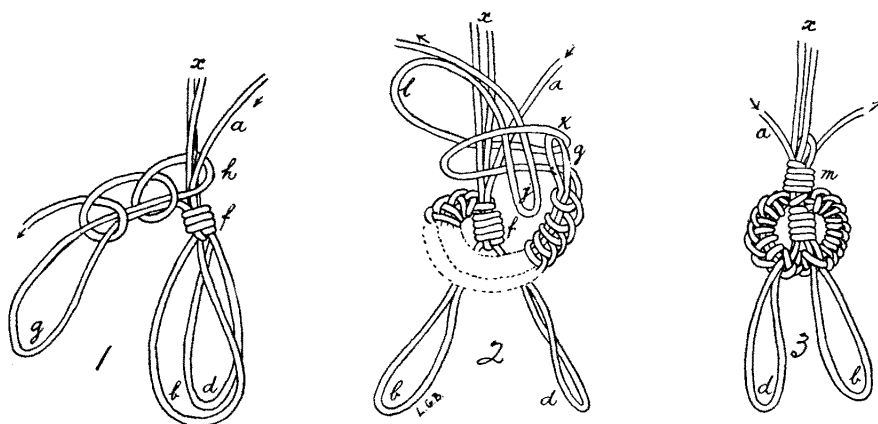


FIG. 145. HANAI J.

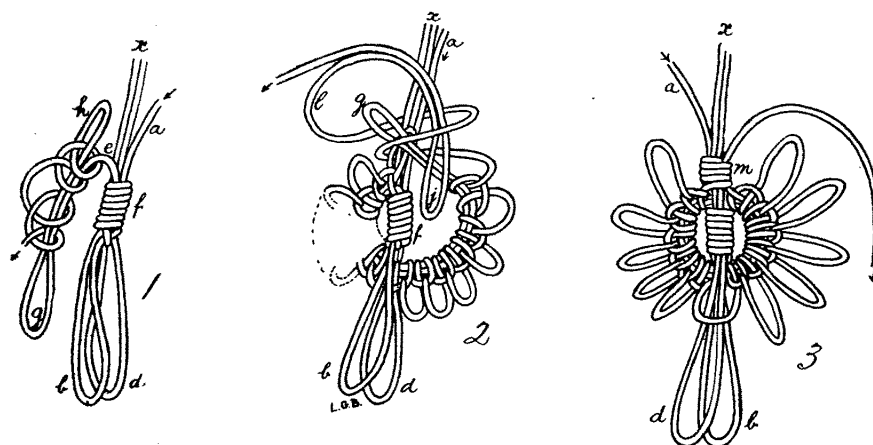


FIG. 146. HANAI K.

In Andrews' Hawaiian Dictionary, a definition of the word *maoloha* occurs as: "The ancient name of the strings or net for a calabash, equivalent to the modern word koko." Natives were questioned about any knowledge of *maoloha* in these days, and one old fisherman said that *koko makalii* or *koko maoloha* existed before the time of Kamehameha the First, but were now no longer; that the name was now applied to the *koko* carried by the man in the moon. David Malo, in his account "Moolelo

⁴² James Montgomery; Journal of Tyerman and Bennet, Vol. II, p. 69. Boston, 1832.

Hawaii,"⁴³ refers to the koko of Maoloha as being connected with the ceremonies of the Makahiki festival. Following the end of the services, he says: "A net [koko] with large meshes was then made, which, being lifted by four men supporting it at four corners, was filled with all kinds of food, such as taro, potatoes, breadfruit, bananas, cocoanuts, and pork, after which the priests stood forth to pray. When the kahuna [priest] in his prayer uttered the word hapai (lift) the men lifted the net and shook it back and forth, to make the food drop through the meshes, such being the purpose of the ceremony. This was called the net of Maoloha. If the food did not drop from the net, the kahuna declared there would be a famine in the land; but if it all fell out he predicted that the season would be fruitful."

Dr. Emerson adds the following interesting note to his translation:—"Koko a Maoloha, the net of Maoloha. The ex-

pression is used *Ke koko a Maoloha i ka lani*. Tradition says that the first appearance of the Koko of Maoloha was in time of famine, when Waia was king on Hawaii.

⁴³ *Hawaiian Antiquities (Moolelo Hawaii)* by David Malo, Translated from the Hawaiian by Dr. N. B. Emerson. Honolulu, 1903. p. 197.

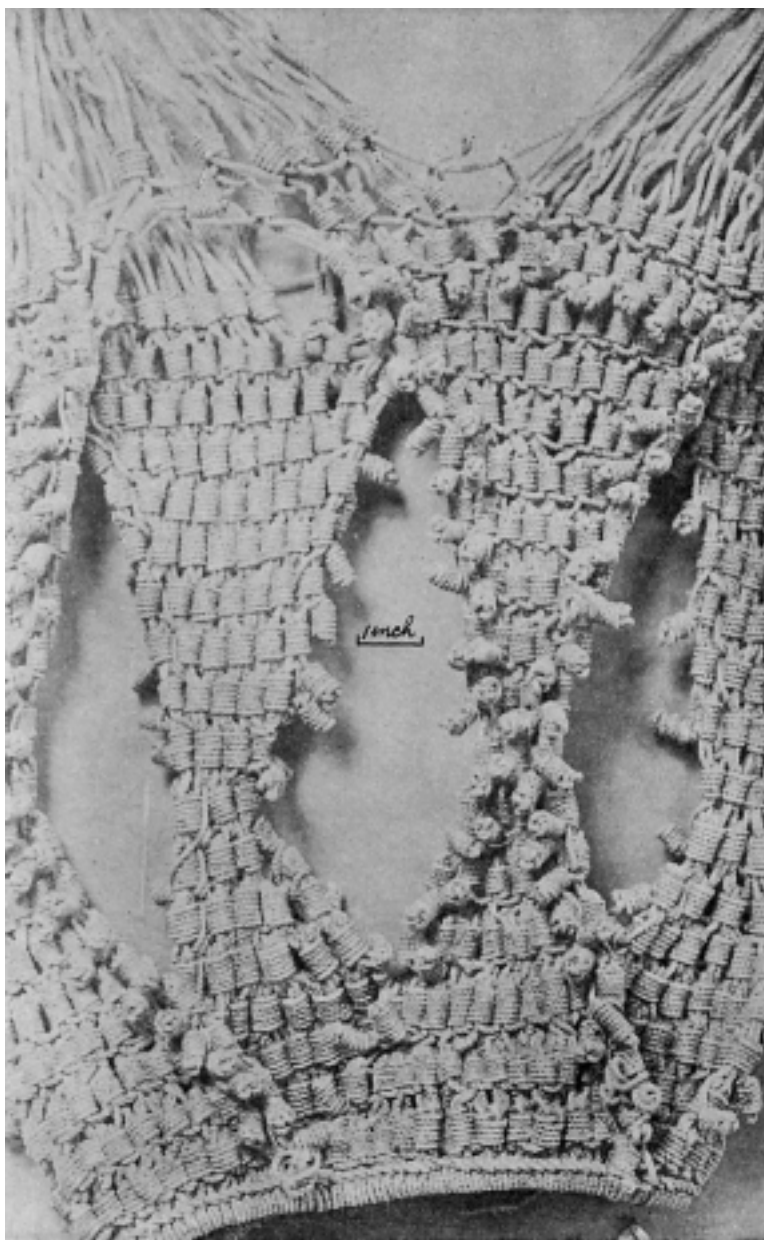


FIG. 147. HANAI L.

In view of the famine that distressed the land, Waia, who was a *kupua*, possessed of superhuman powers, let down from heaven a net whose four corners pointed to the North, South, East and West, and which was filled with all sorts of food, animal and vegetable. This done he shook the net and the food was scattered over the land for the benefit of the starving people." Also:⁴⁴ "Apropos of the net of *Maoloha*, at the time the net was filled with food and shaken, the following responsive service, called *ka pule koko*, the prayer of the net, was celebrated. The net is lifted and the kahuna opens the service saying:—

- | | |
|-----------------------------------|---|
| 1. E uliuli kai, e Uli ke akua e! | Oh deep-blue sea, Oh god Uli! |
| 2. E uli kai hakoko! | Oh blue of the wild, tossing sea! |
| 3. Koko lani e Uli! | Net of heaven, oh Uli. |
| 4. Uli lau ka ai a ke akua. | Green are the leaves of God's harvest fields. |
| 5. Piho lani koko; e lu—! | The net fills the heavens—Shake it! |

"Then the people respond:—

- | | |
|-------------------------------|---------------------------------------|
| 6. E lu ka ai a ke akua! | Shake down the god's food! |
| 7. E lu ka lani! | Scatter it oh heaven! |
| 8. He kau ai keia. | A season of plenty this. |
| 9. E lu ka honua! | Earth yield up thy plenty! |
| 10. He kau ai keia.. | This is a season of food. |
| 11. Ola ka aina! | Life to the land! |
| 12. Ola ia Kane, | Life from Kane, |
| 13. Kane ke akua ola. | Kane the god of life. |
| 14. Ola ia Kanaloa! | Life from Kanaloa! |
| 15. Ke akua kupueu. | The wonder-working god. |
| 16. Ola na kanaka! | Life to the people! |
| 17. Kane i ka wai ola, e ola! | Hail Kane of the water of life! Hail! |
| 18. Ola ke alii Makahiki! | Life to the king of the Makahiki! |
| 19. Amama, ua noa. | Amama. It is free. |
| <i>Kahuna:</i> Noa ia wai? | Free through whom? |
| <i>People:</i> Noa ia Kane. | Free through Kane. |

"Then the kahunas stand up holding their hands aloft, and the people exclaim: 'Ua noa. Ua noa. Ua noa.' At the same time holding up the left hand, and at the utterance of each sentence, striking with the right hand under the left arm-pit.

"When the kahuna utters the words '*E lu*'—in the 5th line—those who are lifting the net shake it and make its contents fall to the ground."

A legend called the "Koko a Makalii" was narrated to the writer by a Hawaiian repository for such and is here repeated in brief: "Kane, the highest god in the Hawaiian pantheon, had connection with a woman on earth and became the father of Makalii. During a time of severe drought, the people made prayers and offerings to Kane for rain, which were disregarded by the deity. Then Makalii, grieving for the

⁴⁴Ibid, p. 204-6.

starving people, declared that he would go to his father and demand rain. Provided with koko of exceeding fine mesh⁴⁵ he approached the Polynesian Jove, who welcomed his son and filled the koko with water. When Makalii returned to earth the water dropped through the meshes of the koko and fell as rain.”

It is probable that the two accounts refer to the same thing, as the pule koko recorded by Dr. Emerson would fit the Koko a Makalii, if anything, better than the Koko a Maoloha. As far as known, no such net as that used in the ceremonies has ever been preserved. There may have been a service at the end of the makahiki festival somewhat similar to that described by Malo in commemoration of Makalii's dar-

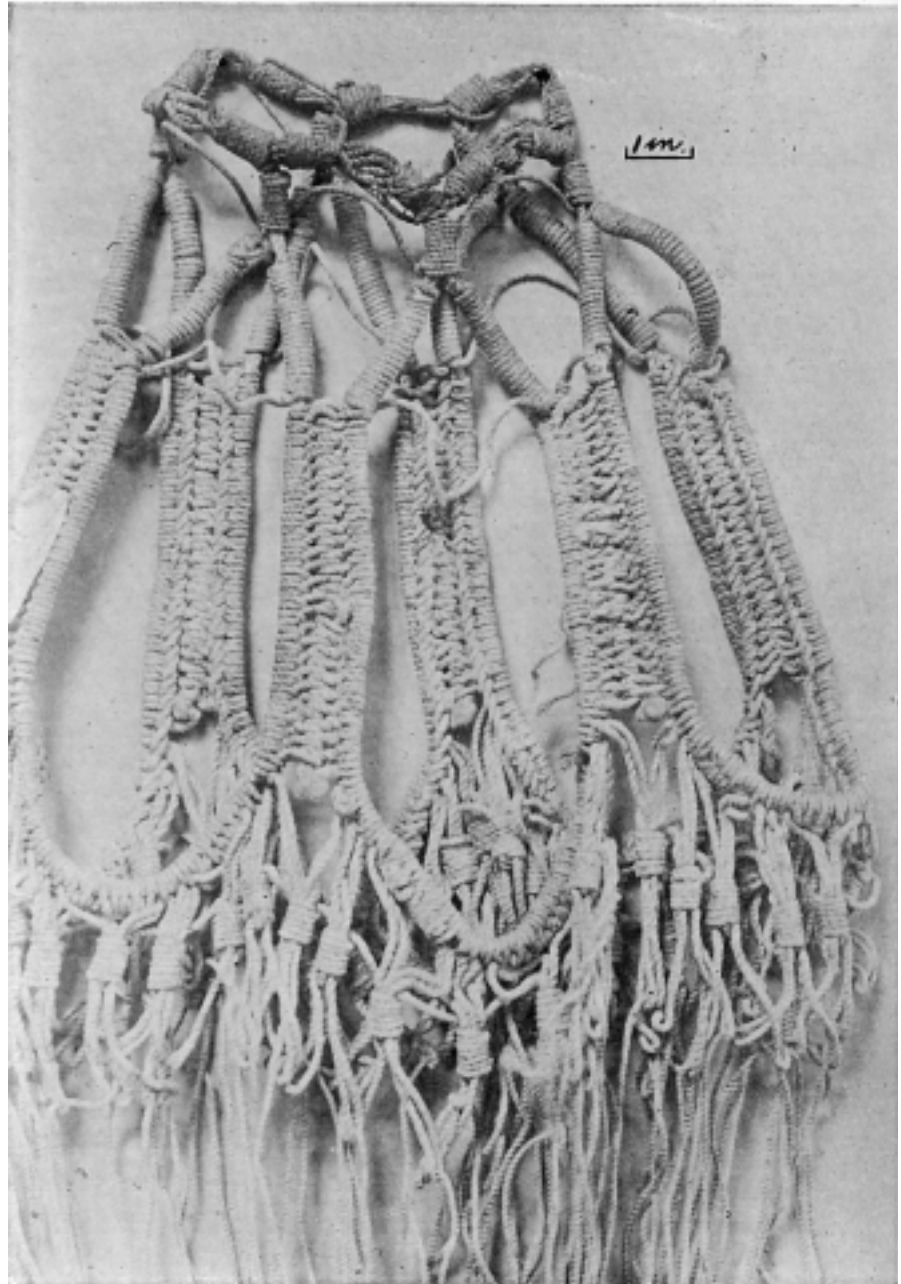


FIG. 148. HANAI M.

ing and beneficial act, but Malo's account is so nearly parallel with that of Peter's vision⁴⁶ that the two must have been confused. At the time of Malo's conversion to

⁴⁵ Maka = mesh, and lii = small.

⁴⁶ Acts, 10; 11, 12.

the Christian religion he was considered exceptionally well versed in native traditions, but following the change he became an ardent but narrow Christian, unable to distinguish between good or bad in the native lore, and condemning the whole as evil. While his mind overflowed with biblical accounts, he wrote his "Moolelo Hawaii," so that it would be quite natural for a bible story to occasionally creep into his relations.

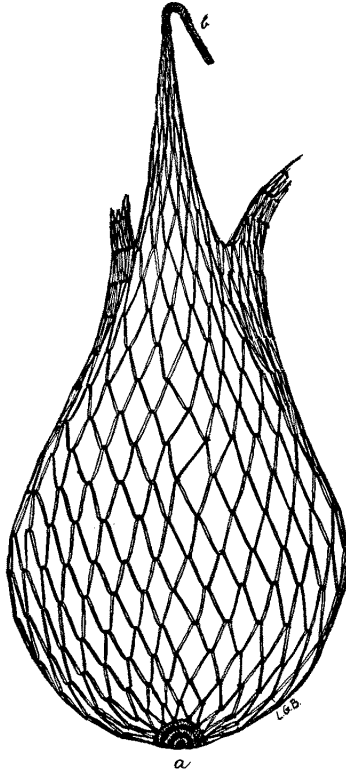


FIG. 149.

In the following lists of koko in the Museum, the measurements are given in inches. The length mentioned is only that of the hanai and piko combined, the kakai being about as long again. The pu of the kakai is *uo* unless specified otherwise. A comparison of the size of the knot or *puu* with the mesh will give an idea as to the closeness of some of the netting, and it is quite probable that those koko with the very fine mesh were used as *eke*, as such are generally accompanied with a *piko*, the ring of which is very small.

KOKO PUALU.

4423. Ahuawa; Piko A, Hanai C; length 21, mesh 2.2; kakai, pu lino; heavy cord.
4424. Coir; Piko A, Hanai C; length 19, mesh 3.4; rope.
4425. Ahuawa; Piko D (small), Hanai C; length 22, mesh 2.9; kakai, pu lino; heavy cord.
4426. Coir; Piko E, Hanai A; length 30, mesh 9; kakai, pu lino; rope.
4427. Coir; Piko A (small, diam. 1), Hanai C; length 16, mesh 4.8; heavy cord.
4428. Coir; Piko A, Hanai C; length 30, mesh 8; heavy cord.
4429. Coir; Piko E, Hanai A; length 14, mesh 5; kakai, pu lino.
4430. Coir; Piko E, Hanai A; length 17, mesh 5.5; kakai, pu lino.
4431. Coir; Piko E, Hanai A; length 18, mesh 5.5; kakai, pu lino.
4432. Coir; Piko E, Hanai A; length 14.5, mesh 5.5; kakai, pu lino.
4433. Coir; Piko E, Hanai A; length 19, mesh 6.6.
4434. Coir; Piko D, Hanai A; length 12, mesh 3.1.
4435. Coir; Piko D, Hanai A; length 12.5, mesh 3.3.
4436. Coir; Piko D, Hanai A; length 13, mesh 3.2.
4437. Coir; Piko E, Hanai A; length 27, mesh 9.5; no kakai; heavy cord.
4438. Coir; Piko E, Hanai A; length 18, mesh 5; kakai without pu.
4439. Hau; Piko C, Hanai A; length 16, mesh 7.3.
4440. Coir; Piko D, Hanai A; length 18.5, mesh 5.7.
4441. Coir; Piko D, Hanai A; length 18, mesh 5.2.
4442. Coir; Piko C, Hanai A; length 13, mesh 4.3; heavy cord. Fig. 114.

4448. Oloná; Piko C, Hanai A; length 20.5, mesh 7.5.
 4449. Waoke; Piko A, Hanai A; length 12, mesh 5; kakai, pu lino.
 4450. Waoke; Piko C, Hanai A; length 7.5, mesh 1.6.
 4452. Cotton cord; Piko D, Hanai A; length 6.5, mesh 4.
 4453. Waoke; Piko D, Hanai C; length 12.5, mesh 3.5.
 4463. Coir; Piko B, Hanai A; length 12, mesh 1.2; no kakai.
 6859. Coir; Piko C, Hanai A; length 17, mesh 5.6.
 9017. Hau; Piko E, Hanai A; length 8, mesh 4.5.
 9018. Coir; Piko A, Hanai C; length 15, mesh 4.5.
 9019. Coir; Piko C, Hanai C; length 23, mesh 8.
 9020. Coir; Piko A, Hanai C; length 29, mesh 7.5; heavy cord.

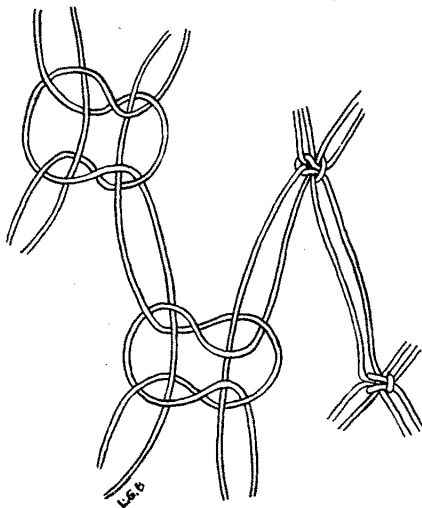


FIG. 150.

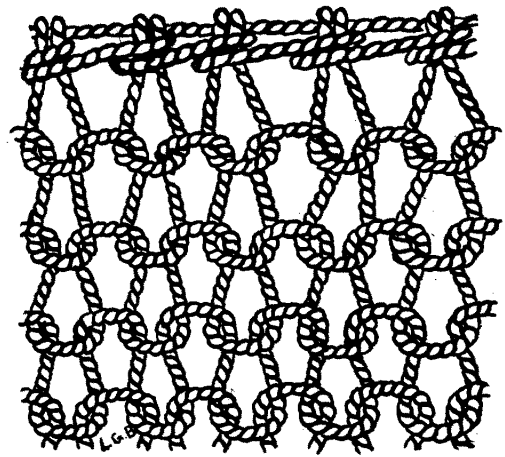
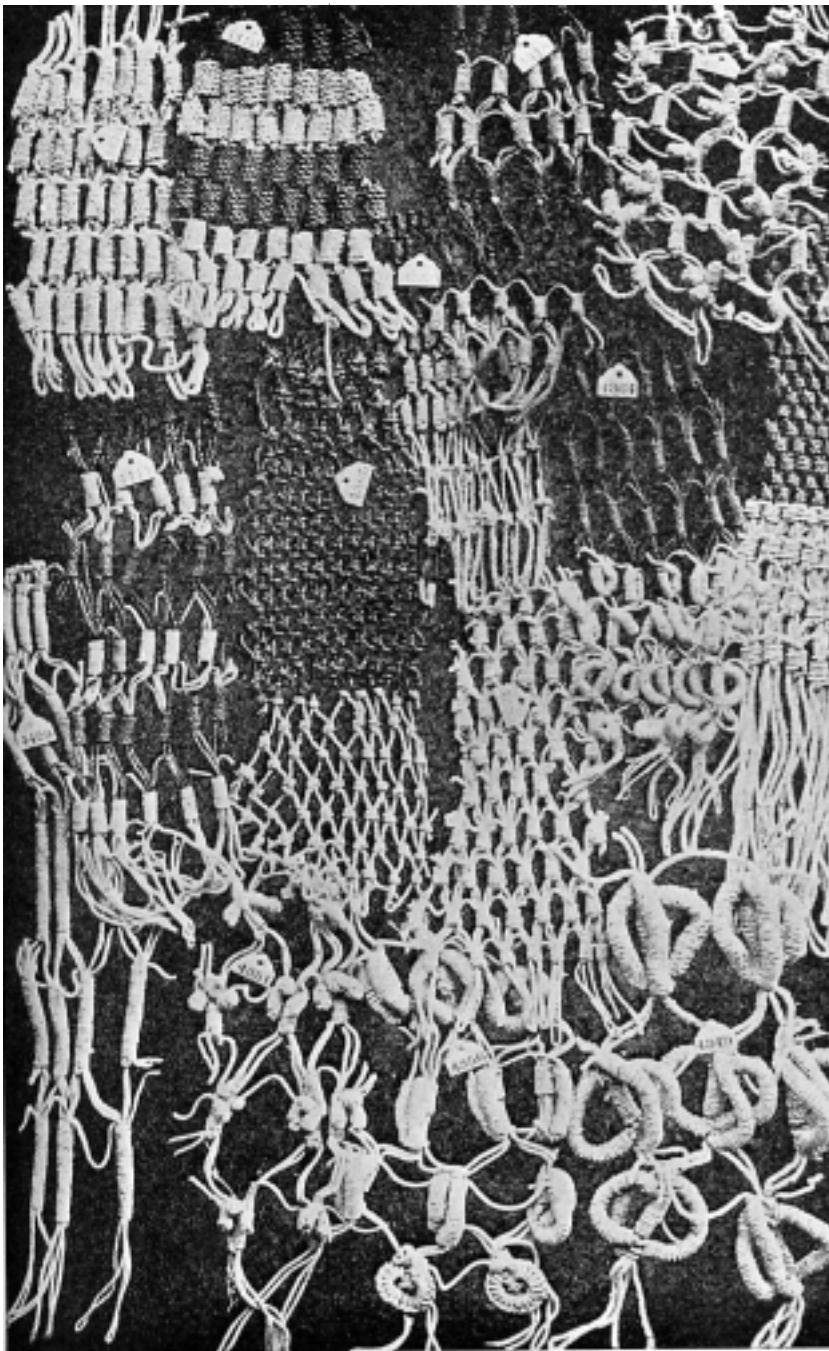


FIG. 151. HANAI OF PLAIN KNITTING.

9021. Coir; Piko D, Hanai C; length 14, mesh 4.5.
 9022. Coir; Piko E, Hanai A; length 30, mesh 10.2-11.8; heavy cord.
 9023. Coir; Piko E, Hanai A; length 22, mesh 9.2.
 9024. Coir; Piko D, Hanai A; length 17.5, mesh 4.5.
 9025. Coir; Piko D, Hanai A; length 17, mesh 3.8.
 9026. Coir; Piko E, Hanai A; length 16.5, mesh 6.5; kakai, pu lino.
 9027. Coir; Piko D, Hanai A; length 14, mesh 3.
 9028. Coir; Piko E, Hanai A; length 15.5, mesh 6.2; kakai, pu lino.
 9029. Coir; Piko D, Hanai A; length 14, mesh 4.3.
 9049. Coir; Piko E, Hanai A; length 20, mesh 6; heavy cord.
 L 196. Hau; Piko E, Hanai A; length 11, mesh 6.
 L 197. Coir; Piko D, Hanai C; length 23, mesh 12.
 L 198. Coir; Piko E, Hanai A; length 16, mesh 11.5; kakai, pu lino.
 L 394. Coir; Piko E, Hanai A; length 10.5, mesh 6.7.
 L 395. Coir; Piko D, Hanai C; length 13, mesh 13.
 L 396. Coir; Piko E, Hanai A; length 14.5, mesh 9.

KOKO PUUPUU.

3070. Onionio, coir and horsehair; Piko N, Hanai D; length 16.5, mesh 3.2; puu 1 inch long.



3071. Onionio, coir and horsehair; Piko N, Hanai D; length 16, mesh 3, puu 1.

4346. Waoke; Piko J roughly made, Hanai G with 2 puu; length 17.5, mesh 3.2, puu 1.2.

4347. Pauku, coir and waoke; Piko F, Hanai D; length 13, mesh 2.3, puu .5; no kakai.

4348. Pauku, coir and oloná; Piko D (small, .6 diam.), Hanai B+D; length 24 (16+8), mesh 4+1.7, puu .3+.5; no kakai.

4349. Waoke; Piko N (27 in circumference), Hanai H with 3 puu; length 16.5, mesh 6, puu 1.8.

4350. Waoke; Piko F, Fig. 122, Hanai D; length 13, mesh 1.8, puu .8.

4351. Waoke; Piko N, Hanai G with 3 puu, Fig. 131; length 15, mesh 4.5, puu .7.

4352. Waoke; Piko N, Hanai G with 3 puu; length 12, mesh 3.5, puu .5; no kakai.

4353. Waoke; Piko N (24 in circ.), Hanai G with 3 puu; length 12, mesh 2.1, puu .6.

4354. Waoke; Piko N (large), Hanai G with 3 puu; length 11.5, mesh 1.5, puu .6.

FIG. 152. SAMPLES OF KOKO.

4355. Waoke; Piko H, Hanai G with 1 puu; length 16, mesh 2, puu .6. Fig. 105 c; koko inverted.
4356. Oloná; Piko N, Hanai H+J, Fig. 144; length 15.5, mesh 5.7, puu .6.
4357. Oloná; Piko N, Hanai M; length 14.2. Fig. 148.
4358. Oloná; Piko F, Hanai L; length 15, mesh .8, puu .4. Fig. 147.
4359. Pauku, coir and waoke; Piko C, Hanai B; length 15, mesh .6, knot .4; no kakai.
4360. Pauku, coir and waoke; Piko D (.6 diam.), Hanai B; length 21.5, mesh .4, knot .2.
4361. Pauku, coir and waoke; Piko O, Hanai D; length 9, mesh .8, puu .7; damaged, no kakai.
4362. Pauku, coir and waoke; Piko O, Hanai D; length 12, mesh .5+1.5, puu .5+1.6.
4363. Oloná; Piko N (27 in circumference), Hanai K; length 21, mesh 2.8. Fig. 105 d; koko inverted.
4364. Pauku, coir and waoke; Piko F, Hanai D+H, Fig. 143; length 14, mesh 2.5, puu .6; no kakai.
4365. Pauku, coir and waoke; Piko A, Hanai A+B; length 13, mesh .3+1; kakai with 1 pu uo bound together at the two ends. Fig. 134.
4366. Pauku, coir and waoke; Piko O (1 diam., Fig. 133), Hanai D; length 20, mesh .7-2.3, puu .6-1.8; no kakai.
4367. Pauku, coir and waoke; Piko F (18 in circumference), Hanai D; length 14, mesh 1-1.4, puu .6-.8; no kakai.
4368. Pauku, coir and waoke; Piko O, Hanai D; length 17, mesh .6-2.4, puu .5-1.4.
4369. Pauku, coir and waoke; Piko K, Hanai D; length 11.5, mesh 2.5, puu .6.
4370. Pauku, coir and waoke; Piko N, Hanai D; length 21.5, mesh 3.3, puu .4-.8.
4371. Pauku, coir and waoke; Piko F, Hanai D; length 15.5, mesh 2.5-3.2, puu .6-.8.
4372. Pauku, coir and waoke; Piko F, Hanai D; length 13.5, mesh 3, puu .9-1.4; no kakai.
4373. Pauku, coir and waoke; Piko N, Hanai D; length 20.5, mesh 2.3, puu .6.
4374. Pauku, coir and waoke; Piko N, Hanai D; length 25, mesh 3.4, puu .7.
4375. Pauku, coir and waoke; Piko N, Hanai D; length 12.2; mesh 2.4, puu .7.
4376. Pauku, coir and waoke; Piko F, Hanai D; length 11, mesh 2.1, puu .4; no kakai.
4377. Pauku, coir and waoke; Piko N, Hanai D; length 15, mesh 3.1, puu .7; no kakai.
4378. Pauku, coir and waoke; Piko J, Hanai D; length 15, mesh 2.9, puu .8; no kakai.

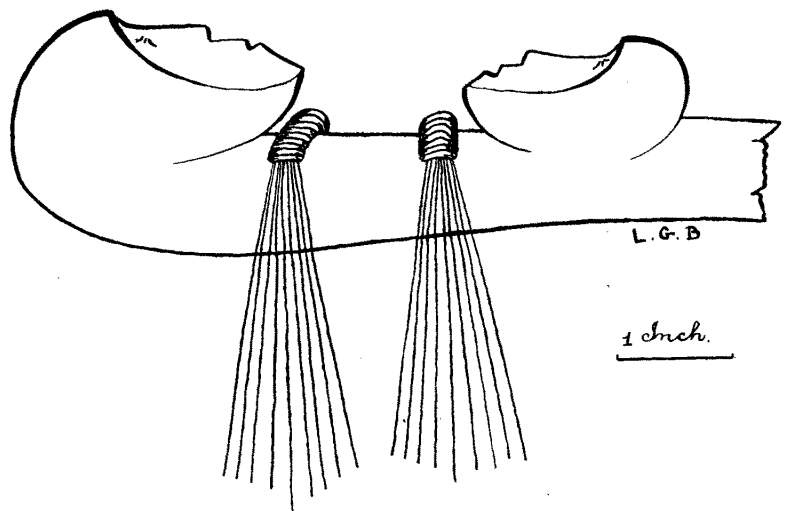


FIG. 153. END OF AUAMO SHOWING PU UO.

4379. Pauku, coir and waoke; Piko J (21 in circumference), Hanai D; length 13, mesh 4, puu .8.
4380. Pauku, coir and waoke; Piko F, Hanai D; length 17, mesh 2.4, puu .8; no kakai.
4381. Pauku, coir and waoke; Piko N, Hanai D; length 18, mesh 3, puu .7; no kakai.
4382. Pauku, coir and waoke; Piko N, Hanai D; length 13, mesh 2.8, puu .7.
4383. Pauku, coir and waoke; Piko N, Hanai D; length 12, mesh 2.7, puu .7.
4384. Pauku, coir and waoke; Piko N, Hanai D; length 15.5, mesh 3.2, puu .8.
4385. Onionio, coir and waoke; Piko F, Hanai D; length 14, mesh 2.1, puu .8.
4386. Oloná; Piko F, Hanai D; length 22, mesh 5-6.5, puu .9-1.1.
4387. Waoke; Piko F, Hanai D; length 20, mesh 1.8-2.5, puu .6.
4388. Waoke; Piko M, Hanai D; length 9.6, mesh 1.3, puu .4.
4389. Oloná; Piko G, Hanai D; length 11, mesh 2.3, puu .8.
4390. Waoke; Piko F, Hanai D; length 14.5, mesh 2, puu .5.
4391. Waoke; Piko F, Hanai D; length 10.5, mesh 2, puu .6.
4392. Waoke; Piko F (1 in diam.), Hanai D; length 15.5, mesh 2, puu .9; no kakai.
4393. Waoke; Piko N, Hanai D; length 10.5, mesh 1.8, puu .8.
4394. Oloná; Piko G, Hanai D; length 17, mesh 1.6, puu 7.
4395. Waoke; Piko K, Hanai D; length 10, mesh 1.7, puu .5.
4397. Oloná; Piko F, Hanai D; length 13, mesh 3.1, puu 1.3.
4398. Waoke; Piko F (1.2 diam.), Hanai D; length 10.5, mesh 2.3, puu .9.
4399. Waoke; Piko F, Hanai D; length 10, mesh 1.9, puu .9; no kakai.
4400. Waoke; Piko H (.6 in diam.), Hanai D; length 15.5, mesh 3.5, puu .7; no kakai.
4401. Waoke; Piko F, Hanai D; length 14.5, mesh 4.6, puu .6-.8.
4402. Waoke; Piko A (.8 in diam.), Hanai D; length 14.5, mesh 3, puu .6.
4403. Oloná hanai and waoke kakai; Piko F, Hanai D; length 14, mesh 2.8, puu 1.1.
4404. Oloná; Piko F, Hanai D; length 8.5, mesh 2.7, puu .4.
4405. Oloná; Piko G, Hanai D; length 12.5, mesh 2.6, puu .8.
4406. Waoke; Piko K, Hanai D; length 12, mesh 2.1, puu .7.
4407. Waoke; Piko K, Hanai D; length 11, mesh 2.1, puu .7.
4408. Oloná; Piko F, Hanai D; length 23, mesh 8, puu .8.
4409. Waoke; Piko F, Hanai D; length 17, mesh 3.7-4, puu 1.5-2.2 long and thin; no kakai.
4410. Onionio, coir and waoke; Piko H, Hanai D; length 12, mesh 1, puu .7; no kakai.
4411. Onionio, coir and waoke; Piko N, Hanai D; length 17.5, mesh 3, puu .6-.7; no kakai.
4413. Pauku, coir and waoke; Piko N, Hanai D; length 9, mesh 2.8, puu .5.
4414. Onionio, coir and waoke; Piko N, Hanai D; length 13.5, mesh 2.8, puu .7.
4415. Pauku, coir and waoke; Piko N, Hanai D; length 14, mesh 3, puu .9.
4416. Onionio, coir, waoke and horsehair; Piko N, Hanai D; length 15.5, mesh 2.7, puu .8.
4417. Pauku, coir and waoke; Piko N, Hanai D; length 15.5, mesh 2.9, puu .8.
4418. Onionio, coir, waoke and horsehair; Piko F, Hanai D; length 11, mesh 2.1, puu .6; no kakai.
4419. Waoke; Piko F, Hanai D; length 9.2, mesh 2.3, puu .7.

4420. Onionio, coir and waoke; Piko E, Hanai B; length 14.5, mesh 3.
 4421. Pauku, coir and waoke; Piko A, Hanai B; length 10.5, mesh 2.3.
 4444. Pauku, coir and waoke; Piko D (?), Hanai B; length 17, mesh 4.3, knot .5; modern looking.
 4445. Pauku, coir and waoke; Piko A, Hanai A; length 19; mesh 3.
 4446. Pauku, coir and waoke; Piko D, Hanai B; length 16.5; mesh 5.5.
 4447. Pauku, coir and waoke; Piko B, Hanai B; length 19, mesh 4.7, knot .4.
 4456. Waoke; Piko F, Hanai E; length 21, mesh 3.5-5, puu .5. Fig. 105 *a*.
 4457. Pauku, coir and waoke; Piko N, Hanai D; length 12, mesh 2.7, puu .8.
 4458. Pauku, coir and waoke; Piko N, Hanai D; length 17, mesh 2.5, puu .7.
 4459. Waoke; Piko N, Hanai D; length 10, mesh 2.4, puu .5.
 4460. Pauku, coir and waoke; Piko N, Hanai D; length 13, mesh 2.5, puu .7.
 4461. Waoke; Piko J (Fig. 126), Hanai D; length 10, mesh 2.4, puu .7.
 4462. Pauku, coir and waoke; Piko F, Hanai D; length 9.5, mesh 2, puu .5.
 4464. Waoke; Piko F, Hanai D; length 12, mesh 1.4-2.3, puu .9. Figs. 120, 121.
 4465. Waoke; Piko F, Hanai D; length 13.5, mesh 1.7, puu .9.
 5324. Coir; Piko O, Hanai D; length 8.4, mesh 1.1-1.3, puu .6-1; fragment, lower two-thirds only.
 6857. Waoke; Piko F, Hanai E; length 20, mesh 4.2, puu .4. Fig. 104 *a*.
 6858. Waoke; Piko F, Hanai D; length 8.8, mesh 2.2, puu .3.
 7703. Waoke; Piko L, Hanai F; length 15, mesh 3, puu .6. Fig. 115.
 7706. Pauku, coir and waoke; Piko F (.6 diam.), Hanai B; length 16, mesh .8.
 7707. Waoke; Piko F, Hanai D; length 15, mesh 1.7, puu .6; no kakai.
 7708. Pauku, coir and waoke; Piko D (.4 diam.), Hanai B; length 21, mesh .8; no kakai.
 7748. Pauku, coir and waoke; Piko F (1 diam.), Hanai D; length 15, mesh 2.3, puu .6.
 7966. Waoke; Piko N, Hanai D; length 15, mesh 2.5, puu .8.
 9013. Waoke; Piko K, Hanai D; length 10.5, mesh 2, puu .8.
 9014. Pauku, coir and waoke; Piko N, Hanai D; length 15, mesh 2, puu 1.
 9015. Onionio, coir, waoke and horsehair; Piko N, Hanai D; length 17, mesh 3, puu 1.
 9016. Waoke; Piko N, Hanai G with 3 puu; length 13, mesh 3, puu .4.
 9050. Waoke; Piko F, hanai of plain knitting; length 6.9, mesh .3.
 L 92. { Pauku, coir and waoke; Piko O, Hanai D; length 10.5, mesh .5-1.5, puu .4-1.1.
 { Oloná; Piko F (large), hanai of plain knitting (Fig. 151); length 12.5, mesh .4.
 L 194. Pauku, coir and waoke; Piko D (.3 diam.), Hanai B; length 15, mesh .5, knot .3; kakai in four parts.
 L 195. Pauku, coir and waoke; Piko N, Hanai D; length 17, mesh 3, puu 1.
 L 397. Coir; Piko F, Hanai D; length 9, mesh 2.5, puu .8; fragment, no kakai.

KOKO EKE.

4422. Cotton cord; Piko (?), hanai, foreign knot, probably Chinese; length 20, mesh 4.2.
 4451. Waoke; Piko D, Hanai C; length 12.7, mesh 3.5; kakai, a double draw string. Fig. 136.
 9051. Waoke; Piko D, Hanai C; length 11.8, mesh 5; kakai, draw string.

MISCELLANEOUS.

4454. Foreign koko; length 37.5, mesh 2.2. Figs. 149 and 150.
 4455. Foreign koko; black woolen braid; knot, Fig. 150; length 20, mesh 2.6.

Aha.—Of the aha⁴⁷ or cords surrounding and permanently fastened to gourd water bottles (huewai, olowai, etc.) the most common was that known as *hawele*—sometimes referred to as *koko hawele*—and shown in Fig. 106 enclosing a huewai. There is in the collection a great number of drinking and other gourd vessels without

cordings which would have been carried in *koko puupuu* or *pualu*. The huewai was a drinking gourd of large body and narrow neck for general use. The variety of forms of gourd vessels was very great, and was generally the result of manipulation when the fruit was green.

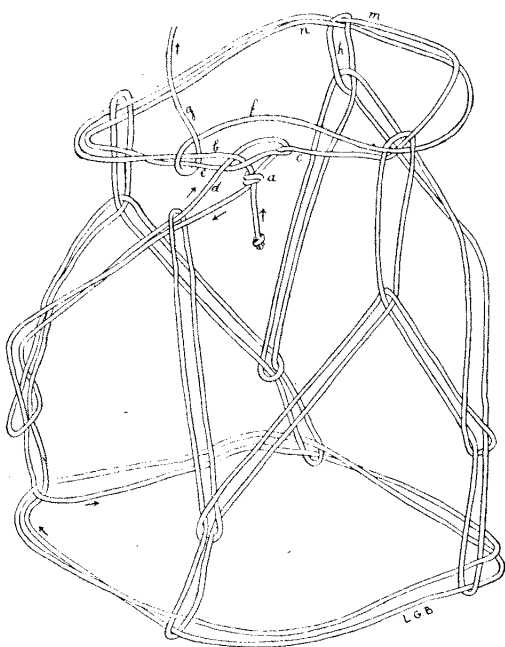


FIG. 154. DETAIL OF AHA HAWELE.

The word *hawele* means a tying or binding on in which the joinings or loops are never knotted, and the *koko* or *aha hawele* may be so recognized. Details of technique of the *aha hawele* in Fig. 106 will be seen in Fig. 154, where, after a loop, *b m c*, is made round the neck of the bottle and tied at *a*, the cording continues in the direction indicated. There is a slight error, for which the writer is responsible, in the drawing, for the cord *f*, instead of encircling *b* and *e*, should pass under and over *a* and *d* and under itself. A bail is then made by carrying *g* over the top of the bottle, over *m*, under *h*, over *n* and back around *a* and *d*. When there are four or five thicknesses of cord in the bail, it is bound at several points with half hitches by the end of *g*, the latter being finally fastened to the wooden or shell stopper. The material used was coir, spun or braided—seldom *oloná* or *hau*. A similar lashing, but more complex, was noticed on a gourd water bottle, No. 1931, from New Caledonia.

A very neat fastening of the *aha hawele* has been made around a huewai *pueo* (Fig. 155) which is a water gourd shaped like an hour glass. In the figure, when the *aha hawele*, as shown in Figs. 106 and 154, was attached to the lower bulb, to its upper cords another binding was added for the purpose of enclosing the other part. However, in a great number of the *pueo* with *hawele* the lower bulb is alone corded

⁴⁷ Aha should be applied only to (1) coir cord, (2) cord of human hair, (3) strings made from intestines. (See Andrews' Dictionary.) Other cords, such as *oloná*, should be termed *aho*.

and the bail fastened to the waist. A plain and chaste style of aha hawele was found on an old broken huewai in the collection Fig. 156, the cord of which was more neatly braided than on any of the other specimens. Another form, rarely used, is shown in Fig. 157.

A form of water gourd used in the canoes was called olowai, Fig. 107. The writer has not been able to learn any specific name for the aha on this gourd, and since only two (Nos. 3877 and 3880) out of the five specimens in the collection have aha exactly similar, the probabilities are that each individual followed his own taste in cording. In the aha figured, Fig. 107, the work was done by making two half hitches on the bottom of the gourd, and on the rings thus made four loops of single cord were formed large enough to reach the middle. The cord was then brought to the neck of the bottle and fastened by two half hitches. A set of four loops was attached to these rings, at the same time passing in turn through the bights of the previous set, thus drawing the lashings tightly around the gourd. The cord was then made to follow the cords of each loop and an eye was formed by tying at each bight. The double ring at the middle was added last. For the bail, suspended over the side of the bottle, a separate cord was used. Another aha, on specimen No. 3995, is similar to that in Fig. 107, except for the double ring in the middle. Of the other specimens of corded olowai, one, No. 3879, is enclosed in an aha hawele, and the other, No. 3881, in a large-meshed netting.

Ipu le'i, *ipu holoholona*, *poho aho* and *ipu aho* are among the names used to designate a utensil, consisting of two pieces, for containing fish hooks and lines. There are two general forms of this article: one with the lower and smaller part of wood covered with a larger gourd, Figs. 158 and 159, and the other of gourd with the lower larger than the upper part, Fig. 160. There is some confusion now as to the correct names and uses of the different styles, but the best information seems to be that the former, called *ipu le'i* or *ipu holoholona*, was for the purpose of holding bait in addition to hooks and lines, and the latter, *poho aho*, for the fishing tools alone. Some of the

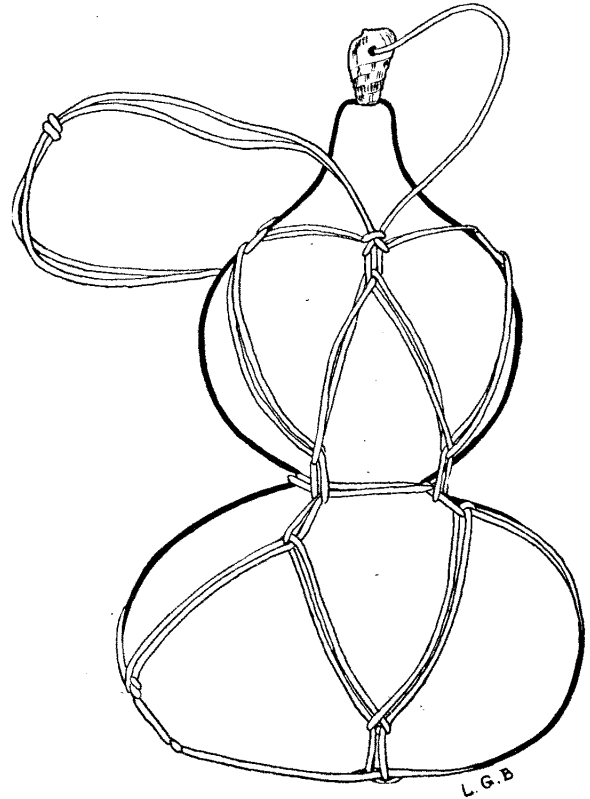


FIG. 155. HUEWAI PUEO WITH AHA HAWELE.

poho aho were composed of bowl-shaped gourds, and others of long narrow gourds, covered with half a small gourd or coconut.

Similar cordings enclosed both styles, and the most finished in appearance is that around the ipu le'i in Fig. 158. This cording, called koko, or koko ipu le'i, is a combination of the aha hawele firmly fastened around the wooden part, to the upper cords of which a netting is attached to enclose the cover. The netting is closed around the cover by a draw string, which also serves to carry the utensil. In a few specimens the aha hawele has been dispensed with, the netting being fastened through holes bored in the upper edge of the lower part, Fig. 159.

This last method was also used on the *hinai poepoe*, which have been treated by Dr. Brigham in the previous portion of this memoir. Another and simpler method of attaching cords to these articles is shown in Fig. 160; here the edge of the lower

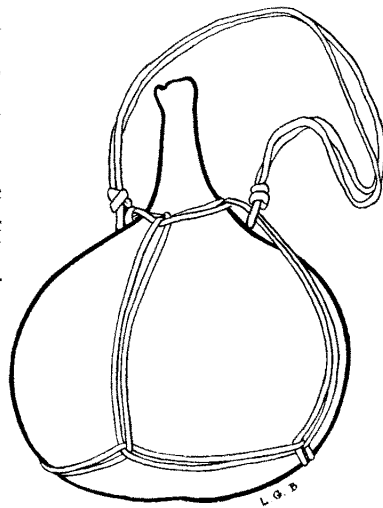


FIG. 156.

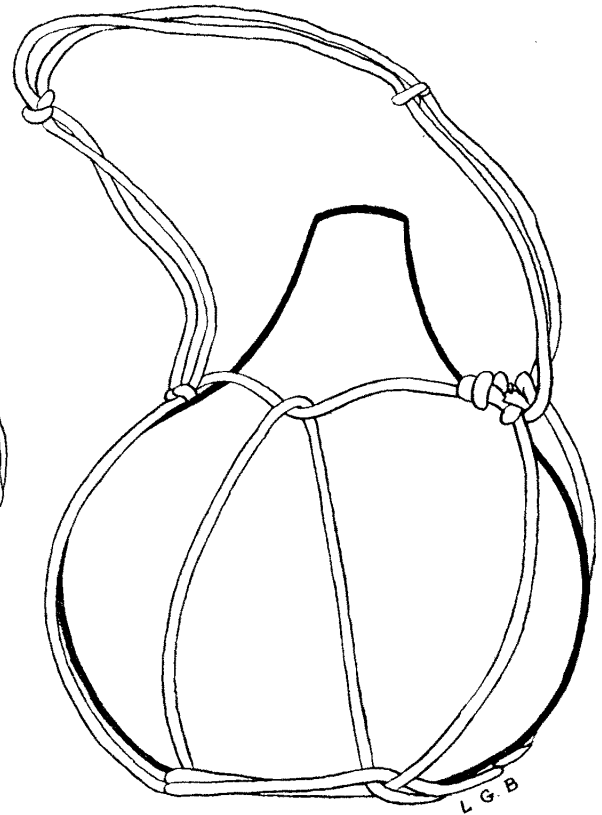


FIG. 157.

HUEWAI WITH AHA HAWELE.

part has been pierced at two opposite points, from which two cords were led upwards through holes in the cover.

Before passing from the gourd cordings, it might be in order to mention the several means of securing handles to gourds in vogue among the natives. The simplest form noticed is a coir or hau cord around the neck of the huewai, when the mouth of the gourd bulges, Fig. 161*a*; some of the cords were roughly made and tied, but in others the cord has been braided and then attached by a double half hitch. A few of the huewai pueo have also been treated in this manner, Fig. 161*b*. When the huewai was not pueo or bulged at the mouth, then a handle was sometimes attached by making a hole at the base of the neck and through it drawing and knotting both ends of a loop of coir or hau cord or braid, Fig. 161*d*, or, by boring the edge of the mouth at two

points opposite, through which the ends of a hau or oloná line were passed and knotted. Fig. 161c.

In some of the bowl-shaped gourds, eight holes were pierced in pairs and each end of two cords passed through two of the holes and knotted, Fig. 162. Handles, generally more than two, were so attached to many of the hinai poepoe, and *icie* and pandanus baskets.

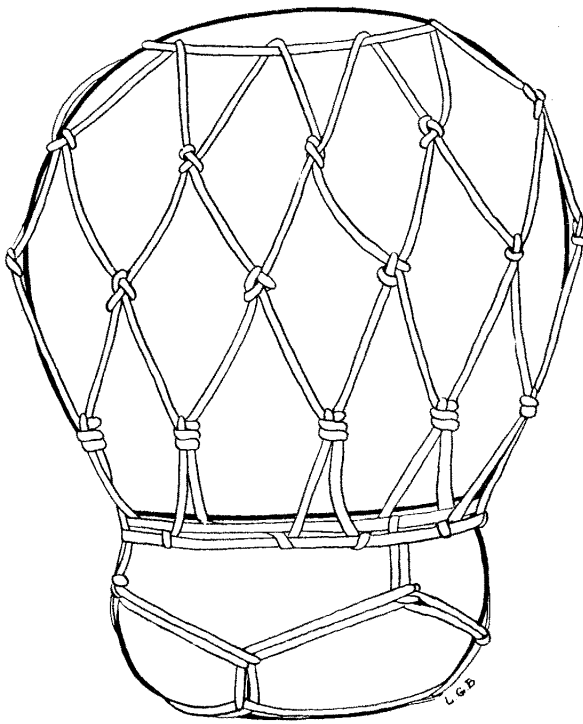


FIG. 158. IPU LEI.

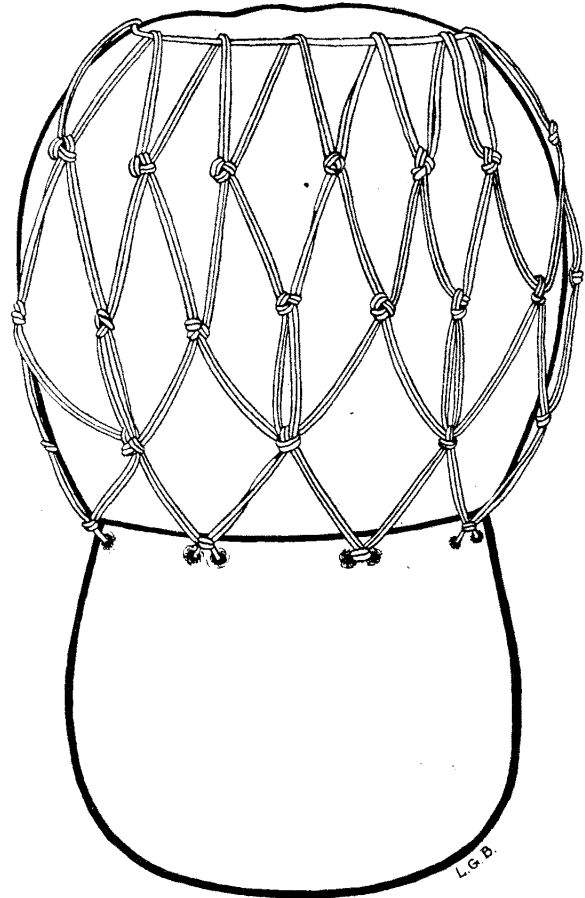


FIG. 159. IPU LEI.

LIST OF GOURD VESSELS, WITH CORDINGS ATTACHED.

- | | | | |
|-------|----------------------------------|-----------|-------------------------------------|
| 1093. | Huewai; aha hawele, coir. | 1112. | Huewai pueo; aha hawele, coir, |
| 1094. | Huewai; aha hawele, coir. | Fig. 155. | |
| 1099. | Huewai, aha hawele, coir. | 1113. | Huewai pueo; aha hawele, coir. |
| 1100. | Huewai; aha hawele, coir. | 1114. | Huewai pueo; aha hawele, coir. |
| 1101. | Huewai; aha hawele, coir, Fig. | 1121. | Huewai; aha hawele, coir. |
| 156. | | 1122. | Huewai; aha hawele, coir. |
| 1102. | Huewai; aha hawele, cotton cord. | 1124. | Huewai; aha hawele, coir. |
| 1104. | Huewai; aha hawele, coir. | 1128. | Huewai; aha hawele, coir. |
| 1107. | Huewai; aha hawele, coir. | 1129. | Huewai; aha hawele, coir, Fig. 106. |

- | | |
|--|--|
| 1133. Huewai; aha hawele, oloná. | 7667. Huewai; oloná, Fig. 161 <i>d</i> . |
| 1137. Huewai; aha hawele, coir. | 7668. Huewai; coir, Fig. 161 <i>a</i> . |
| 1261. Huewai pueo; aha hawele, coir. | 3877. Olowai; coir. |
| 3934. Huewai; aha hawele, hau, Fig. 157. | 3879. Olowai; aha hawele, coir. |

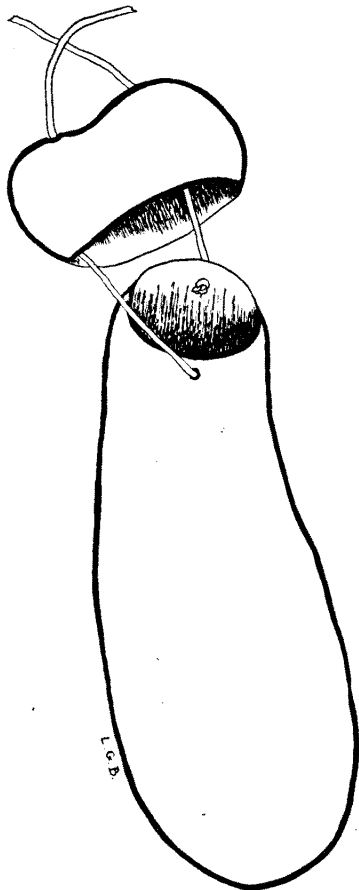


FIG. 160. POHO AHO WITH CORD.

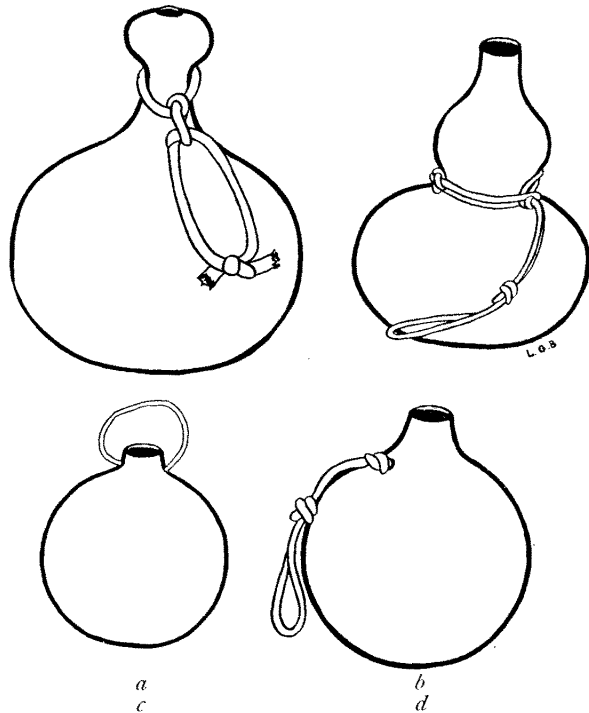


FIG. 161. HUEWAI WITH CORD HANDLES.

- | |
|--|
| 3935. Huewai; aha hawele, coir. |
| 3938. Huewai; aha hawele, hau. |
| 3940. Huewai; aha hawele, coir. |
| 3996. Huewai pueo; aha hawele, coir. |
| 7750. Huewai; aha hawele, hau. |
| 1097. Huewai; coir, Fig. 161 <i>a</i> . |
| 1108. Huewai; coir, Fig. 161 <i>d</i> . |
| 1109. Huewai; hau, Fig. 161 <i>c</i> . |
| 1111. Huewai pueo; coir, Fig. 161 <i>b</i> . |
| 3942. Huewai; hau, Fig. 161 <i>a</i> . |
| 3944. Huewai; coir, Fig. 161 <i>a</i> . |

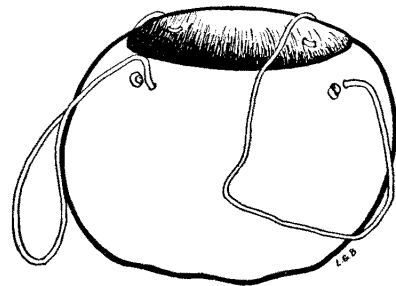


FIG. 162. GOURD UMEKE WITH CORD.

- | |
|-------------------------------|
| 3880. Olowai; coir, Fig. 107. |
| 3881. Olowai; coir, netted. |
| 3995. Olowai; coir. |
| 3951. Umeke; oloná, Fig. 162. |
| 3952. Umeke; oloná. |

IPU LE'I.

3850. Oloná and coir.	3854. Coir.	3858. Oloná.
3851. Hau, coir and oloná.	3855. Wooden part only, pierced.	3859. Oloná.
3852. Oloná, cords of ha- wele doubled.	3856. Coir, Fig. 158.	3860. Hau.
3853. Oloná.	3857. Coir, Fig. 159.	3994. Coir.

POHO AHO.

3861. Oloná.	3873. Oloná.	3953. Oloná.
3869. Oloná.	3874. Oloná and coir.	5027. Coir.
3870. Oloná.	3875. Oloná, Fig. 160.	6373. Coir.
3871. Oloná.	3876. Oloná.	
3872. Oloná.	3927. Coir.	

Nets, Upena.—As the second division of net work, fish nets and similar fabrics for different uses come up for consideration. The material most preferred and used, except where noted below, was oloná spun into cord varying greatly in thickness.

The method of beginning a net is interesting, and has been shown to the writer by fishermen on Oahu and Molokai. The native, having filled his shuttle from the ball of twine without severing the line, takes another cord, Fig. 163 *aa*, the ends of which he ties together. Sitting on the ground with feet far apart, he inserts the first toes into the ring and stretches it tightly. The ball is passed under and over *aa* three times towards the right, and the friction on the cords is sufficient to keep the line *e* taut while closing the knots. Then the shuttle is passed around the gauge, over *aa*, under *e*, and *e* is drawn down by the shuttle cord to the gauge where the knot at *b* is made. To begin the second and alternate knots the shuttle would of course pass under *aa* and over *e*. Cord for the continuance of the loops is drawn from the ball by loosening the windings around *aa*. When the knot (called *ka, umii*, etc.) slips properly into place, as at *b* and *d*, the worker ejaculates *kakiokohe* with satisfaction, but if it misses the loop, as at *c*, the word *omanokole* is uttered with disgusted tone. Sometimes, as the work proceeds, two loops are by mistake enclosed by one knot, the name for which is *mauae*.

In this division come the *nae*, or netting which constitutes the groundwork of feather garments,⁴⁸ netted *malo*, bird net and the regular fish netting.

Nae.—Nae is a netting of very fine mesh, varying in the Museum feather garments from .05 to .27 inches. The twine is not as fine as the size of the mesh might suggest, averaging .025 inch in diameter, so that in some of the specimens the

⁴⁸B. P. B. Museum; Memoirs, vol. i, nos. 1 and 5.

netting is as close as loose burlap.⁴⁹ As stated by Dr. Brigham, in *Feather Work*, the bases of the cloaks are composed of several pieces of nae, each being cut to fit. The pieces are not always of the same mesh, that of those in the cloak of Kiwalao, for instance, varying from .1 to .25 inch. However, the mesh of the majority varies but slightly in each individual.

The closeness of the mesh in some cloaks and capes has suggested research for a suitable shuttle to do the work, but beyond the niao, already described, and needle of kauila wood, no implement has been found. In a piece of nae, specimen No. 2840⁵⁰, prepared for the addition of feathers, the mesh increases from .05 at the top to .08 inch

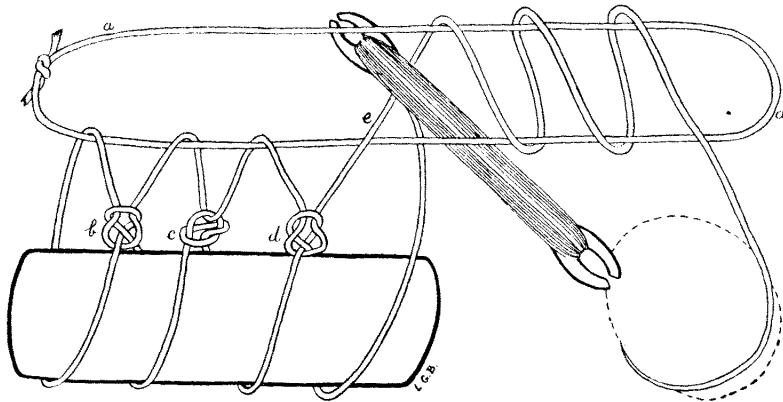


FIG. 163. COMMENCEMENT OF A NET.

at the bottom and is too fine to allow even an ordinary pinhead to pass through readily. The specimen is 37.5 inches wide and 11.5 inches long, the edges of which have been trimmed at the knot without leaving the usual netting selvage. There are from four to ten rows of netting continuously in both directions,

while of course in netting the rows usually alternate. This nae was made without a shuttle with lengths of twine drawn through the loops, and for such purposes the natives dipped the ends of the twine into the highly saccharine juice of the *ki* root, which, drying rapidly, made the fibre stiff enough to be threaded through the holes. It is not the intention of the writer to give the impression that all nae have a number of rows of netting continuously running in the same direction, for in most of the specimens the rows alternate regularly. The nae with a mesh of .25 inch could be and probably was made with a shuttle such as that shown in the middle of Fig. 101, or a niao.

In the collection is a piece of unfinished netting of rather fine mesh, the history of which is unknown. The upper part is 41 inches wide with a mesh of .25 inch increasing to .44 inch in the lower, and it has, as far as completed, the shape of a feather cloak. The first half has been made with four shuttles, one following the other, and possibly by four people, and the unfinished half with three shuttles as the three loose strings on the bottom indicate. The specimen is Hawaiian and is probably the result of an incompleated later day attempt to prepare nae for a feather cloak. Sometimes in

⁴⁹Ibid, pl. ix, upper figure, left side.

⁵⁰Ibid.

making very broad fish nets, or when there was need for rapid manufacture, two or three men would net along the same side, following each other. The cord, of the first man to finish, was knotted to the ends of the succeeding rows when completed and was the first to begin the next series.

Netted Malo.—Of netted malo there are two specimens in the Museum, each with a mesh of about .25 inch. One, No. 2842, is a plain piece of netting 15.3 ft. long and 7 in. wide.⁵¹ The malo, or loin cloth, of oloná netting was always an alii's garment and was worn by him on canoe voyages.

The other specimen,⁵² No. 6921, 12.2 ft. long and 5.7 in. wide, came to the Museum from the Provisional Government of Hawaii after the revolution in 1893, as a relic of royalty, with the royal feather robes. It has been the nae of a feather malo, and in sewing on the tufts of feathers, the meshes have been so compressed as to give the fabric the semblance of cloth. The stitches are in good order still, but few shafts and no feathers remain. There are not left enough fragments of feathers to even show the general color, but red, yellow and black stumps were found, all on the front end. Near this end are the remains of black feathers on the outline of a diamond, and a little nearer the middle, thread bindings indicating the former presence of a feather cross shaped like St. Andrew's. To the ends of the malo are attached rows of human molars, and to the sides near the cross a single molar. Looped to the sides, every two inches for the entire length, is a cord enclosed in a fine cylindrical netting, by which feathers have been fastened in the form of a lei.

Upena Manu.—The Museum possesses but one specimen of bird net,⁵³ No. 138. This is a diamond-shaped net, mesh 5 inches, made with the same sized twine as in nae. Its total length when stretched is 16.25 feet, and in width it increases from 18 meshes at the beginning to 40 meshes at the middle, thence diminishing to 13 meshes at the end. At each end the meshes are bound together. The increase of the number of meshes in a row is accomplished by running on an additional loop (as at *g*, Fig. 111) at regular intervals, while the decrease is effected by the use of the mauae knot, called *makakukai*. A cord of about .1 inch in thickness is run along both sides, but there are no sticks attached, nor any place for attachment. The net

⁵¹Ibid, pl. ix, middle of upper figure.

⁵²Two old Hawaiian ladies who had been continually at court during the reigns of several monarchs were shown this malo, and both independently affirmed that it was the malo of Liloa. The story of Liloa and his son Umi has been told too many times to repeat here. Liloa reigned on Hawaii at the latter part of the fifteenth century. It is possible that oloná fibre may outlast the intervening period, and, as the malo constituted the most important part of Umi's family credentials, the succeeding ruling chiefs would have preserved it with reverential care. There are several faint stains on the netting, but whether blood stains or not it is impossible to tell.

⁵³B. P. B. Museum Memoirs, vol. i, no. 1, p. 13.

has been tanned and, where broken, mended with tanned and untanned twine. The method of use is unknown, but judging from the large mesh and fine twine it was used for entangling. Natives have told the writer of two methods of bird-catching with nets, one of which was to lie concealed on the hills in wait for the birds returning from the sea at nightfall, and as they approached heavy with food and flying low, to suddenly appear and raise the net: the startled bird darted upward and became enmeshed. The other method was used for plover when resting on rocks inside the coral reef. The hunter chose a dark night and waded at high tide to one of the uncovered rocks. The net was wetted and silently shaken over the sleeping birds, which, waking and expecting rain, crowded closer together and slept again. The shower was repeated several times and the hunter, then sure of his quarry, threw the net over the group and held down the edges close to the rock with his hands and feet. When the birds were exhausted with their struggling, the net was gathered together with the booty inside.

Fish Nets.—Upena, or fish nets and methods of using them have been described with considerable detail in Mrs. Beckley's⁵⁴ concise and complete article on Hawaiian fisheries, and Mr. Cobb's⁵⁵ comprehensive work on the commercial fisheries of these islands, in which is incorporated that of Mrs. Beckley. It will therefore not be necessary to do more than mention the nets of only Hawaiian origin, and describe and list such as are in the Museum.

The netting tools and the sizes of the mesh have been mentioned above. The material used was oloná, with rare exceptions. There is an upena ahuulu in the collection, No. 764, with unusually thick closely spun cord, which on examination proved to be waoke. In this example—a small hand net—it is probable that some cord prepared for koko was substituted during a scarcity of oloná. The other materials were hau, coir and ahuawa. For the shark net, upena mano, hau bark was stripped from the tree and while fresh was roughly twisted into thick rope. Hau and ahuawa were used for the rough turtle net—upena honu. Coir netting is said to have been used to lie in the water, as a protection against sharks, a few feet outside an oloná net in which captured fish were awaiting landing. Fishermen declare that sharks dislike the roughness of an article manufactured of coir. Another fisherman stated that the Hawaiian nets were not of coir, and that the use of such material was due to the Gilbert Islanders, of whom there was a large colony here for a generation up to a few years ago. Taking into consideration the abundance of oloná in this place and its flexibility, and the small size and scarcity of coconuts in these islands, it would seem natural that of the two the natives would turn to oloná as the staple. A number of the Museum nets have been

⁵⁴ Emma Metcalf Beckley. Hawaiian Fisheries and Methods of Fishing. Honolulu, 1883.

⁵⁵ John N. Cobb. Commercial Fisheries of the Hawaiian Islands, U. S. Fish Commission Report for 1901. Washington, 1902. It might be mentioned that in Mr. Cobb's excellent report are a number of sketches of fishing implements in this Museum, the acknowledgment of which has undoubtedly been overlooked by that gentleman.

tanned, the process merely requiring the steeping of the net and fresh bark of the *kukui* (*Aleurites triloba*) in water for several days.

Fish nets are frequently composed of two or more pieces of netting run together with a cord. Five methods of making this joining were noticed, the simplest being with a cord, called *aea*, drawn through the meshes of the two edges in turn. The second was by placing the meshes of the two edges exactly opposite and with a single cord tying them together in order, using a single knot. The third was to lay the edges together with the meshes alternating and then running the cord from one side to the other with a single knot at every mesh; this at first glance has the appearance of continuous netting. The fourth method of joining was to net on one edge and run the shuttle in turn through the loops of the other edge. The fifth was by joining the two edges by the usual form of netting. A number of the smaller nets, particularly those of small meshes seem to have been cut down or made of pieces taken from larger nets; in such cases the netted knot forming the edge seems to have stood the usual wear and tear. When a net has been torn or broken, more generally with the fine meshed nets, the mending was sometimes effected with an *aea*, or a piece was cut from an old net, laid over the hole and sewed on by the same method. Large nets are sometimes fastened together by a rope called *kukai*.

The name *alihi* was applied to the head and foot ropes, the full names being respectively *alihi pikoi* and *alihi pohaku*, or more recently *alihi kepau*. The *pikoi* was a float of wood, *hau* preferably, but failing that, *kukui*. *Wiliwili* (*Erythrina monosperma*), the lightest wood in the islands, was not considered sufficiently durable. In recent times two other woods have become available for the *pikoi*, and since their introduction oleander (*Nerium oleander*) and the castor oil tree (*Ricinus communis*) have been added to the list. The shape of the *pikoi* varied. In some, a large branch was cut into sections and the pieces split, and from these the *pikoi* was made (a block about 4 inches long, 3 inches wide and 1 inch thick). It was fastened through holes drilled in its side to the *alihi*. Another form was a section of a branch about 4 inches long, and 2.7 inches in diameter, which was pieced on the side and so attached. The heart wood in the kinds used was soft, and could be easily removed to allow the *pikoi* strung on the *alihi*, but it is uncertain if this kind of *pikoi* was of ancient use. Sinkers of *pohaku* (stone) and *kepau* (lead) were shaped to suit. Sticks used to support or distend a net were called *kuku*, and when curved or bent were also called *kaka*. To make the necessary length for the *kuku* or *kaka* two or more sticks were fastened together by overlapping and binding the ends. In referring to the nets by their native names, it should be mentioned that one form of fish net is occasionally used for various kinds of fishing and has a different name in each, and that the same name is sometimes applied to different nets in various parts of the islands.

UPENA PAPAI, CRAB NET.—One specimen, No. 762. This is a flat, circular sieve from 20 to 23 inches in diameter. The frame is composed of two kaka securely fastened. Stretched across the hoop is a set of parallel heavy cords one inch apart, at right angles to which is a second set the same distance apart and merely knotted to the first. This sieve of course cannot be called netting. Such an implement was mainly useful in throwing the crabs ashore after they had been enticed within range by a piece of bait. Fishermen report another style of upena papai, illustrated by Mr. Cobb,⁵⁶ in which the cords of the sieve give place to a conical net.

UPENA PAOO, OR UPENA IAO.—One specimen, No. 761. A small, fine-meshed, tanned dip net suspended from an ovate-acuminate frame, which shape is called *poo*. The frame is rigid and is composed of kaka bent until the ends meet at the point, where they are bound together and form the handle. A cross piece is tied to the frame seven inches from the handle. The net tapers irregularly to a point, which is directly below the handle. The mesh varies somewhat; adjoining the frame is a band of netting 4.5 inches wide of .75 inch mesh joined at the handle. Then come several rectangular pieces of nae averaging .2 inches in mesh. All the connections are with aea. These pieces have no selvage, and have probably been cut from the remains of a larger net. Length and breadth of frame, 32 and 17 inches. Depth of net 23 inches.

UPENA KAEF, OR KAEF PAOO.—One specimen, No. 765. The name is practically the same as that previously mentioned. The specimen is a small fine-meshed untanned scoop net with a frame similar to but longer and narrower than No. 761 and without cross piece. The kaka are two long pliant wands, resembling willow, twisted together. The frame is so pliant that it may be readily elongated by a little pressure at the handle and the opening thereby reduced in size. The net is shaped like a very broad sack, and is gathered very much at the upper margin. In this specimen the netting has been done for the purpose. The mesh of the top row is 1 inch, and has been reduced from .4 inch in the second row to .2 inch at the bottom. As netted, it was long and narrow, and to reach its present form, was doubled and netted together at the bottom and one side. Length and breadth of frame 27 and 9 inches. Length of net at bottom, 47 inches, depth 10 inches.

UPENA AHUULU, OR UPENA PUNI.—Two specimens, Nos. 763 and 764. In this style of net the kaka are two parallel sticks about 3.5 feet long. The net, of medium sized mesh, is a single piece of netting folded together and sewed at the bottom and side by the second or third method mentioned above. The top edges of the bag thus formed are attached one to each of the kaka for about three-fourths the length, the balance of the kaka remaining bare for handles. Where the two sides of the bag meet

⁵⁶ Ibid, pl. 23.

the kaka, the latter are fastened and prevented from spreading by cords about two inches long. The kaka are of about equal strength, and by holding the points of the handles in the palm of the hand and springing the sticks apart with the fingers, the kaka, being tied at the other end, become bowed and so open the mouth of the net wider when necessary. No. 763 is of oloná, and No. 764 of waoke, both tanned. The measurements are:—

763. Length of kaka 42 in., width apart 2–2.3 in.; length of net 33 in. or 25 meshes, depth 16 meshes, mesh 1.4 in.

764. Length of kaka 44 in., width apart 2.–2.5 in.; length of net 36 in. or 16 1-2 meshes, depth 8 1-2 meshes, mesh 2 in.

UPENA HOLOHOLO, OR UPENA POO.—One specimen, No. 5176. A large tanned dip net with a frame the same shape as No. 761, but three times as long and twice as broad. The cross piece is 16 inches from the point. The net has a mesh of 2 inches, and is composed of a piece of netting folded together and netted along the sides to form a bag. The net is suspended from the frame as far as the cross piece, the balance of the kaka being left uncovered for the handle. Length of frame 8.3 feet, width 2.8 feet. Length of net, 81 meshes, depth 24 meshes.

UPENA UHU.—Four specimens, Nos. 766, 767, 768 and 5175. These specimens are each composed of a square piece of netting stretched flat by alihi, which are fastened by the corners to the ends of two kaka tied at right angles to each other at the middle. The diagonal of the netting is less than the length of the kaka, so that the latter are somewhat arched when in position. Weights of stone, or lead, are fastened to the ends of each kaka. Specimen No. 766 is labelled *upena akiikii*, and has a mesh considerably smaller than the other nets of this kind. *Upena pakiikii* is probably the same.

766. *Upena akiikii*, length of kaka 6.5 ft., size of net 21×22 1-2 meshes, mesh 2.3 in.

767. *Upena uhu*, length of kaka 8.3 ft., size of net 10 1-2×18 meshes, mesh 6 in.

768. *Upena uhu*, length of kaka 8.5 ft., size of net 16×17 1-2 meshes, mesh 5.3 in.

5175. *Upena uhu*, without kaka, size of net 15×15 meshes, mesh 4.5 in.

Mr. Cobb's description⁵⁷ of an upena uhu does not seem to agree with the specimens in the Museum, nor with the evidence of fishermen consulted. The piece of netting is hardly bagged at all, and is almost as flat as a piece of netting can be in horizontal suspension. The kaka, which Mr. Cobb states were made "to swing around and lie parallel" and thereby close the mouth of the net to retain the fish, are fixtures when the implement is set up and cannot be moved from their relative position without drawing the net to the surface where the hand can reach and untie them. In drawing the implement rapidly through the water the net would of course act as a drag and bow the

⁵⁷ Ibid.

kaka somewhat, and bag the net, but the sticks are too stiff to bend much. The secret in catching the uhu, as described to the writer, is the knowledge that the instinct of the fish when disturbed is to dart to the bottom, and the uhu after being enticed into the net by the decoy spends its time in trying to swim through the meshes underneath. But one fish is caught with each dipping of this net.

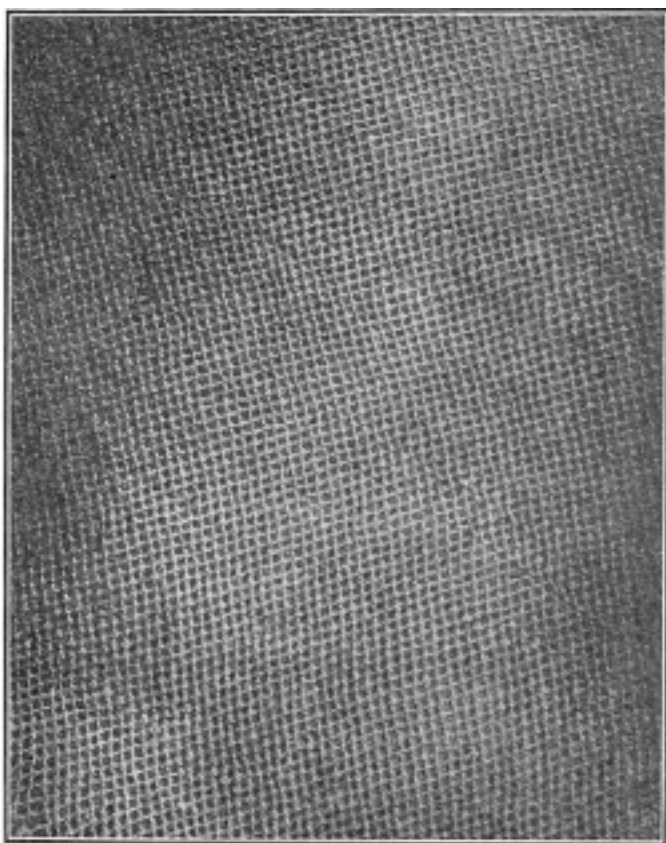


FIG. 164. SAMPLE OF .4 INCH MESH.

The scoop net described by Mr. Cobb on page 407⁵⁸ is known to the natives as *kace*. There is a scoop net in the collections, No. 9052, without name or history, which from its appearance might well be used as a *kace* also. It has a frame composed of two *kuku* 3.7 feet long, forked at one end; at the forked end they lie 2.3 feet apart, and come together at the others for the handle. Near the handle is a cross piece 8 inches long. Resting in the two forks is a *kaka* 6 feet long made by joining two slight wands. The net, .8 inch mesh, was a piece 51 meshes deep and 153 wide, and this has been sewed at the bottom and side by *aea*, making a bag 76 meshes wide. The top edge of the bag is fastened to the *kaka* which is somewhat bowed by the tension.

About the middle of the two *kuku*, the sides of the bag are tied to the sticks and from the bottom of the bag is a cord reaching to the end of the handles. This net in position lies on the *kuku* with a wide mouth on the ground held wide open by the *kaka* which is bent around in a semicircle. Behind the mouth and sloping up towards the hand is the bag.

UPENA NAE KUKU.—Three specimens, Nos. 756, 757 and 6578, untanned. This is a scoop or bag net, of very fine mesh as indicated by the name. It is shaped like a sack, broader than long, with the end and top open, and gathered at the upper edges. Along part of these edges, Fig. 165, two *kuku* are tied, with their ends resting

⁵⁸ Ibid.

in rings at the corners. In operation these ends are placed on the sea bottom as far apart as the mouth of the net will allow and the sticks elevated at an angle of about 45° . The closed end of the bag drops behind like a pocket. These nets are composed of several pieces joined by aea and growing finer in mesh towards the pocket. In the figure is given a plan of No. 6578 showing the meshes and sizes of the various pieces. This specimen is called upena nae hinana, or upena hinana and is of particularly fine mesh. Fig. 164 shows a sample of .4 inch mesh in No. 757. The twine in these nets is much heavier than might be expected in those of such close mesh.

756. Total length 7.5 ft., depth 4 ft., mesh .25-.4 in., length of kuku 4 ft.

757. Total length 25 ft., depth 7 ft., mesh .3-.5 in., length of kuku 17.5 ft.

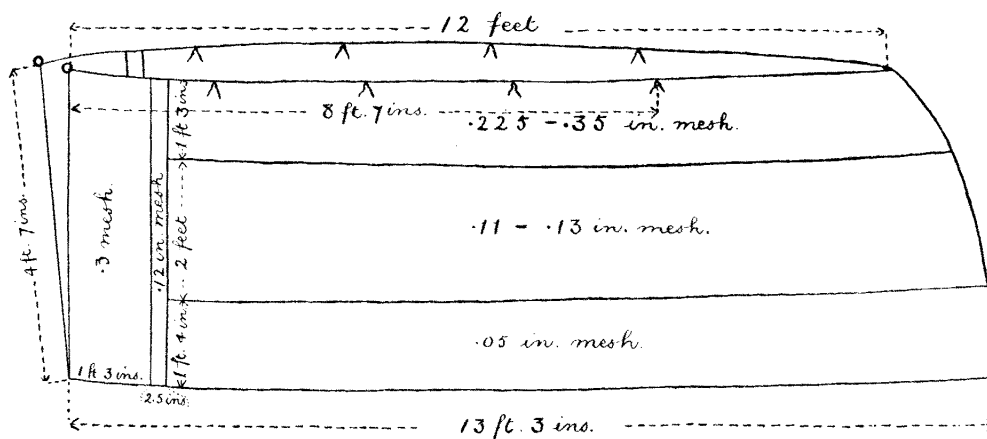
6578. Total length 13.3 ft., depth 4.6 ft., mesh .05-.35 in., length of kuku 8.6 ft.

It is probable that the nets described as *upena nehu*, *upena pua*, *kapuni nehu* and *upena iiao* by Mrs. Beckley and Mr. Cobb would all come under the above description.

UPENA KAILI, OR UPENA AAI-OPELU.—One specimen, No. 760. This is a large semiglobular bag net suspended from two kaka. In position the ends of the kaka are overlapped and tied, making a circular opening. The length of the kaka is the same as that of the fishing canoe. Three men handle the net, one to draw the net to the surface, and one at each end of the canoe to untie the ends of the kaka and allow the sticks to spring to. The bottom of the net opens into a small bag, to which is fastened the stone sinker. In the specimen the kaka are wanting. This specimen was made of many pieces of netting of various meshes. On the top is a narrow band 7 meshes wide of 2.5 inch mesh. Then follows a band of 35 meshes wide and 2 inch mesh. The rest of the netting is 1.2 inches mesh, and, with the exception of the bag at the bottom, was made in two vertical sections. Each section was made up of strips of netting drooping at the middle, gathered at the upper edge and joined at the ends to the netting of 2 inch mesh. By this means the native secured the oval shape. Where portions of the ends overlapped, the larger sized net was cut and the piece fitted. The strips and sections were run together by aea. To attach the bag, the two bottom strips were cut in the middle of the lower edge and the bag fastened by the same cord as before. The bag was a broad piece of netting, netted at the sides, with an open bottom which was closed when fishing by tying with cord. It might be mentioned that the bag is 105 meshes round, while the opening in the bottom of the larger net is only 76 meshes in circumference. This specimen is 48 feet in circumference at the top; the depth, hanging flat, is 19.5 feet and that of the bag 2.9 feet. *Upena kaihi* is said to be similar to this net.

UPENA EKE.—One specimen, No. 5310. This specimen is an old untanned bag net, of which most of the bottom is missing. When in operation it is a long hori-

zontal bag, tapering but slightly away from the mouth, which is at one end. At the other end in the specimen is an opening less than half the size of the mouth, where probably was fastened a closed bag of smaller size. In section, the bag is semicircular, with the arc above. The bottom part of the net called *honua* is anchored by stones at the corners of the mouth and at two points along each side about ten and twenty feet from the mouth. Between these points, stretching the *honua* wide are sticks called *puhi*. There is another stone at the tail end of the bag. To the upper curved part, called *lana*, the *pikoi* are fastened in great numbers in irregular rows. Heavy ropes of hau run the whole length of the bag, one along each edge and one on each



NO. 165. DIAGRAM OF UPENA NAE KUKU.

slope of the *lana* about 8 feet from the edge. The total length of the *lana* is 39 feet, the first 21 feet from the mouth being light cord of .08 inch in thickness and of 1.5 inches mesh, and the rest of heavy cord .17 inch thick and 1.2-1.4 inches mesh. The *lana* is 29 feet in width at the mouth, measuring the ropes, and the lighter portion is made up of five pieces of wide netting averaging 33 meshes long and decreasing from 407 meshes wide in the first piece at the mouth to 238 meshes in the fifth. The pieces are run together by *aea*, in this net called *iwi puhi*. This method of tapering a net seems to have been preferred by natives to the use of the knot known as *makakukai*, already mentioned. The heavier part of the *lana* is in two pieces, 112 and 70 meshes long, and respectively 170 and 165 meshes wide. Of the *honua*, there remains but one piece, of the heavier cord, at the rear end. It is about 11 feet or 113 meshes long and 130 meshes wide. Leading away from the sides of the mouth, there should be two long nets called *paku*, the same depth as the bag, at a wide angle to each other, as a drive. The net on the right is said to be 15 fathoms long, and that on the left 10 fathoms. *Upena kolo* is said to be a net on the same lines as the preceding, but on a much larger scale. The same is reported of the net used in *Lau kapalili*. It is probable that the nets called *papahului* and *au-mai-ewa* and used in conjunction with each other are also similar.

HANO OHUA, OR UPENA OHUA.—One specimen, No. 7072: This specimen has been made of pieces of netting purchased from and netted by Chinese from Chinese fibre, and run together by natives by aea in what is probably one of their ancient forms of fish nets. The knot is what is known as the square or reef knot and is a poor one for fish nets. The mouth is semicircular, 11.8 feet at the base and 19.5 feet along the arc, and from there tapers to a small hole 2 inches in diameter. The length of the upper side is 11.8 feet, and of the lower 9 feet. The mesh is about .5 inch. The mouth is leaded at the bottom, and along the upper part is closely strung a row of pikoi. Fig. 166. *Hano iao* and *hano malolo* are reported as having this shape, the latter being a much larger net.

UPENA KUU, UPENA PALOA, or, generally speaking, seines or gill nets. Two specimens, Nos. 758 and 759, tanned.

758. Length 82 ft., depth 7 ft. or 41 meshes, mesh 2.2 in.

759. Length 66 ft., depth 10.5 or 48 meshes, mesh 3.3 in.

The names of some of the nets reported⁵⁹ under this heading are *akuikui* or *pakuikui*, *uluulu*, *ka-waa*, *kupo*, *luelue*, *pahu*, *papaolewalewa*, *pouono*.

Occasionally a kuku was fastened to each end of the net, and was of great assistance when drawing the net through the water.

UPENA MANO AND UPENA HONU.—Large meshed roughly made nets of about 12 or 6 in. mesh respectively. They are reported to be about 100 ft. long and 6 ft. deep.

There are several other names,⁶⁰ attributed to fish nets, for which the writer has been unable to find descriptions, viz.: *apai*, *uhina*, *kai*, *kaii*, *kuleohua*, *lualua*, *maku*. Some of these names no doubt refer to forms of the nets described above.

In concluding, the writer wishes to express his appreciation and thanks to Mr. L. G. Blackman for his careful and painstaking drawings, and to Dr. W. T. Brigham, Professor Otis T. Mason and many others for suggestions and information cheerfully given and the generous loan of specimens.

⁵⁹ Hawaiian Antiquities, by David Malo, pp. 277, 279, 280, and Andrews' Hawaiian Dictionary. ⁶⁰ Ibid.

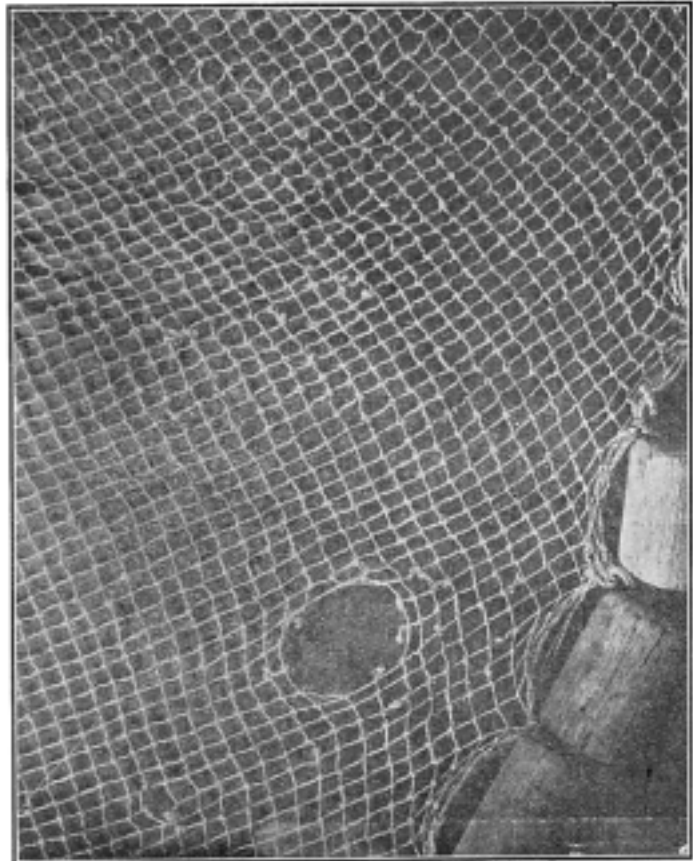


FIG. 166. HANO OHUA.

PLATES.

PLATE I.

MICRONESIAN BASKETS.

- 5631 Rude basket or frail of coconut leaves. Caroline Ids.
7559 Basket of palm leaf. Ponape.
3346 Coiled basket of palm. Caroline Ids.
7800 Small palm leaf basket. Caroline Ids.
8081 Knotted basket of pandanus. Nawodo, Caroline Ids.
4024 Knotted basket of pandanus. Caroline Ids.
7578 Covered basket of coconut leaves.
3347 Decorated basket of grass. Maloelab, Marshall Ids.
7796 Basket of sennit. Ponape.

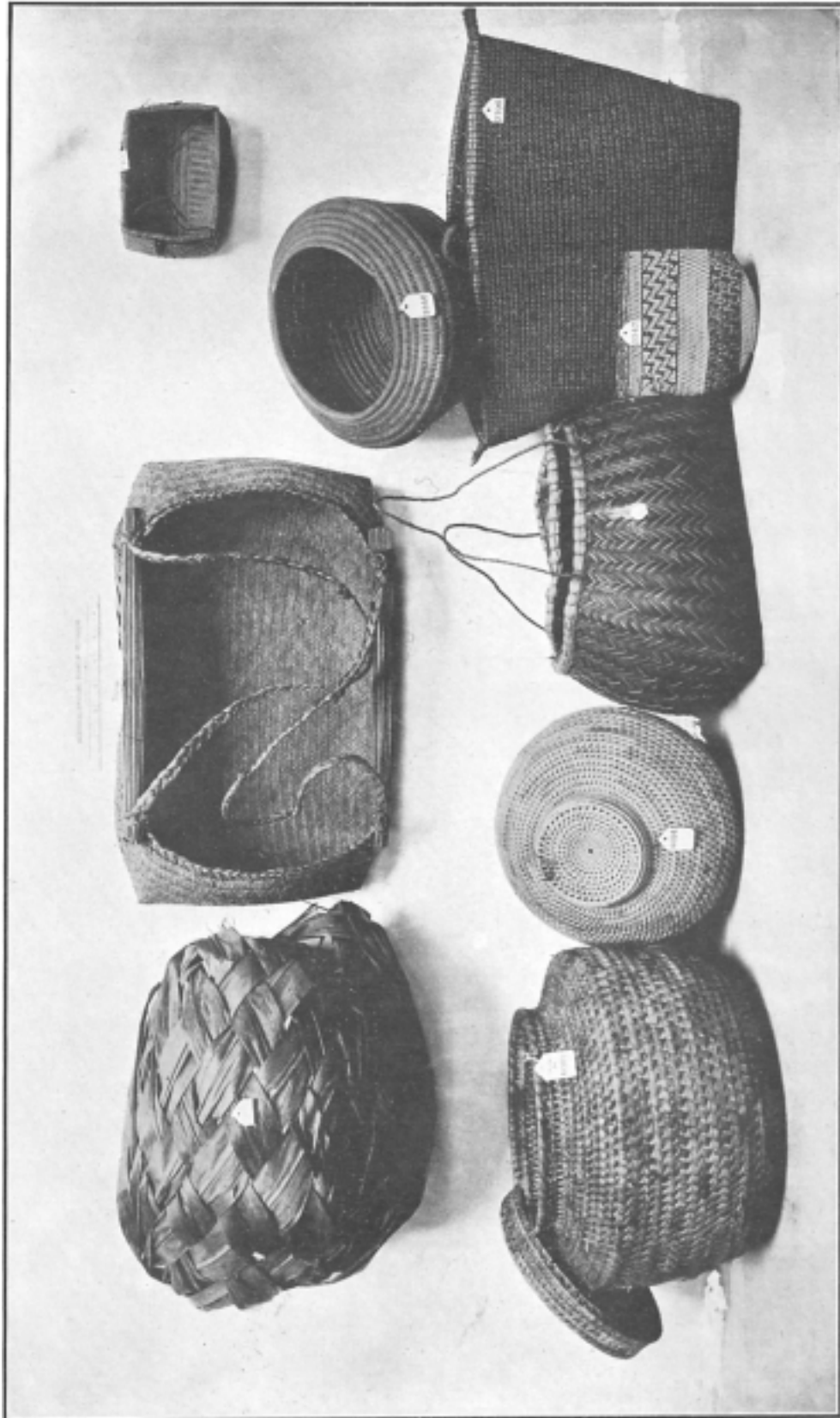


PLATE II.

MICRONESIAN BASKETS.

- 7096 Satchel of pandanus from Gilbert Ids.
- 7095 Folio of pandanus made like the preceding, from the same group.
- 3497 Sack of pandanus, continuous weave at sides, interwoven at bottom.
- 7094 Satchel of pandanus.
- 3351 Basket of pandanus embroidered with human hair.
- 3349 Satchel of pandanus coarsely woven.
- 3350 Basket of pandanus, double throughout; common Gilbert Ids. form.
- 3353 Basket of pandanus sewed with human hair cord; Tapiteuea.
- 6399 Basket from Tapiteuea, Gilbert group.
- 7518 Basket of coco leaf.
- 6398 Basket of pandanus from Tokelau, Gilbert group.
- 3352 Basket from Tapiteuea; sewed with human hair cord.

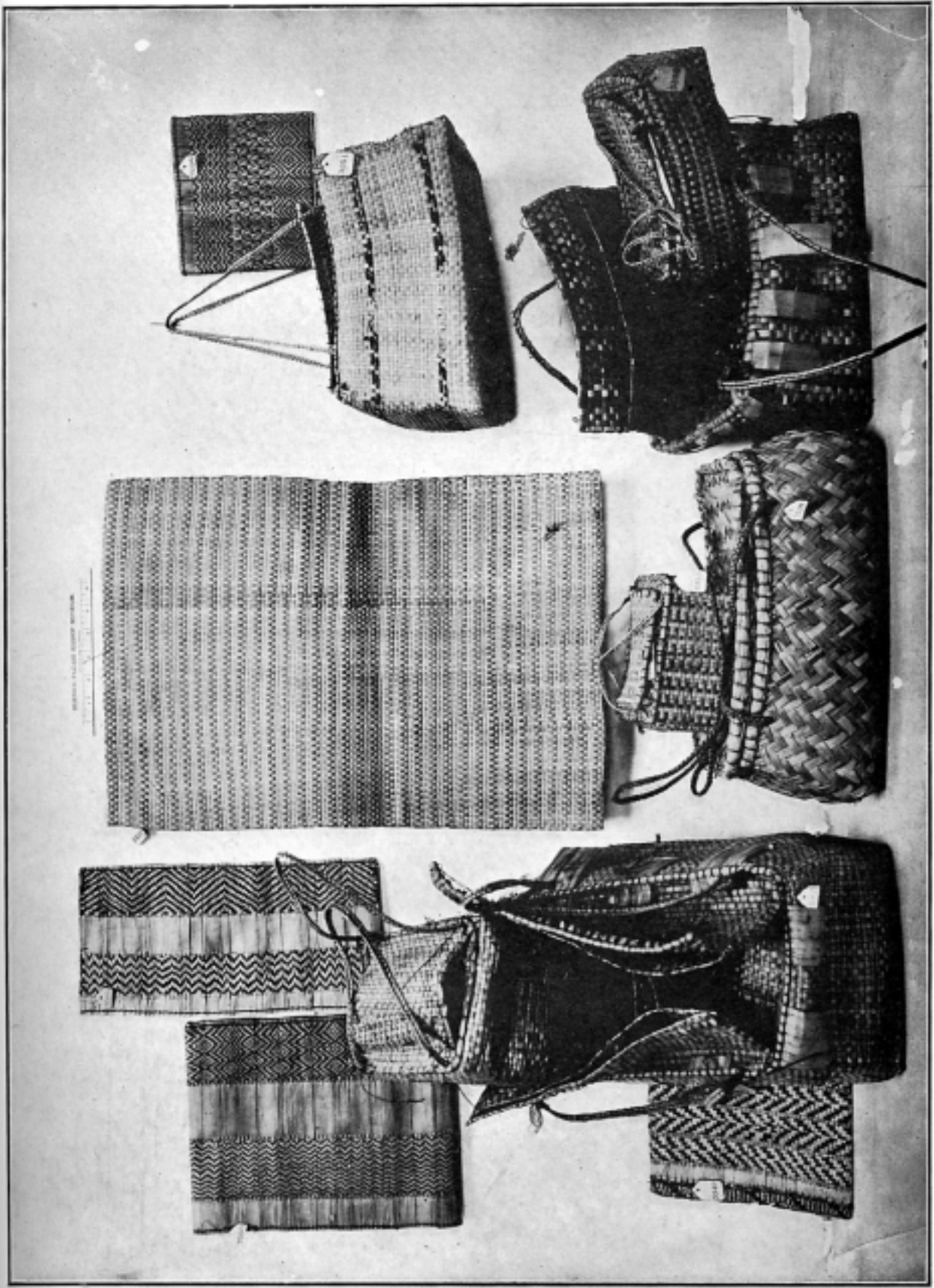


PLATE III.

HAWAIIAN SANDALS = NA KAMAA MAOLI.

- 4547 Sandals, ki leaves (*Cordyline terminalis*): well braided.
- 5107 Sandals of poaaha or partly beaten waoke (*Broussonetia papyrifera*).
- 4538 Sandals of waoke similar to the last.
- 4535 Sandals of pandanus leaves; Na Kamaa lauhala.
- 4540 Sandals of banana leaf; Na Kamaa maia.
- 4546 Sandals of ki leaves; Na Kamaa lai ki.
- 4548 Sandals of ki leaves; Na Kamaa lai ki.



PLATE IV.

HAWAIIAN FISH BASKETS OR TRAPS.

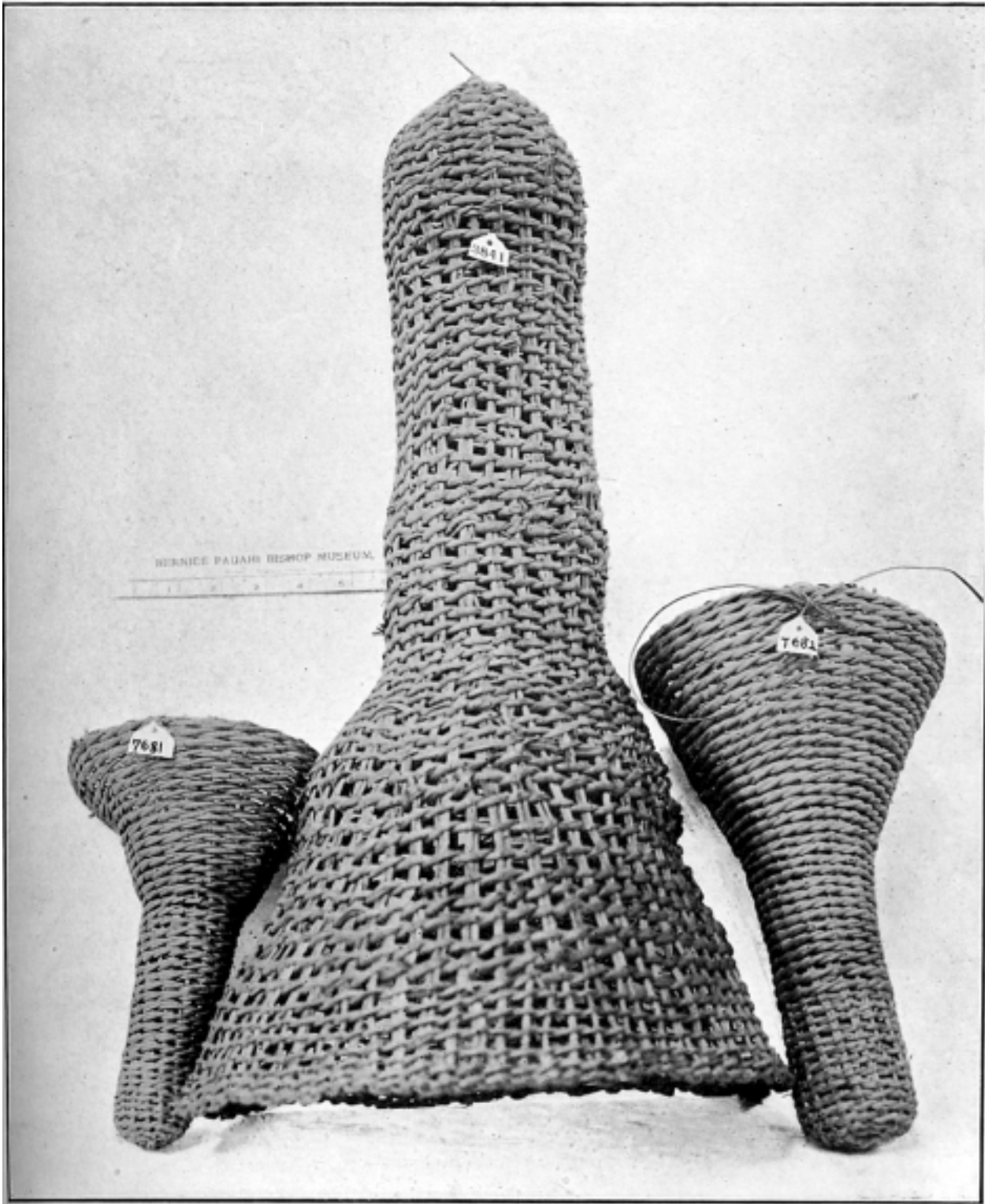


PLATE V.

Corner of a pandanus leaf mat of large size used by the author as a table cover.

The full size is 6 ft. 10 in. by 6 ft. 7 in. The border is about 13 in. wide.



PLATE VI.

Illustrations of plait in Hinai poepoe.

1

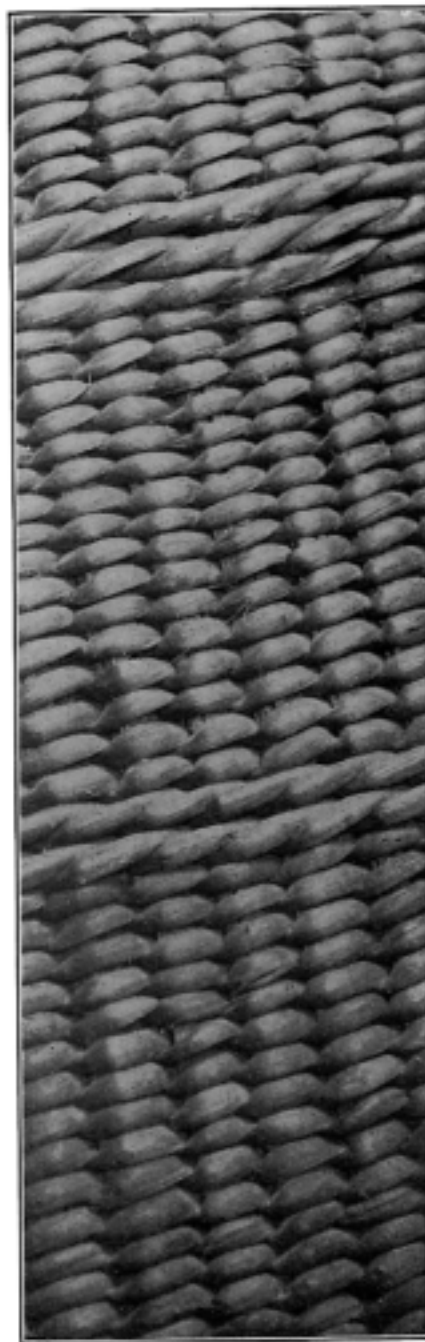
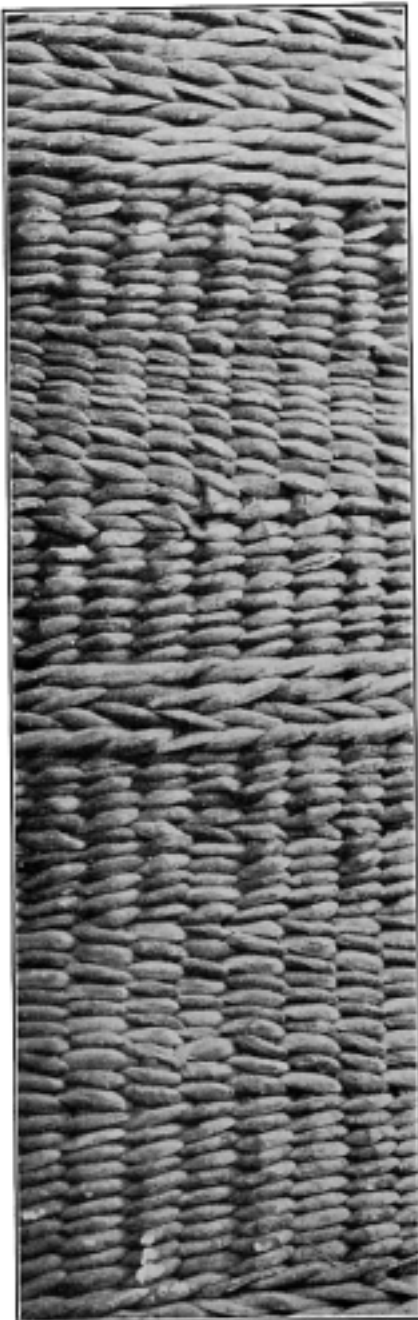
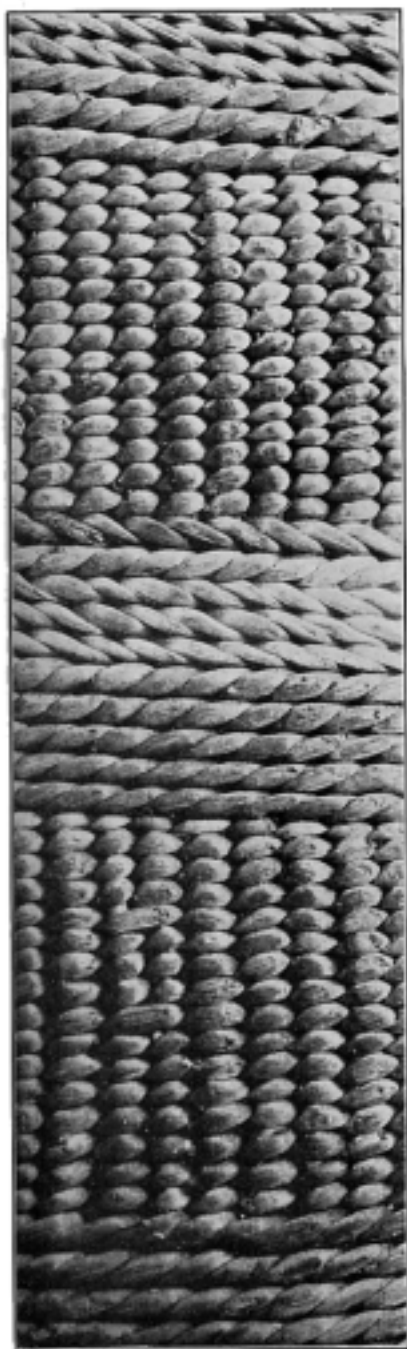


PLATE VII.

7651 Cover of the ieie basket, No. 7651, shown in text.

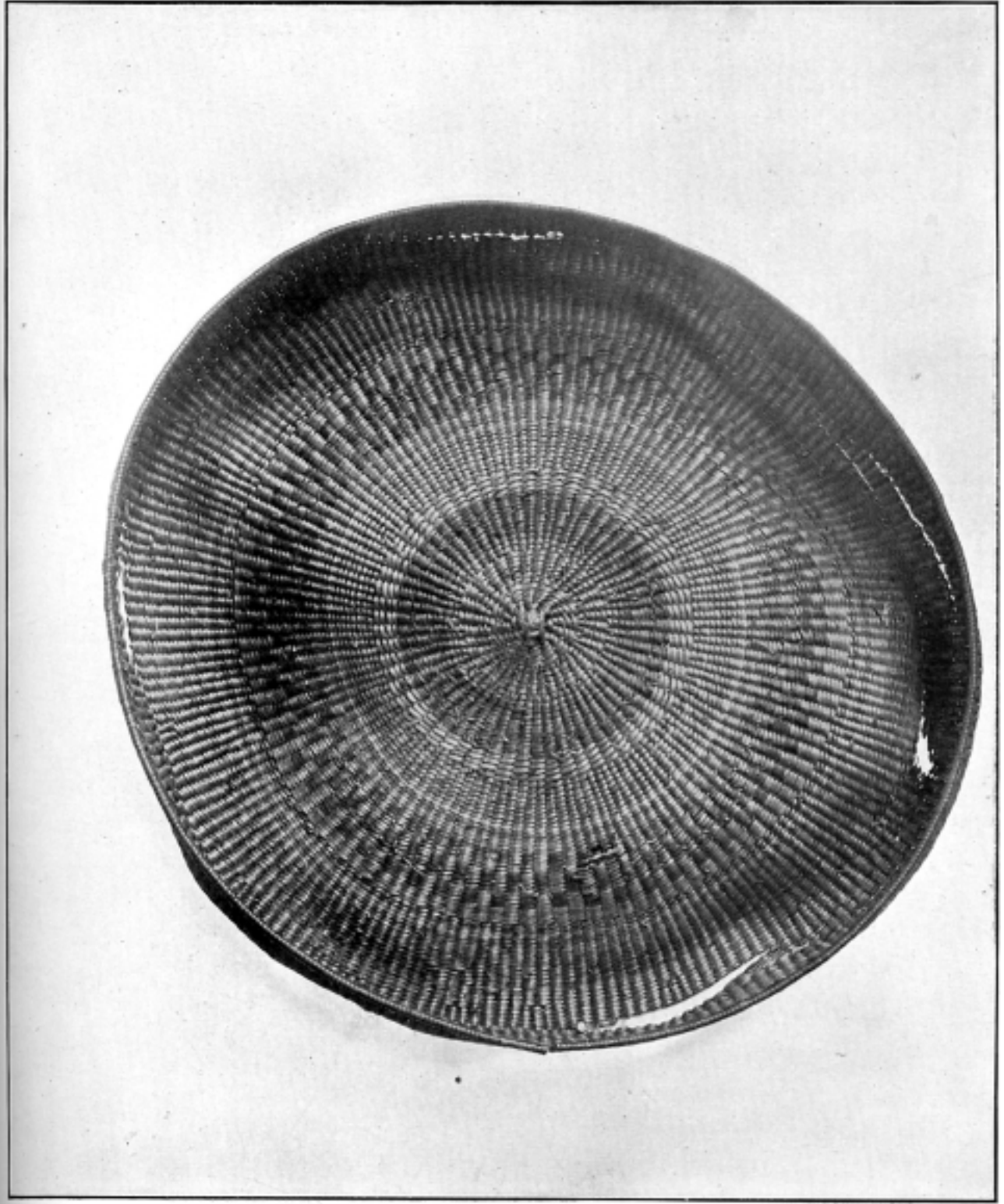


PLATE VIII.

1409 Basket covering of a gourd.

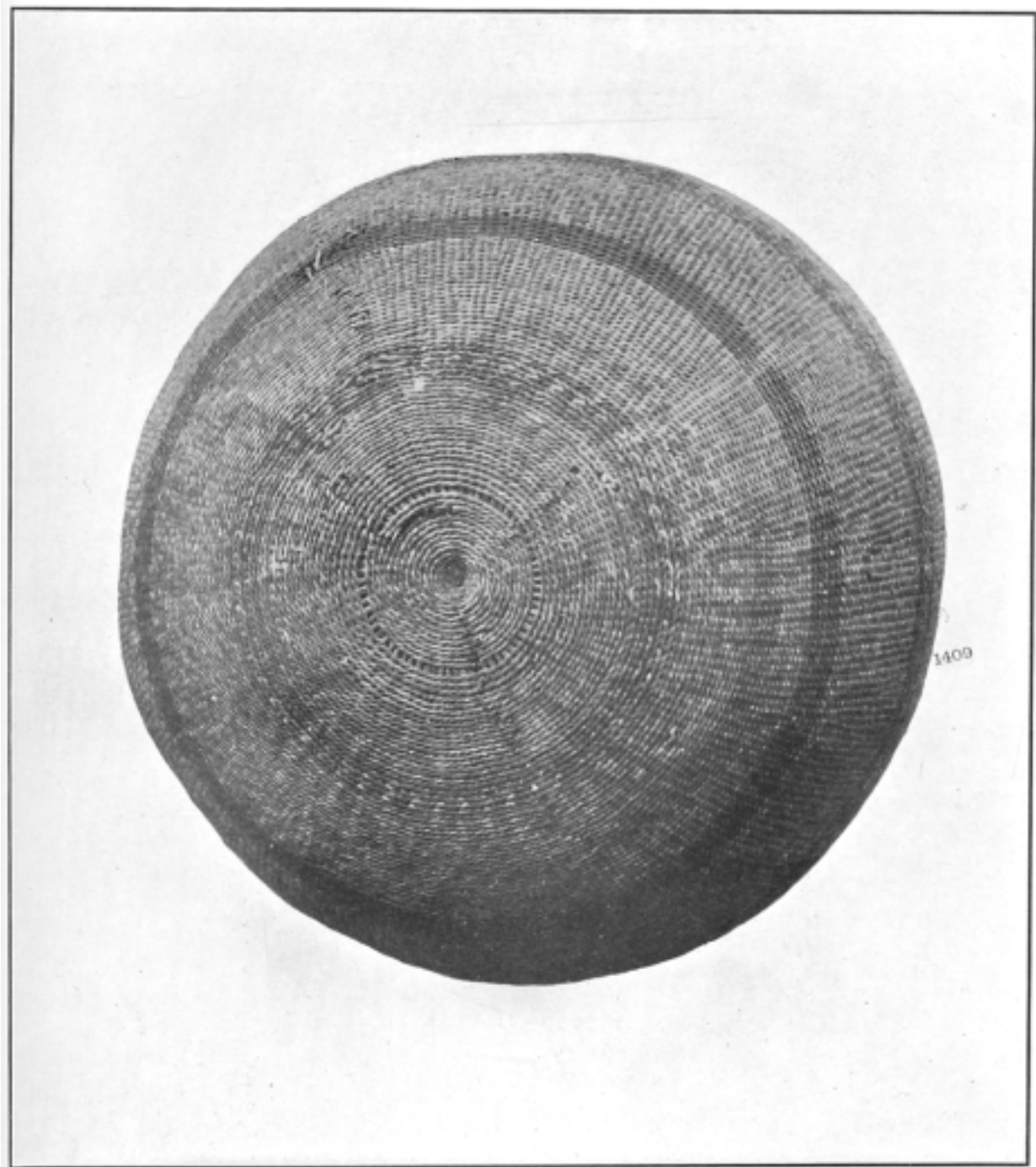


PLATE IX.

- 3889 Hinai poepoe of ieie around a wooden umeke.
- 3890 Hinai poepoe with cover, both around wooden umeke.
- 1404 Decorated Hinai poepoe around gourds.

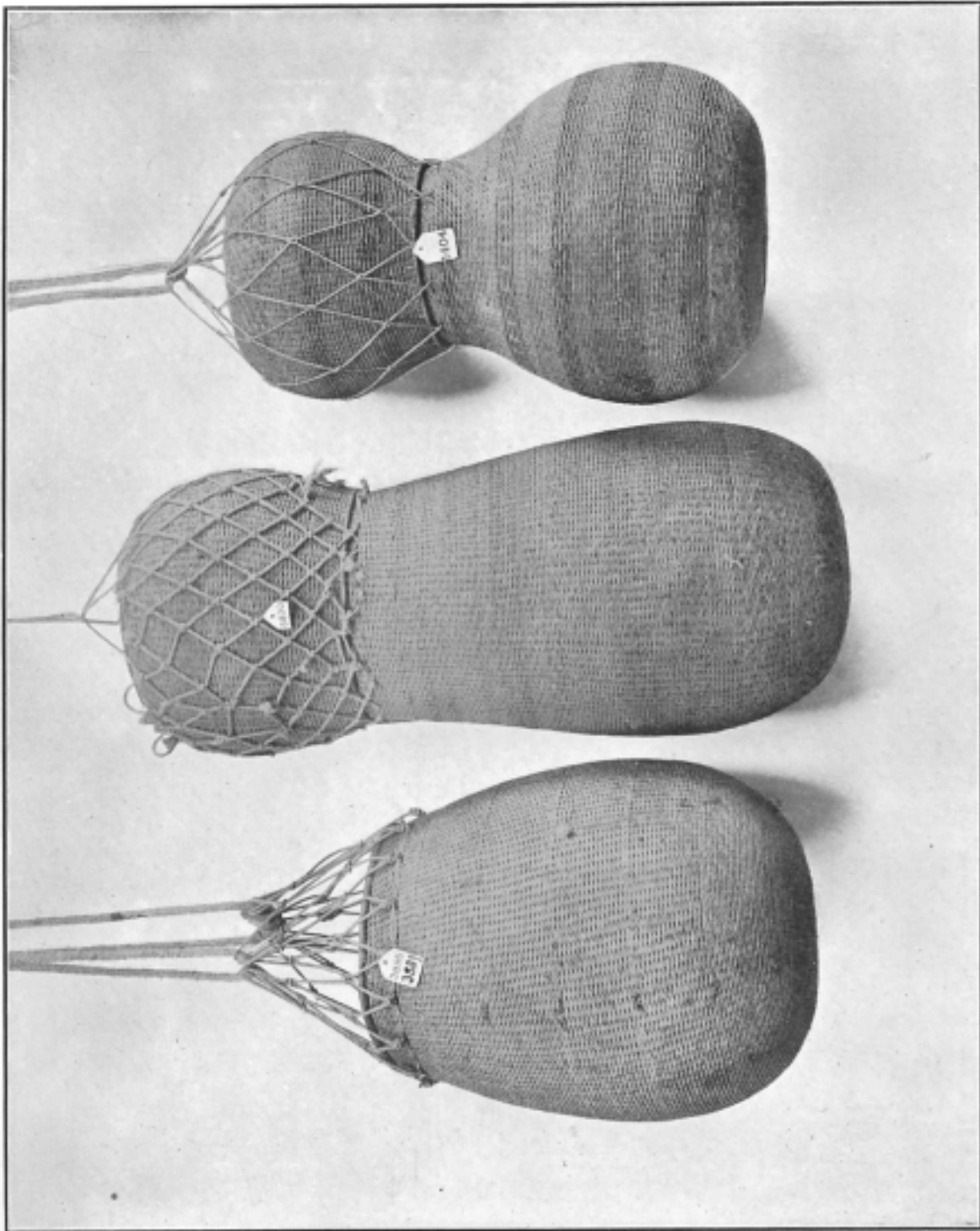


PLATE X.

The beginning of a Makaloa Mat.



PLATE XI.

Portion of a Niihau or Makaloa Mat.

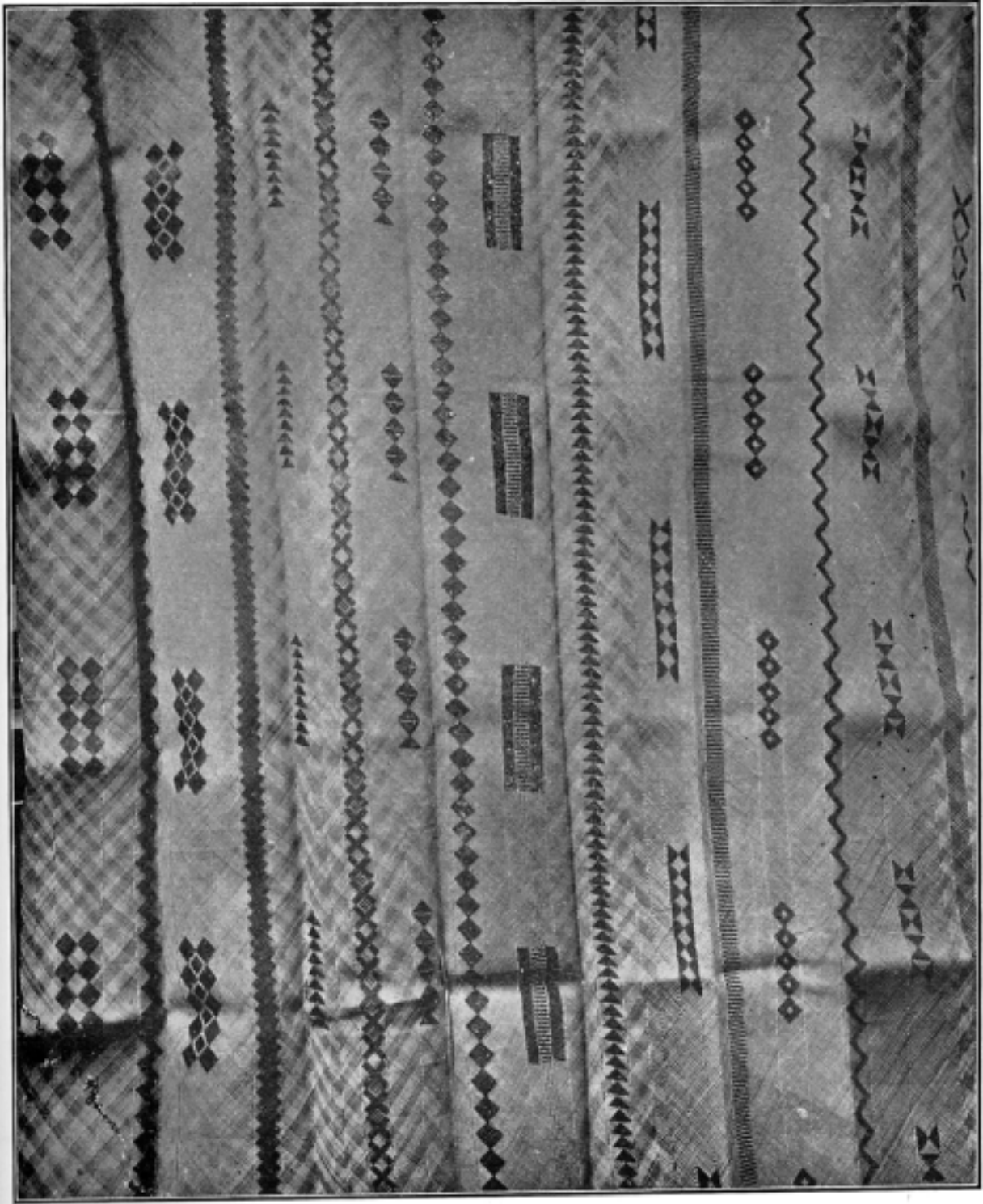


PLATE XII.

Portion of a Niihau or Makaloa Mat.

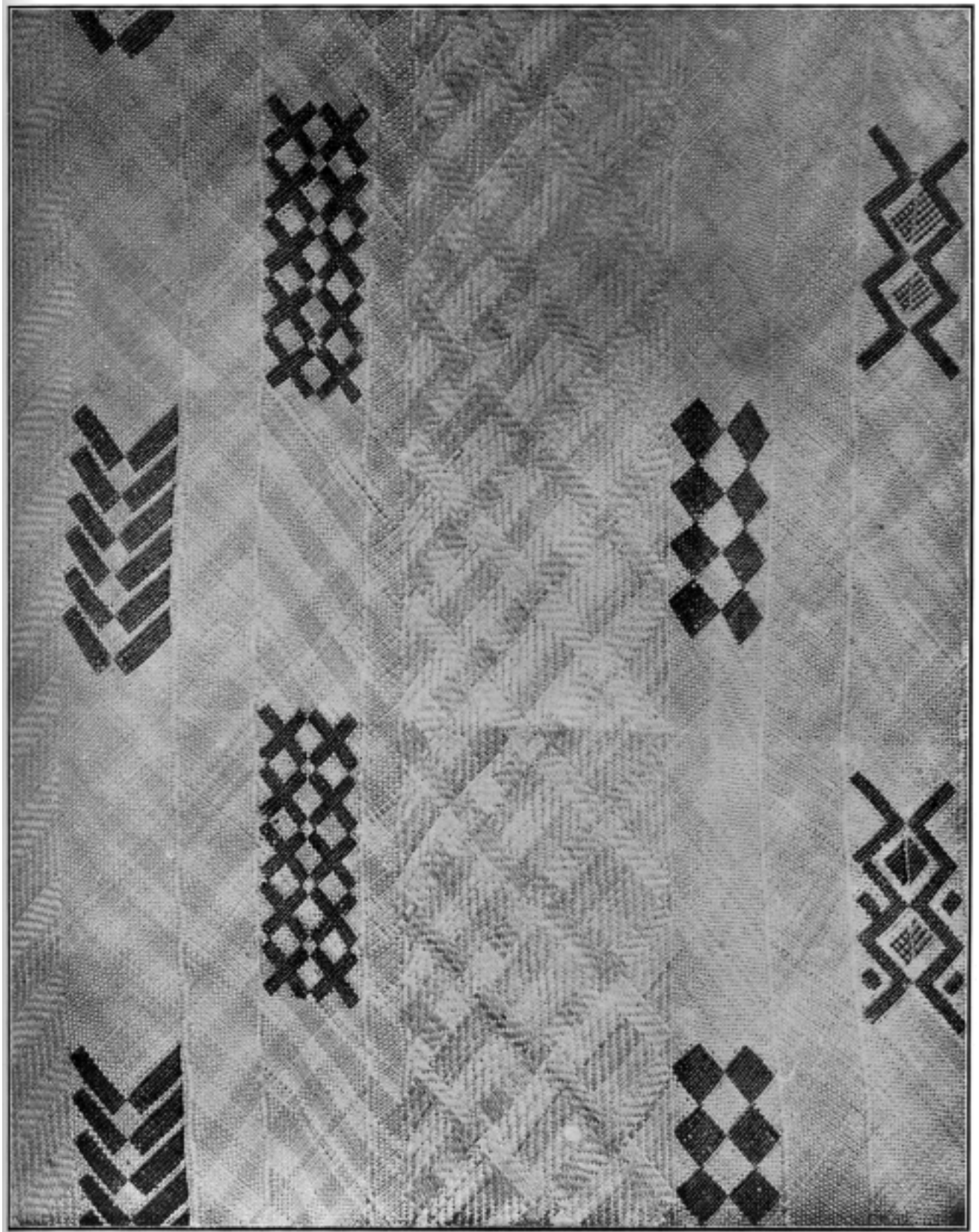


PLATE XIII.

Portion of a Niihau or Makaloa Mat.

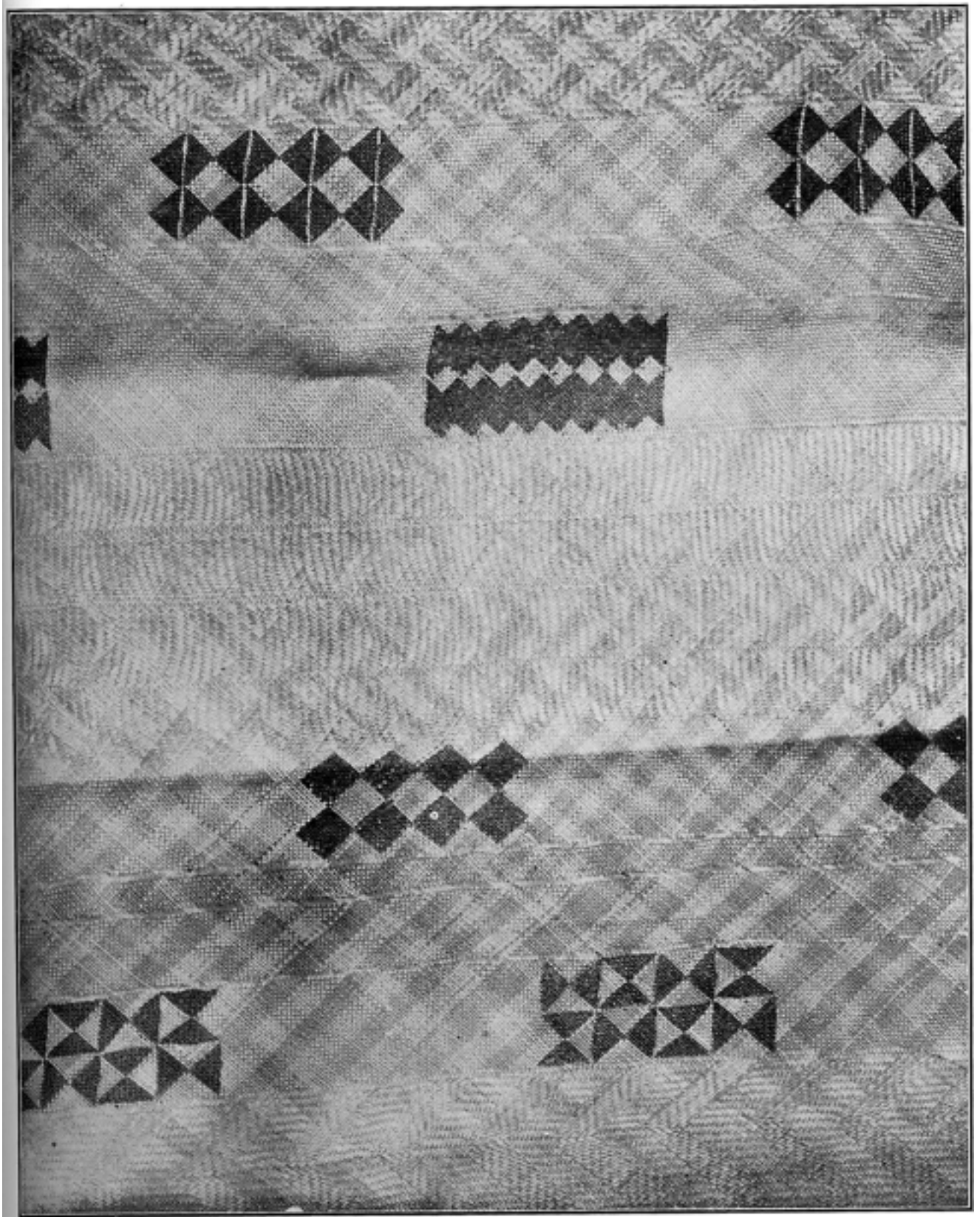


PLATE XIV.

Group of modern Hawaiian Fans with a central one of ancient form.

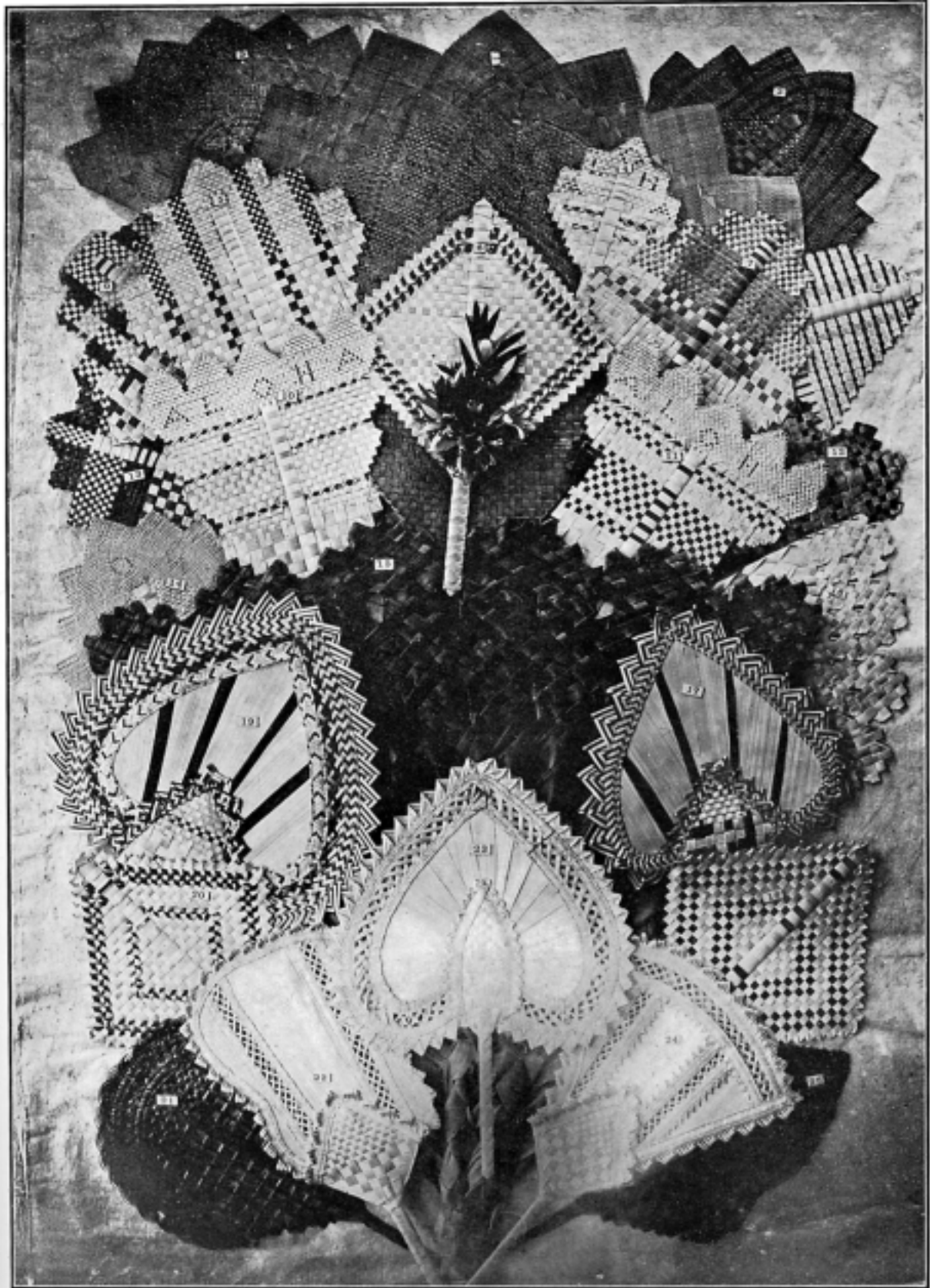


PLATE XV.

A figure of a Hawaiian, cast from life by the sculptor Allen Hutchinson, to illustrate the ancient method of scraping the fibre of oloná in the cord and net manufacture. Made for the Bernice Pauahi Bishop Museum. The background shows the case containing fishing implements.

