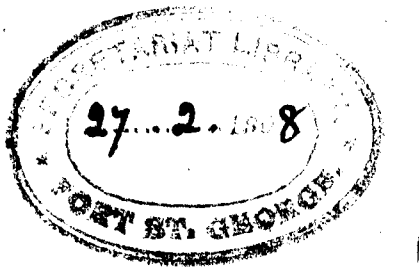




Fig. 1

A MONOGRAPH
ON
IRON AND STEEL WORK
IN BURMA



BY
E. N. BELL, I.C.S.

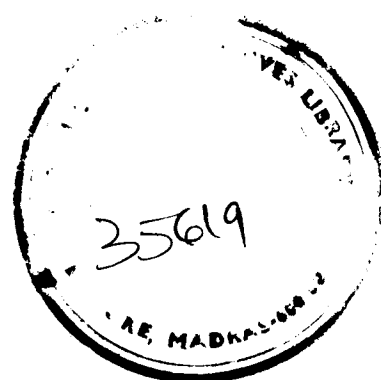
ILLUSTRATED

RANGOON
SUPERINTENDENT, GOVERNMENT PRINTING, BURMA

1907



X8 (F182) .438
N07



CONTENTS

	PAGE
CHAPTER I. HISTORICAL	I—5
„ II. PRESENT CONDITION	6—10
„ III. DEVELOPMENT	11—13
„ IV. IMPORTATIONS	14 AND 15
„ V. METHODS AND APPLIANCES	16—19
„ VI. PRODUCTS	20—23
„ VII. ARTISTIC DEVELOPMENTS	24—30
„ VIII. CONCLUSION	31



P. Klier, Rangoon.

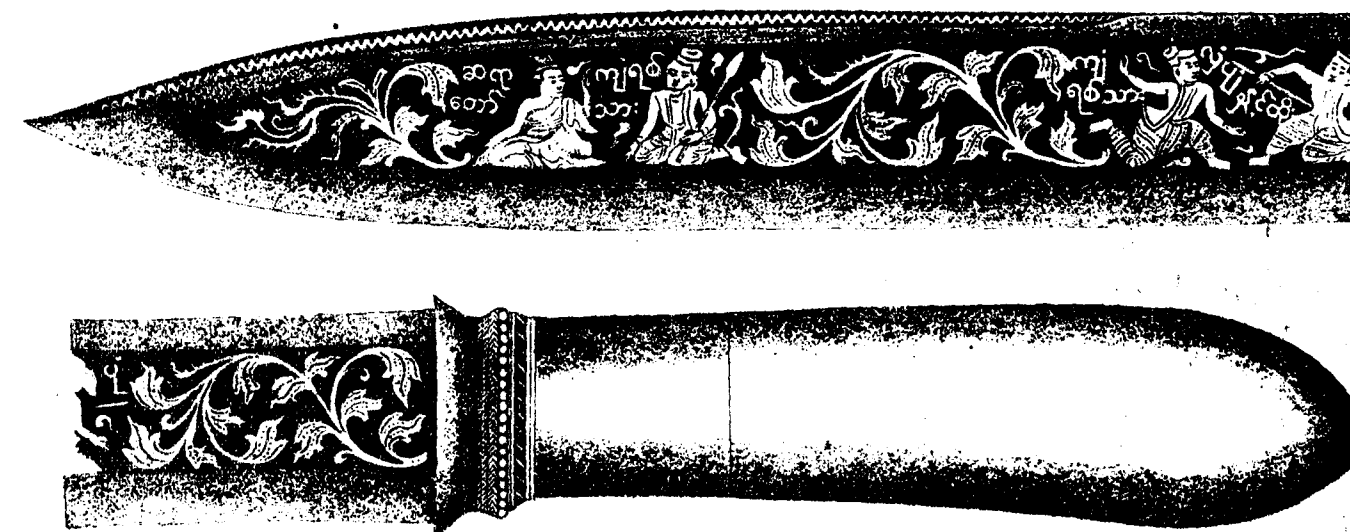


FIG. 2.

CHAPTER I.

HISTORICAL.

THE early origin of the blacksmith's art in Burma is shrouded in the mists of history. Although we know that the Indian mercenaries who followed Xerxes to Marathon bore iron weapons, we do not know that any of them came from the Burmese Kingdom, nor is there proof positive that in those days the relations of Burma with other nations trended westward, and not only to the kindred peoples on the East. The soldiers who followed the fortunes of King Anawrata and his successors are said to have been armed with bows and arrows, swords and spears, home-made products forged from the iron smelted at Popa. Round the Popa legend centres the earliest history of the forge. According to tradition there was a great earthquake in 442 B.C., during which the great cone of Popa rose from the plains: but the native chroniclers leave no record of how long it was active and when it became extinct. And indeed is recent a date as that would be acceptable to no geologist.

Following the tradition which has given to volcanoes a name derived from Vulcan, the old armourer god, Maung Tin Dè, the legendary hero of the Popa myth, is represented as a blacksmith of prodigious strength. His date by the chronicles is the fourth century A.D. The son of a blacksmith, Maung Tin Dè could wield in his right hand a twenty-five viss hammer, and a twenty-viss hammer in his left: and under his blows the anvil roared like thunder, and all the people round were struck with panic. His great power was a source of fear to the King of Tagaung where he lived, who to secure himself married his beautiful sister Saw Mè Ya, and afterwards seized by treachery the smith, whose funeral pyre was shared by his sister: the pair of them thereafter became those most powerful Nats, the *Mahagiri Maung Hnama Daw* (မဟာဂိရိ မောင်နှမ နတ်) of Popa.

Maung Tin Dè may be called the patron saint of Burman smiths, and his career is illustrated in the *dalwè* (figures 2—9) made by Saya Pyo.

Without weapons and implements of iron neither the warrior nor the agriculturalist could have developed Burma into the prosperous condition in which it was found by the first Englishman recorded to have landed in Burma, the adventurous Ralph Fitch, who reached Bassein at the end of 1586. Twelve years after that date we touch solid ground, for although blacksmiths from India are mentioned in the chronicles, the iron industry was established only with the coming of the Portuguese. It is recorded that in the Burmese year 960 (1598 A.D.), a band of 500 Portuguese males, with 300

females and 2,000 native followers, under the leadership of Nga Zinga (Philip de Brito), obtained leave from King Ngazudayaka to settle in Syriam; but after asserting their independence, they were in 1612 A.D. attacked by Anauk-pet-lun, King of Ava, who put to death Nga Zinga, and deported the remainder to Shwebo, Tabayin, Amyin and Nabet. So many of the captives as were conversant with the art of smelting were formed into a company or guild of smiths, under the orders of a *Than-gyet-wun* (တံခွေဝန်), then for the first time appointed. The date of this appointment being given as 975 B.E. (1613 A.D.): the post remained on, more or less as a sinecure, into the days of King Thebaw, the last incumbent being U Hmyu (ဦးဧူ), lately deceased, who, at the time of the British occupation of Mandalay, was in Paris negotiating a treaty of friendship with the French Government, as Burmese Plenipotentiary and Minister Extraordinary. He is said to have had a slight touch of Portuguese blood.

Previous to this appointment of a *Than-gyet-wun*, iron was only extracted by primitive methods and spasmodically to serve the Royal needs: the King, as occasion arose, would send an order specifying the quality and quantity of iron to be provided by the official in charge of some distant village, not necessarily one whence iron was easily obtainable.

With the establishment of smelting as a regular industry under the guidance of the Portuguese captives, the supply of raw metal was assured, and iron became one of the four Royal monopolies (rubies, gold, iron and stick-lac).

The *Than-gyet-wun* was the head of a Department

under the Crown, and not only was he in charge of this monopoly, but he was also the Court of original jurisdiction, Civil and Criminal, for all disputes between his employes. His headquarters were in Mandalay, and he received a fixed salary of Rs. 200 a month: all orders for smelting were transmitted to the three *Than-hmus* (သံ ဟူ) under him. Subordinate to the *Than-hmus* were the *Than-gaungs* (သံ ခေါင်း), each of whom was in charge of five or six furnaces (ဒို): while to each furnace went five *Than-asu-ahmudans* (သံ အု အမှုထမ်း) or *Than-gyet-thamas* (သံ ချက်ထွား).

Thathameda was levied on the workers only when smelting was discontinued, never when it was in full swing.

The present Shwebo District was the chief scene of these operations. But there is a record of an Italian adventurer, Captain Chipatti (?), who obtained leave from the then King of Burma to smelt at Sagaing iron procured from the Sattha valley tract (between Sagaing and Shwebo). Iron was also obtained from the Myedè Subdivision of Thayetmyo, from Magwe and Yamethin Districts, and from the Pagan subdivision of the Myingyan District, chiefly on the West and South of Popa: this last is said to have been highly prized for its quality, a result due not improbably to the crude methods employed, which made it profitable to work only ores of the highest grades. Perhaps it was the Royal monopoly that caused 50 per cent. of dross to find its way into a pig of Popa iron.

In the wilder parts, which under the Burmese Kings could not be called even semi-administered, smelting of a rude sort was carried on, and still survives, e.g., among

the Marus, beyond the Shippwe Ka in the Kachin Hills, in the Samka and Laikka Shan States, at Thandaung, beyond Banmauk, and among the Laikas: these will be described later on.

In spite of the appointment of a *Than-gyet-wun* and the establishment of a monopoly, much unauthorized smelting was carried on by a class of *Than-bo-thugyis*, (သံ ဝို ခု ဇွဲ), who were skilled both in smelting the ore and in manufacturing the metal thus obtained. These seem to have been privileged to carry on their work without hindrance, save no doubt for occasional contributions to the privy purse of the Iron Department.

Raw iron is reported to have been introduced into Burma in the days of the Pagan Min, since when the trade in indigenous iron has gradually declined.

Of the manufactures in Burmese times the greater part persist up till now: one branch alone has practically disappeared, the making of weapons, now killed by the enforcement of the Arms Act. It is regrettable that information on this subject was conspicuous by its absence in reports received from many sources, and that the writer could not obtain access to the private collections which no doubt exist in the country.

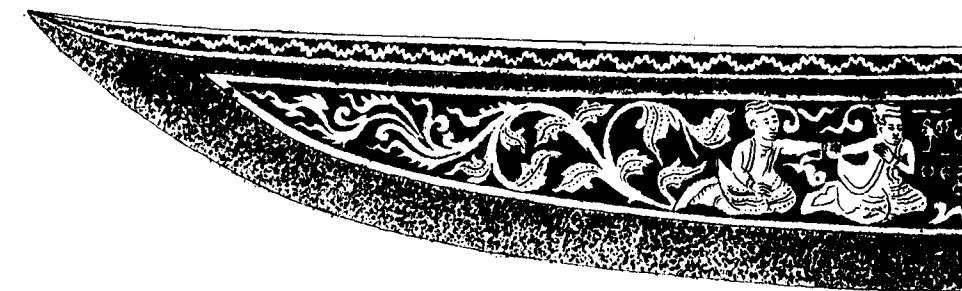


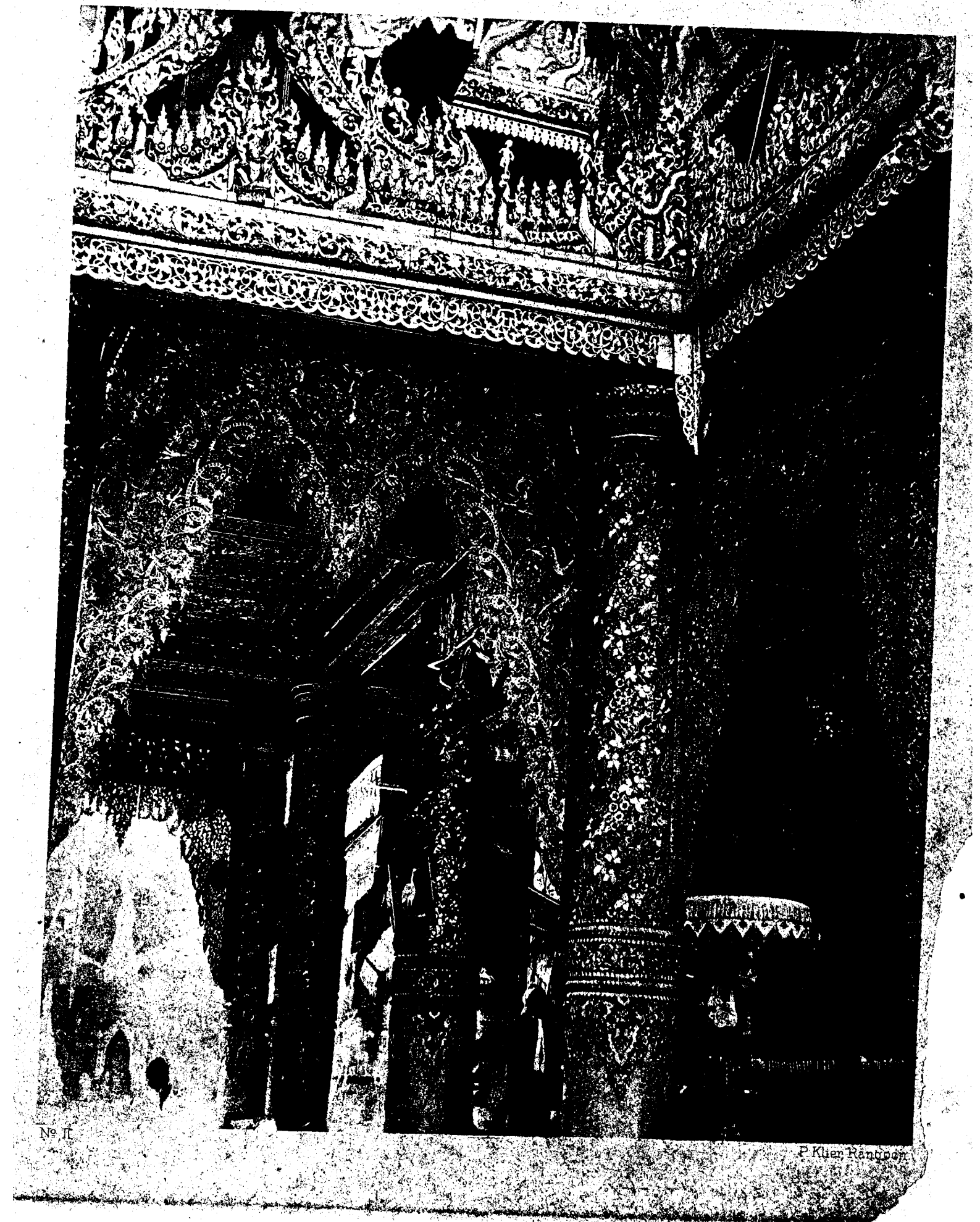
FIG. 3.

CHAPTER II.

PRESENT CONDITION.

PEOPLES, like children, have their days of hobbledehoyhood, and at the moment Burma is passing through a period of transition, undetermined yet as to her ultimate career. In Burma of to-day where the railway has supplanted (these twenty years) the bullock cart along the King's way to Mandalay, and where every up-country bazaar supplies with cheap German clasp-knives, the needs of the young Mohock, the art of the blacksmith still survives, but hardly as a living art. In every five or ten villages is found a smith who, as a rule, is not working permanently at his trade, but is a cultivator for eight months of the year, for one month rests from his labours, and in the other three prepares his bellows and charcoal, and begins to re-tyre the village carts and re-forg the *das* that use has blunted.

In his small way the village blacksmith will survive, more fortunate than his *confrère* the smelter, who is surely doomed by the influx of foreign iron. Before he disappears, let his memory be recorded in the following extract from a note by G. C. B. Stirling, Esq., C.I.E., given as Appendix XIII to the Report on the Administration of the Shan States for the year 1889-1890:—



IRON AND STEEL WORK IN BURMA

"Iron ore is extracted from a hill called the Loi Namleen in the Lègya (Laika) State. There are three shafts on the north side of the hill, and on a ridge a little distant are a number of shallow workings from which most of the ore now extracted is obtained. Each furnace has two workers, the smelter and his man. The former mines the ore during the day, returning when he has filled two cooly baskets, this being as much as can be worked at one smelting: the latter has to make from pinewood a supply of charcoal sufficient to smelt this. The furnace is of earth with two openings: into the lower the charcoal is placed, and banked up to keep in the heat. The rough ore which has been pounded up to the size of fine gravel is dropped in through the upper opening, handful by handful, mixed with charcoal. The ordinary bamboo bellows are used to give the blast. The smelting is begun at 2 A.M., and finished by sunrise. The lump of metal [*Kaung* (ကော့)] so obtained, on being taken from the furnace is cleft almost in two, to admit of being carried on a bamboo. The quantity of ore required to produce one of these *kaungs* varies according to its quality: in an experimental smelting, carried out in an extemporized furnace, 50 lbs. weight of ore yielded a piece of metal weighing ten lbs., the smelting being completed in less than four hours. If the smelter works constantly, and at his usual rate, he has four *kaungs* of metal at the end of the fourth day. On the fifth he and his man take these to the bazaar where they are disposed of at once to a brisk demand; the price ranges between six annas and one rupee."

This raw metal is almost entirely bought up by local smiths, of whose work Mr. Stirling adds the following note:—

"The smiths have, as a rule, from three to six underlings, and having bought the metal from the smelter, like him work hard for four days, and on the fifth go to the bazaar to sell the manufactured articles, and to get a fresh supply of metal.

"The *kaung* is first reheated in the smithy and beaten out into a flat rod which is cut off into lengths suitable for the required article. All six men are required for this process: the smith who holds and turns the *kaung*, one man to work the bellows, and four to beat out the hot metal. The services of extra men are paid for with small pieces of metal. Charcoal, if purchased, costs two or three annas per cooly-load. The

following are the implements usually manufactured and the wholesale prices of each.

		Rs.	A.	P.	Rs.	A.	P.	
Mattocks (<i>pauktu</i> , မေါတ်တူး)	4	0	0	to	5	0	0	} for 10.
Axes (<i>paukseim</i> , ဖုဆိမ်)	3	0	0	to	4	0	0	
Axes (larger and heavier) ....	....	....	....	....	7	0	0	
Tripods (<i>thanpo-ganauk</i> , ထံပိုဂဏောက်) ....	....	....	....	....	2	0	0	
Spades (<i>taywin</i> , တူးရှင်း)	1	4	0	to	1	8	0	
Damas (long, ထားဝါ)	2	8	0	to	3	0	0	
Damas (short and heavy) ....	....	....	....	....	4	8	0	
Dagauk, ထားထောက် ....	....	....	....	....	1	8	0	
Scissors (<i>katkyi</i> , ကတ်ကျီး) ....	....	....	....	....	1	8	0	
Tongs (<i>mi-hnyat</i> , မီးဗွတ်)	1	0	0	to	1	8	0	

"The industry is comparatively small at present: smelters and smiths work very hard, but neither seem able to make a living by their trade, for all cultivate fields and *taungyas* as well."

Mr. Stirling's note is reported to be true of the existing state of things in the Southern as well as the Northern Shan States, where more than elsewhere the indigenous handicrafts might be expected to flourish. But the reports received from district officials hold out little hopes for the future: the smelter, however patient and industrious, cannot hope to hold out long against imported bar iron which is sold along the Lashio line at Rs. 30 per 100 viss. Another report says that "very little of the local iron is now used by the blacksmiths in this subdivision. It is more difficult to work than imported iron and does not give such good results. It is quoted at Rs. 5 to Rs. 6 per ten viss, while foreign iron bought at Mandalay is quoted at Rs. 40 per 100 viss in the local markets.

So, too, the local blacksmith in these outlying parts has a hard struggle with imported goods. Local wants, however, provide sufficient occupation for wandering Maingthas who tour in Myitkyina for six months of the year: they come in parties of three, a *saya* (ဆရာ) and two disciples *tabe* (ထံပြည့်): each party is said to return to China the richer by Rs. 300—500. Raw iron is brought with them or picked up locally, in bars or as scrap-iron. Steel imported from Rangoon by Chinese traders costs one rupee a viss. These men confine themselves to *das* and axes, all other articles of common use, including pagoda *tis*, being brought up from below.

In the Kachin Hills there is a distinct blacksmith caste, the art being hereditary and handed down from father to son: and there are strict rules against endogamy: a member of the Lepais family from the north of unadministered territory cannot marry a Lepais woman from Katha or the Ruby Mines. She must be of a different family, *e.g.*, a Lepais may marry a Maran from the next village. Cooking-stands, *das* and spears alone are manufactured; everything else is imported from China or Myitkyina; and even the *das* known locally as Mainsa *das* are largely imported from China.

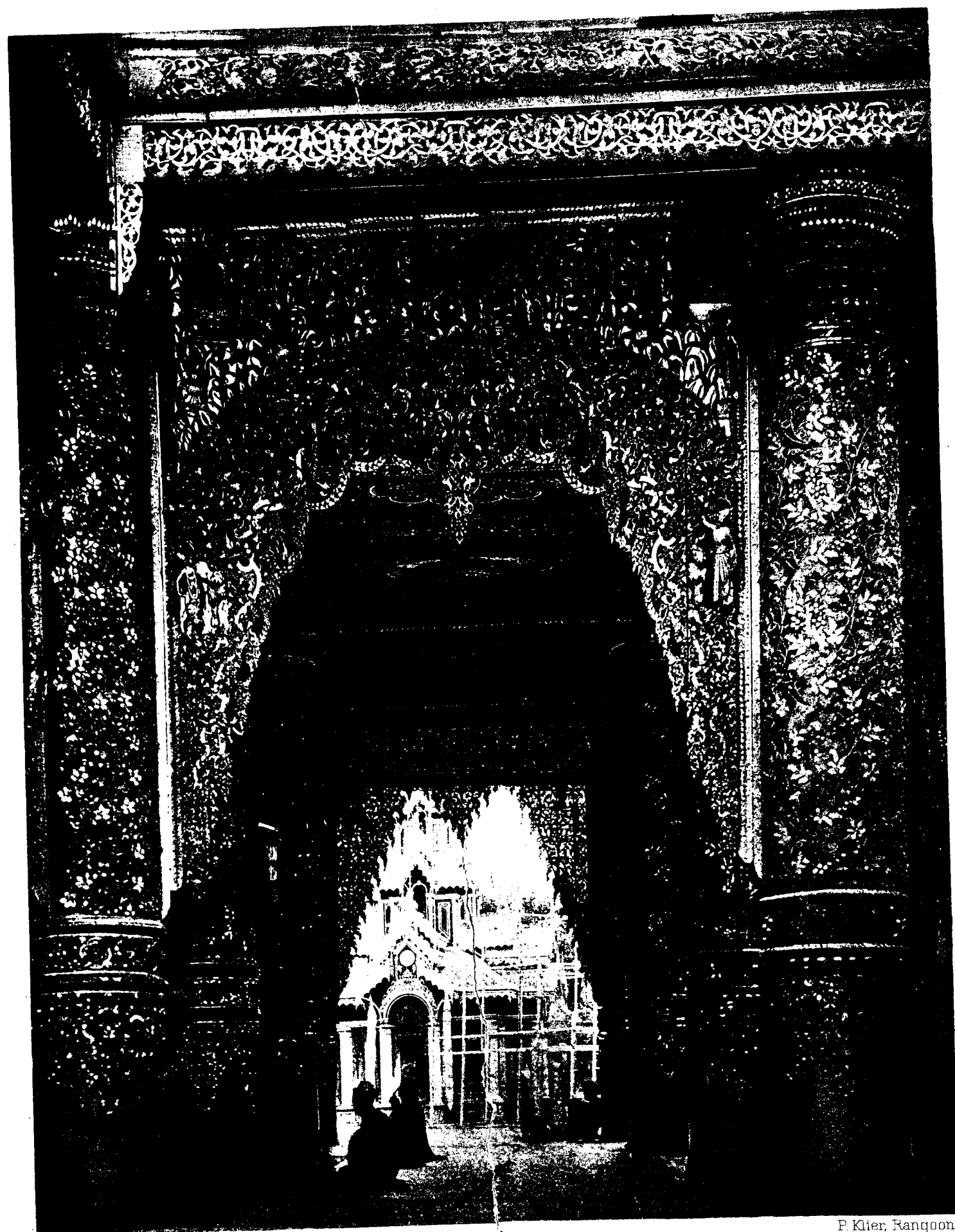
In the Southern Shan States, Mong-Kung and Kehsi-Mansam produce *das* which have a wide reputation even in Siam whither a large number are exported annually under the trade name of *Hamngai*, the blades being bought wholesale by Hamngai traders who fit them up with handles.

If this is the state of things in the parts of Burma where imports are hampered by lack of communications, the local blacksmith has but poor prospects when confronted with a constant stream of foreign goods, with added complications in the development of foundries in Rangoon which study local needs, and the rise of wages for unskilled labour in the paddy fields and other occupations.

The local craftsman survives as yet, doing a certain trade in *das*, hoes, forks and other agricultural implements, and in local repairs more especially in the matter of cart tyres: but he seldom depends upon his forge alone, regarding it rather as a supplementary source of income when field-work is over. Even he usually wanders round neighbouring villages to stimulate the demand for his services. His methods, appliances, and products will be dealt with later.



FIG. 4.



P. Klier, Rangoon

CHAPTER III.

DEVELOPMENT.

AMONG the many importations into Burma of raw iron and manufactured products, when the output of the local artisan tends to become more and more restricted, there is cause to wonder whether the Burman blacksmith will strike out new lines for himself, or adapt himself to new needs.

In minor matters he shows some versatility, the rotatory ploughs used over a great part of Lower Burma are entirely of local make: the iron ploughshare or iron harrow-tooth that is gradually coming into vogue, is now being cast in the villages from the original patterns; a clay mould is formed round these, dried and filled with molten iron for a new casting. The introduction of these is said to date back ten or fifteen years: their vogue is increasing slowly, chiefly because the agriculturalist is not convinced of their utility, save where deep ploughing is needed. They are met with rarely in the upper country, as the cheap castings soon come to grief in stony ground, and are harder to replace than harrow-teeth of cutch. They are said to do the work quicker, but to need stronger cattle.

Another development, due in great part to the provision of metalled roads and the enforcement of municipal regulations, is the manufacture of iron cart-tyres.

This branch of the industry, at least, is certain of progress since only the local smith can supply local needs.

Curiously enough, none of the district reports received touch on horse-shoes, though here and there in the most rural tracts a shod horse may be seen.

Such as it is, the industry is mainly confined to towns, and is in the hands of natives of India.

The increase of mills and machinery especially in the big towns like Rangoon, Bassein, Moulmein and Mandalay, has brought with it the establishment of iron foundries on European lines, in which a few enterprising Burmans have learnt the art. At Bassein, for instance, Maung Waik, formerly head smith in the foundry attached to the DeCruz mills, can turn out iron castings on a small scale, *mamooties*, ploughshares, bolts and the like. While Maung San Hla, another local smith, is credited with a couple of large gates of wrought iron now erected at the bazaar and jail of Bassein, the former measuring 11 feet by 14 and the latter 15 by 15.

The outlook in this direction, though not perhaps in the immediate future, is most promising: the wealthy Burman is everywhere trying to increase his riches by rice mills or saw mills, which will create an increasing demand for mechanics and repairers. The cotton mills of Myingyan, and the oil wells of the Burma Oil Company employ a fair proportion of Burmans who take kindly to the work, and under supervision can carry out minor repairs.

Nor, when the Burman has begun to undertake bicycle

repairing, is it a very distant dream to imagine some all too daring Burman mounted on a velocipede, of which the frame, at least, has been made in the local shop.

The individual smith does not indeed fear for his own future, but many of them realize that the trade must tend more and more to pass from their hands to those of the captains of large industries; and as prices rise and wants increase, the individualistic arts that aim at utility alone cannot survive like those of the silver-smith or the wood-carver, in which the individuality of the artist counts for something. A most whole-hearted devotion to the craft cannot make a *dama* more than mere *dama*. When the transition is over, and the new industrial age has made its home in Burma, then again will arise the iron age, but the workman will be a hireling and not his own master.



FIG. 5.

CHAPTER IV.

IMPORTATIONS.

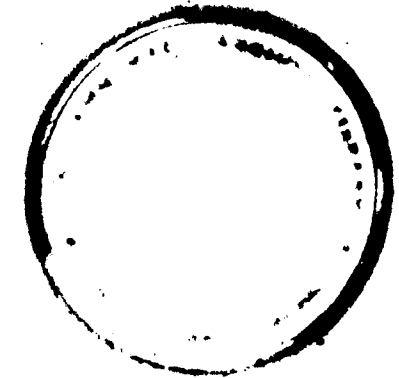
Just as imported raw iron has almost killed local smelting, save in a few outlying mountainous tracts, so the importation of manufactured goods is tending to relegate the village blacksmith more and more to the position of a mere repairer.

There is no record that steel [*thanmani* (ထံမာနီ)] has ever been manufactured in Burma: instruments requiring a keener edge were sometimes made up from imported steel; and the Royal troops in the days of King Mindôn were armed with iron swords over which a thin coating of steel had been welded. The knives of toddy-tappers, *tan-hli-da* (တန်လီသ), were made in the same way: also the knives used to keep trim shaven the heads of monks and novices. But razors of European manufacture have been an article of import for years, and are to be found in the remotest bazaars. There too may be seen cheap *das* of German manufacture for the villages, murderous clasp-knives for the young blood to carry at a *pwè*, nails and scissors for domestic use. In the towns are procurable imported axes, shovels, spades, nails, bolts, files, hinges, screws: the whole *olla-podrida* of the hardware shop, except the silver churn of the poet.

To generalize, indeed any article requiring some special delicacy or finish of manufacture, or any article which is in common use, is imported readily. Pig iron and sheet iron, with sheet steel, are imported from western countries; so, too, with all machinery, girders, rails and similar heavy articles, with which the local European foundries can deal only on a comparatively small scale.



FIG. 6.



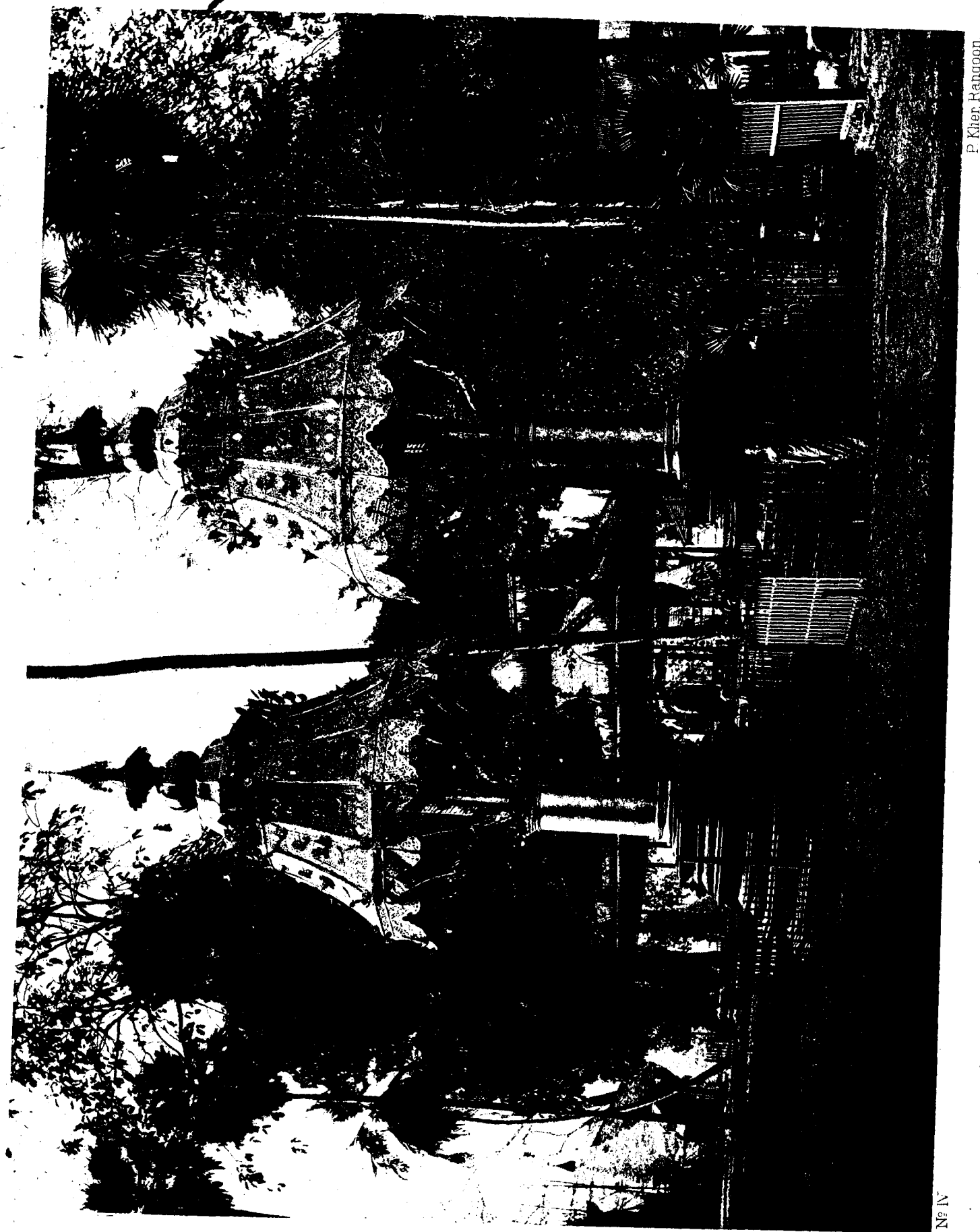
CHAPTER V.

METHODS AND APPLIANCES.

IN Europe the village forge shows no great stock of elaborate appliances, but even these in Burma are so far reduced in number that the wandering smith and his disciples can, without difficulty, carry them round on their wanderings.

The most important is the bellows *po* (ပု). In ordinary use the most common form is the *mat-tat-po* (မတ်တတ်ပု) upright-bellows, which consists of two joints of elephant bamboo, often supplanted now-a-days by tin, set upright in a stand: each is fitted with a piston round which feathers are wrapped lightly to secure a perfect fit: the air is expelled through a smaller pipe of bamboo, inset at the base, the two currents of air meeting in a single nozzle.

A more expensive, but more effective, pattern is the frog-bellows, *Pa-po*, (ပာပု), or *Tôn-lôn-po* (တုံလုံပု), of leather and wood in the European style; but the price (Rs. 30) is prohibitive to most of the smaller operators. It is preferred as giving a better blast with less exertion, being worked by the foot and not by hand.



P. Kher, Rangoon.

The other tools, with their Burmese equivalents, are:—

- | | |
|---------------------------------------|---|
| 1. The hammer, <i>tu</i> (တု) | 6. Scraper. |
| 2. Pincers, <i>mi-hnyat</i> (မီးဗွတ်) | 7. Shears. |
| 3. Chisel, <i>so</i> (ဆွ) | 8. Anvil, <i>pe</i> (ပေ) |
| 4. Drill. | 9. A steel axe to cut the red hot iron. |
| 5. File, <i>tazin</i> (တင်ဇိ). | 10. A water trough. |

These seem to be of a uniform pattern for the whole province: the only point of difference being that the anvil, whether of European or of cruder fashion, is not universal: but its place is often supplied by a shapeless lump of metal.

Of the methods employed, perhaps the most interesting are those concerned with the manufacture of *das*, as certainly of all products the *da* is in most universal esteem. One point common to all the descriptions received, is that the best local blades are all composite; pure steel blades are not made, and even in the days of Kings Mindôn and Thebaw, the army swords were made of an iron core within a steel casing: so are they described by an old smith who spent the year 1870-71 in the Palace re-steeling the army weapons on a salary of Rs. 50 a month. This process obtains still in the remoter districts: the fully shaped *da* or axe is heated red-hot, so too is a thin sheet of steel, which is wrapped round the blade and well hammered. This process is repeated ten times until the welding is complete. Water is used to cool it off instead of the more costly oil, which would probably give better results.

A more elaborate account comes from the Upper Chindwin; first of all a piece of iron is forged into the

required shape, then a strip of steel is placed over the iron blade, and over both a coat of clay the thickness of a copper pice: with the tongs this is placed in the fire until it becomes red-hot, by which time the clay has crumbled away and the two metals have coalesced: after a little filing, a second stage begins: the point of the blade is again coated with a thin layer of clay, and put into the flame until it grows red-hot, then dipped in water till it becomes white and taken out and left until in turns the colour shows yellow, dull-green or brown; each here denotes different characteristics and the workman must seize on the appropriate moment to give the final bath: if the blade is dipped when yellow, it becomes very hard and brittle: at the dull green stage it is less brittle and most serviceable for general purposes: if left to grow brown, popular opinion calls it too soft.

Another process is apparently a survival from the days of indigenous smelting, when the iron obtained was graded in three qualities: iron for the back of a blade *a-hnaung-than* (အင်းခင်းတံ) about two-thirds: iron for the edge *a-thwa-than* (အထွေးတံ) about one third: and most precious of all, and coveted by alchemists, a minute deposit on the bellows, known as the bellow's egg *po-u-than* (ပိုးခွံ). To forge a *da* in the old days the back and the edge were made separately and welded together by a lap-joint: and so sharply distinguished were the classes of iron that the only satisfactory weld was between two distinct grades, irons of the same grade refusing to coalesce. Three old receipts for the smelting of the various grades of iron are

given—(1) Take several plants of *Sha-zaung-gyi* (ရှားခင်းကြီး) (*euphorbia* or prickly-pear) reduce them to ashes, dissolve these in water, distil the water, and the residuum is known as euphorbia-salt: mix equal proportions of iron-dust and this salt, and put in a crucible between layers of salt: subject to intense heat in a closed crucible: the volume of metal is reduced to three-quarters: repetitions of this process further reduce it to one-half, one-quarter and one-eighth: this final eighth part is used for the edge of the blade.

(2) To make a drill, cold chisel or razor, take a piece of good iron of the required size and shape, embed it in the ground under a furnace for not less than one month nor more than six, leaving a space of six inches clear between the bottom of the furnace and the surface of the earth: on digging up the metal at the end of the prescribed period it will be hard enough to cut or pierce other metals. This process is known as *hnat-thi* (နှုတ်ထိ).

(3) For making the steel for a tinder-box, *mi-gat-than* (မီးခတ်တံ), mix two parts of iron, with one of salt and one of the new layer of mud from alluvial land, and subject to an intense heat.



FIG. 7.

CHAPTER VI.

PRODUCTS.

THE present chapter will be devoted to the more usual wares turned out by the village smith; the next will contain some account of such artistic developments as have been traced: these are but few and hard to come at, for the blacksmith is primarily a general utility man.

At the head of domestic implements will come, naturally, the *da* in all its various developments: the following forms are mentioned by correspondents:—

- (1) The heavy *dama* (ထာမာ).
- (2) The *da-hmyaung* (ထားမြောင်) or dagger.
- (3) The *da-u-gyun* (ထားဦးချွန်) or pointed *da*.
- (4) The *da-she* (ထားရှည်) or sharp-bladed *da*.
- (5) The *da-mauk* (ထားမောက်), a fine knife for cutting tobacco, etc.
- (6) The Shan *dama* (ရှ်ထာမာ).
- (7) The *pyaung-yo-zin dama** (ပြောင်းရိုးဦးထာမာ) for cutting millet stalks.
- (8) A small *da* for cutting meat (သားဦးထာမာ) or trimming finger-nails.
- (9) The weaver's knife.
- (10) The *tan-hli-da* (တန်လိထာမာ) of the toddy-climber.
- (11) The *dazu* (သားဒု), a variety for the same purpose.

These are all variants recognized practically all over Burma, but in addition there are a host of lesser local

distinctions with a local name for each. Each local division has a distinct size and weight for these implements.

Of other domestic implements of local manufacture, the list is long and varied:—

Scissors, *katkyi* (ကတ်ကျီး).
 Betel-cutters, *kun-hnyat* (ကွင်းညှပ်).
 Hair tweezers, *mwe-hnyat* (မွေးညှပ်).
 Hoes, *ta-ywin* (ထူးရှင်း).
 Spears, *hlan* (လှံ).
 Axes, *pauk-sein* (ပုဆိန်).
 Reaping-hooks, *tazin* (တခင်း).
 Rings, *than-grwin* (သံကွင်း) or *than-bat-kwe* (သံပတ်ခွေ).
 Forks, *kayin* (ခက်ရင်း).
 Chisels, *sauk* (ဆောက်).
 Awls, *su*.
 Harrow-teeth, *tun-thwa* (ထွန်ထွား).
 Ploughshares, *te-thwa* (ထယ်ထွား).
 Ring and screw, *pazun-myet-si* (ပုခွန်မျက်စိ) or prawn's eye.
 Toothed-circular ploughs, *kwin-set-tun* (ကွင်းစက်ထွန်).
 Tongs, *mi-hnyat* (မီးညှပ်).
 Harpoons, *hmein* (မှိမ်း).
 Fish-spears, *tha-nut* (ထန်ထုတ်).
 Double-pronged fish spears, *nga-shin-zu* (ငါးရှင်ရူး).
 Paddy planting tools, *kauk-saik-su* (ကောက်ခိုက်ရူး).
 Staples for boat-building, *hmyaw* (မြှော့).

None of the articles mentioned in the above list call for any special mention, and the prices quoted from the various localities vary so widely that to annex them would be useless.

Of weapons pure and simple the list is small: the spear and *da* have figured above: among *das* the *da-lwe* (ထားလွယ်) and the *hnget-kyi-daung da* (ရှက်ကြီးထောင်ထာမာ) were

more of the nature of accessories to full uniform. The provisions of the Arms Act have killed the manufacture of such in Burma proper. In the Shan States, and doubtless in the Chin Hills, guns are still made; manufacture of the old fashioned flint-lock has nearly died out; and the modern product is usually a muzzle-loader with a nipple and cap, terrible to look at, but handled courageously by the Shan owners. In the hill districts of the Hsam-Tao (Southern Shan States), the villages of Wi Pyu and Pang Yung live by gun-making: "gas-pipe" flint-lock guns and pistols, and imitation "Tower" muskets for percussion caps.

The barrels are made of solid bar iron imported from China, the bore and touch-hole are drilled in the rough, and the superfluous weight of metal is worked down on a grind-stone until the barrel is round and polished. A rough stock is affixed first, and shaped later: the lock (of a flint-gun) comes last of all: these, with the hammers and springs, all come from China. The guns fetch Rs. 6 to Rs. 25 in Kēngtūng Town.

There is also a fancy pattern of horse-pistol with a scabbard-shaped stock, the barrel being used as the handle: the blade can be withdrawn when the gun is cocked; but the description reads as that of a weapon of doubtful utility.

Of domestic implements peculiar to certain localities, two call for special remark. These are the *kun* (ကုန်) from Kindat, and the *dagaw* (သားတော့) from Thatôn. The former is an axe-like instrument with a round

hole, four inches deep at the end, into which a wooden head, like a small mallet, is fitted, and a bamboo handle driven through this head. This is used for felling timber.

The *dagaw* is in shape like a heavy sickle, sharpened on the convex side of the curve: it weighs four pounds and is used for splitting firewood by the Karens of Thatôn.



FIG. 8.

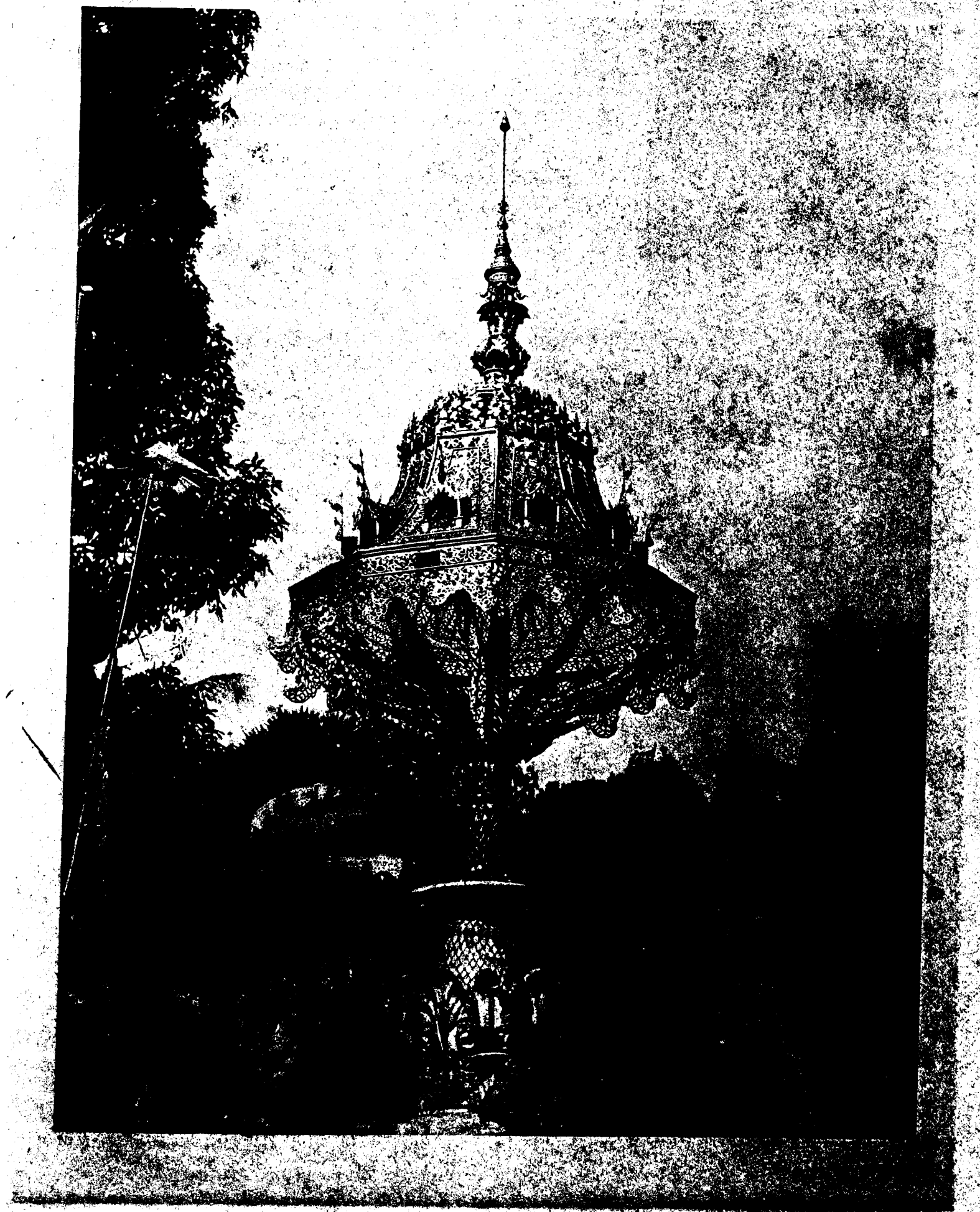
CHAPTER VII.

ARTISTIC DEVELOPMENT.

It has been found possible to trace three particular branches in which the craftsman aims at a decorative effect.

The first and most common all over the country, with its stronghold in the Payagyi and Tanpawadi quarters of Mandalay Town, is the manufacture of iron *tis* (တီး), ornamental umbrellas or spires for pagodas.

The metal for this is bought in the bazaar, sheet iron imported from England, Germany or Belgium: it is cut with shears into the required sizes: on these slips of iron is traced the design, which is then cut out with scissors, and finished off with a short chisel, *so* (စုံ). The *ti* is composed of five, seven, or even nine, concentric circles of iron, decreasing in size as they near the summit. The flat slips of iron, when pierced, are curved into a circle and the ends welded, or sometimes bolted together. In the centre of each of these is placed a flat circular piece of iron, *chet-ma* or (ချစ်မာ) *ti-ka-yaing* (တီးခါယိုင်), through a hole in which runs the iron standard for the vane: this central plate is connected with its ornamented circlet, *ti-gwe* (တီးဂွေ), by spokes, *kya-let* (ကြာလတ်), also cut out of the sheet iron; each circlet is welded to its nave, and then welded to the central iron standard. Above these comes the vane,



hnget-ma-na (၅၀၆၆၀၆၁၁): and at the summit is some decoration, *sein-bu* (၈၆၆), often a glass ball, and in rural villages not uncommonly an empty soda water bottle. A standard size of *ti* is one whose lowest circlet has a diameter of one cubit: this fetches from Rs. 8-0-0 to Rs. 15-0-0, according to workmanship. Paint is an extra. If gold-leaf is applied, the price is raised to Rs. 35-0-0 or Rs. 40-0-0.

Seen close at hand the ordinary pagoda *ti* is clumsy and ill-constructed: but once hoisted with due ceremonial to the pinnacle of a pagoda and set round with little tinkling bells, it gives a crowning graceful touch to the spire, and all faults of workmanship are lost in the general effect.

Mandalay is the centre of this industry, but from many districts have been received reports of the manufacture on a smaller scale. But it is depressing to learn that for the new *ti* to the Yakaing Pagoda in Taungdwingyi, local craftsmen were engaged, but their work proving unsatisfactory, after Rs. 1,000 had been spent, their *ti* was discarded in favour of a brass *ti* from Rangoon.

On the subject of pagoda *tis*, Maung Ne Dun (3), Extra Assistant Commissioner, has supplied the following interesting information:—

“It is said that the first pagoda *ti* in Burma was imitated from that on the Maha Zedi, constructed by King Duttagimini in Ceylon about 161 B.C. In its early days the *ti* was like a conical cover: but gradually as the massive dagoba of Ceylon developed into the more graceful Burmese pagoda, the shape of the *ti* became modified, not to over-weight the lines of its support.”

Apparently the early *ti* was, as its name implies, more or less umbrella-shaped: in many of the pagoda enclosures at Pagan are planted flat stone *tis*; and possibly this umbrella, the emblem of regal dignity, was the form first used. It is easy to understand how this would be modified for artistic reasons and from the flat open umbrella it is an easy transition to the Talaing form of pagoda *ti*, which resembles a half-closed umbrella.

But at the same time it must be borne in mind that in Pāli literature the *ti* is called ခေတ္တိယဘုရား and ခုခေတ္တိယ is the same as ခုခေတ္တိ- or crown. Whereas, in Pāli, the umbrella is ခုခေတ္တိ, the term which is also applied to the flat stone umbrellas already described. The form of the modern pagoda *ti* bears so close a likeness to a seven-fold crown, that there is room for the counter-theory that the pagoda *ti* is essentially a crown, called *ti* from its accidental resemblance.

This view derives further force from the regalia (မင်းမြှောက်တန်းဆာ) with which images of Gautama are occasionally adorned, of which the following story is told. After the days when Gautama had attained to the Buddhahood, there was a king known as Zabubadi, who, for his great pride in his beauty and possessions, thought that he had no equal upon earth. Learning this, Gautama, the Buddha, by his most incomparable and miraculous powers, assumed the appearance of a king with complete regalia, and proved to King Zabubadi that there was yet one whom he could not hope to rival.

The earliest *ti* (တိ) in Burma is said to have been placed

upon the Shwe Dagôn in about 104 B.E. (i.e., 742 A.D.): this was an old *ti* of the Talaing pattern, and is reputed to have lasted on until replaced by King Mindôn in October 1871. Burmans pride themselves on this as the most glorious specimen of the modern *ti*: it consists of seven iron circlets gilded over: its height is 33 ft. 6 ins. its greatest diameter 14 ft. 9 ins. From it depend 1,512 bells of which 126 are gold, 7 pinch-beck, 1,376 silver, and 3 iron. The total value is said to be Rs. 21,26,879. Illustrations of the three kinds of *tis* are attached (Fig. 10).

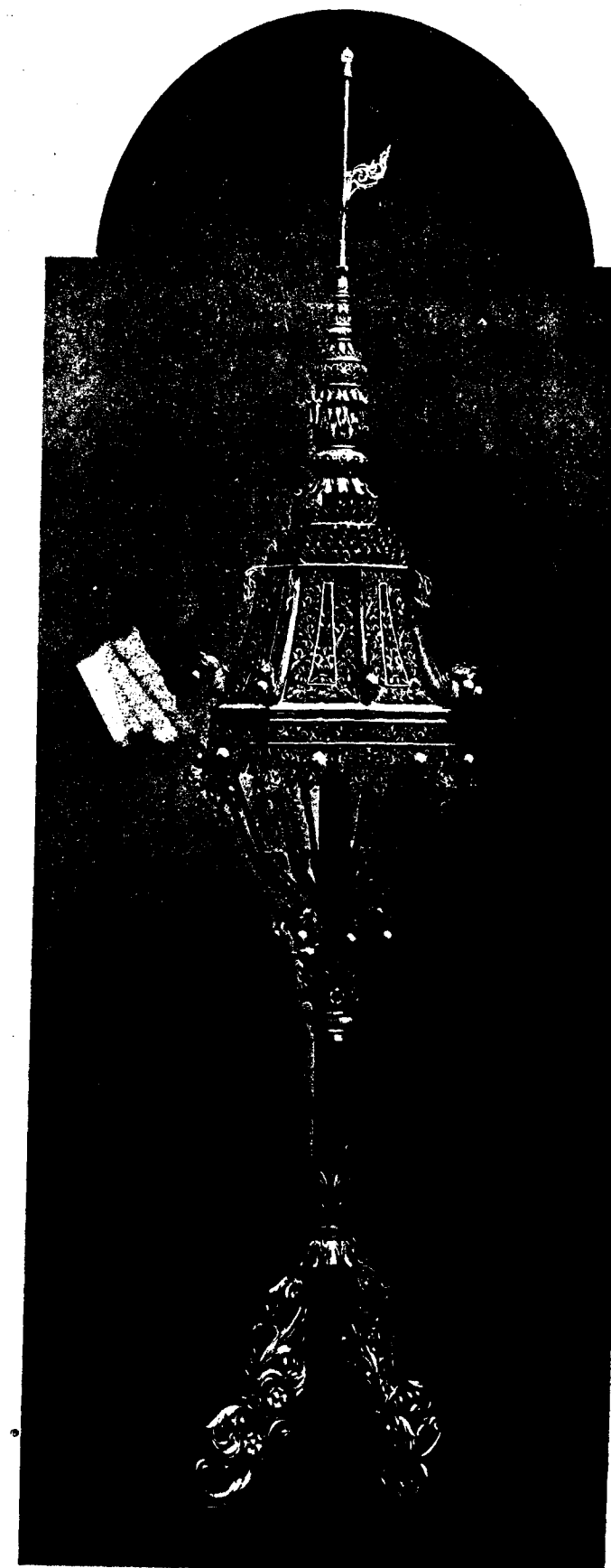
Another artistic development has its home in Mindan Village, Yamèthin District, where every household depends more or less on its smithy, though there are only a few professors of the particular art to be described, which consists of an inlay of silver wire upon an iron surface. The usual articles produced are ornamental *dalwès* (ထားဝွယ်) or *da-hmyaungs* (ထားမြှောင်), scissors, *katkyi* (ကတ်ကြီး), betel-cutters, *kun-hnyat* (ကွင်းညှပ်), hair-tweezers, *mwe-hnyat* (မွေးညှပ်), specimens of which are figured (Figs. 1 to 9 and 11).

This industry is said to have had its origin five generations before Saya Lan, whose son Saya Pyo, the chief local artist, turned out the articles shown in the illustrations. The originator's name is forgotten, but the art is traditional, from father to son, each improving on his ancestors, as Saya Lan himself said: "I was better than my father, and now my son, Maung Pyo, is better than I ever was."

The process of manufacture and the tools used are of the most simple. The metal is imported rod-iron bought in Pyawbwè at Rs. 3-8-0 for ten viss; the silver

wire is drawn by the craftsman himself, the iron frame and its twenty-eight holes of decreasing fineness being all homemade. Supposing that a *.dalwè* is to be made, a sufficient supply of raw metal is first forged into a blade: then the central space which is to be ornamented is scored into a minute criss-cross with a small cold chisel, *sut* (စုတ်): this cold chisel is of superior metal, preferably an English file cut up. The left hand holds and pushes this forward, the right hand wields a small hammer. When the blade is sufficiently scored, the worker with a small pair of pincers, *nan-zwè-hnyat* (နန်းဆွဲညှပ်), holds down the silver wire in position: a few smart taps and this is hammered into the cold iron and becomes one flesh with it, *atha-ta-thadè-pyit-thwa-dè* (အသားတသားတည်းဖြစ်သွားသည်); the design grows rapidly, though no pattern is traced out beforehand, and the hand moves on unerringly. When both sides of the blade are completed, it is heated gently and all the design gone over with the hammer: then with the cold chisel the outlines are defined, and the features brought into slight relief: roughnesses are smoothed down with the hammer, a bath of cold water and a polish with a cloth, and the blade is complete. The silver pattern being so firmly incorporated with the blade that it is almost impossible to detach it, even with chisel and hammer. But save for the forging the metal is never brought to a red-heat.

The third, and in many ways the most interesting development, as showing the ability of the modern Burman artist to adapt himself to meet new needs, is the



NR VI.

P. Klier, Rangoon.

hammered metal work which in places is being used to replace the wooden carvings under door lintels of shrines, porches, etc. This work at present is almost wholly confined to one man, Saya San Nyein of Thèbyungyaung, Rangoon, who claims to have developed it independently of the man whose work first came into notice, Saya Pa of Kungyan, Rangoon, now dead.

If this be true the development is doubly interesting, and gives ground for hopes that fresh ground may be broken in other directions, and a wider outlook opened for the indigenous arts. Many a lover of Burma has noticed with regret how soon on *pôngyi-kyauangs* the lavish decorations of carved teak split and break away through exposure to the weather. The new development substitutes for the more perishable teak either iron or brass, which, when coated with paint or gilt, have a far longer life.

The most important work of Saya Pa's is said to be fifteen years old: it may be seen on the doorway at the head of the southern ascent to the Shwe Dagôn platform: and at once rebuts any suggestion that metal work on a large scale is tawdry or less effective than wood-carving: for it would be safe to assert that not one in a hundred visitors to the pagoda have ever noticed that the ornamentation was other than teak (*see* Plate I).

Saya San Nyein's work may be seen under the eaves of U Gala's *tazaung* (ဦးတုလား တံခွန်ဆောင်း), on the east face of the Pagoda (Plates II and III, of which Plate II shows the iron work, with wooden figures inserted, while Plate III gives the original teak now in process of

replacement), or at a *póngyi-kyauṅ* near the Kyaikkasan Pagoda (ကျိတ်ကံဆုရံ), or in an adapted form in the copy of the Shan *ti* at the pagoda which he made for Lord Curzon (Plate VI), or the doors of a cabinet exhibited at the last Rangoon Art Show 1907 (Fig. 12).

Saya San Nyein's methods are simple in the extreme: the stems of his floral designs are made of stout iron wire, to which are soldered in turn each smaller branch, and flower and leaf: the flowers and leaves are traced in pencil on a thin sheet of brass and iron and cut out with scissors: to curve them into shape and trace the veins the flat designs are held upon a wooden block and manipulated under pressure from a series of small rounded cold chisels of varying curves: the thin metal curling into shape almost as unresistingly as the natural leaf. For finer decorative work, as in Fig. 12, the whole, when soldered together, is coated with black varnish, and picked out with gold.

The workshop is a tiny hovel in a mean street; the appliances cheap; sheet brass from Belgium costs Rs. 2 a viss; sheet iron Rs. 9 per 100 viss; the anvil is a wooden block, the chisels only thirteen in number, a little hammer, scissors, and a simple soldering apparatus complete the outfit.

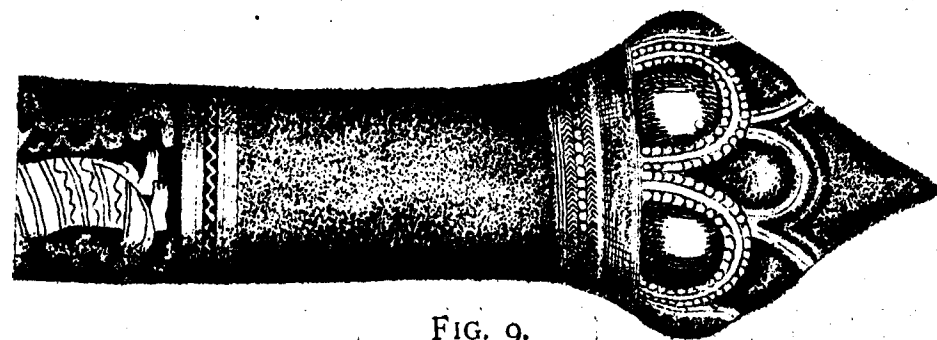


FIG. 9.

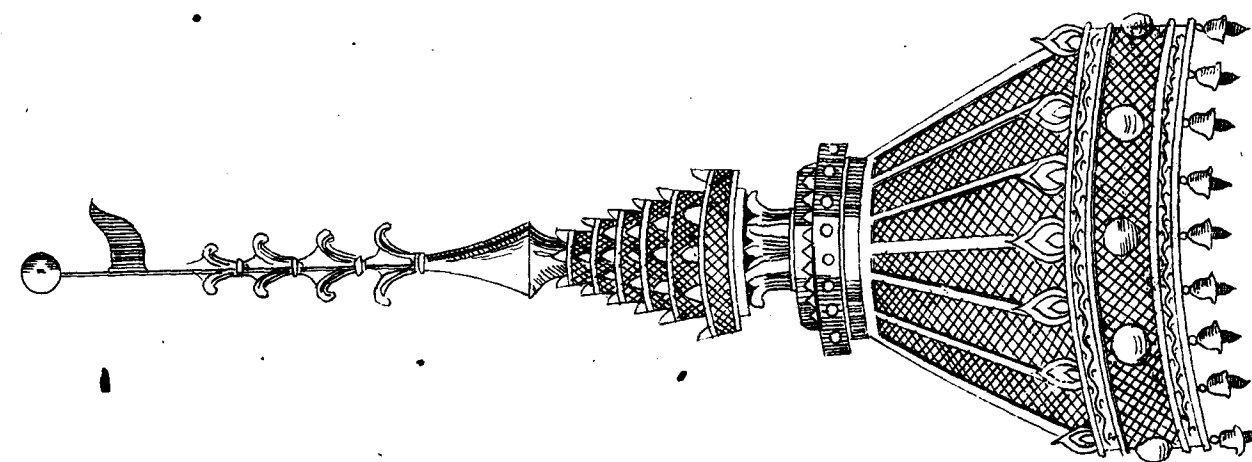
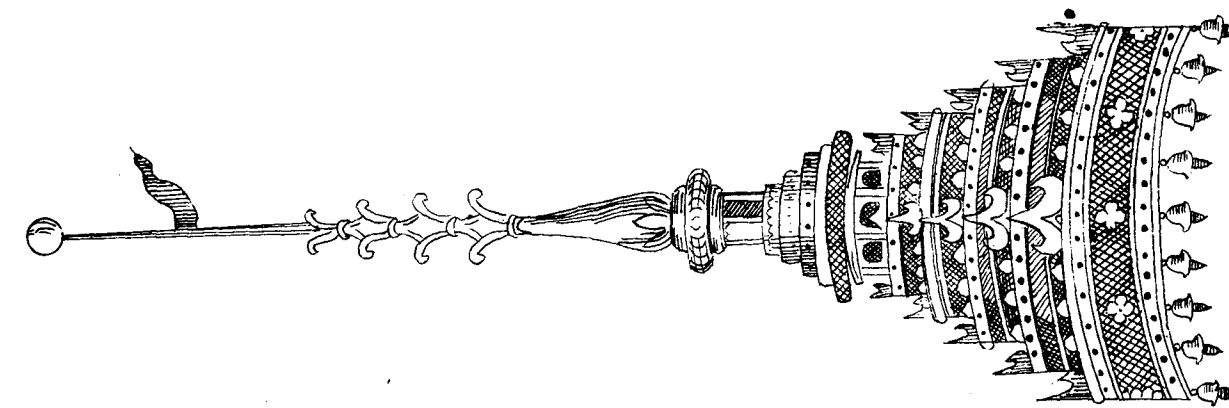
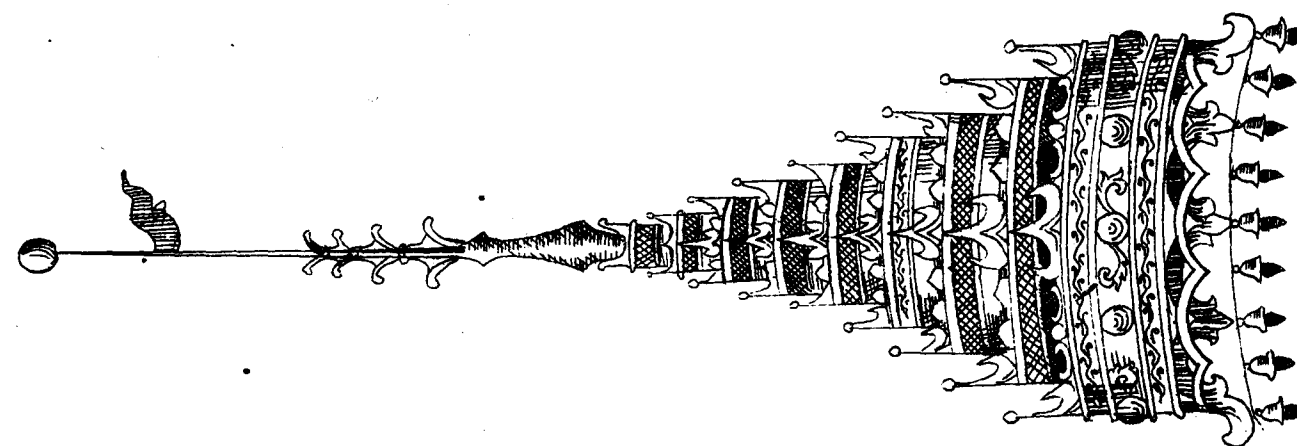


Fig. 10



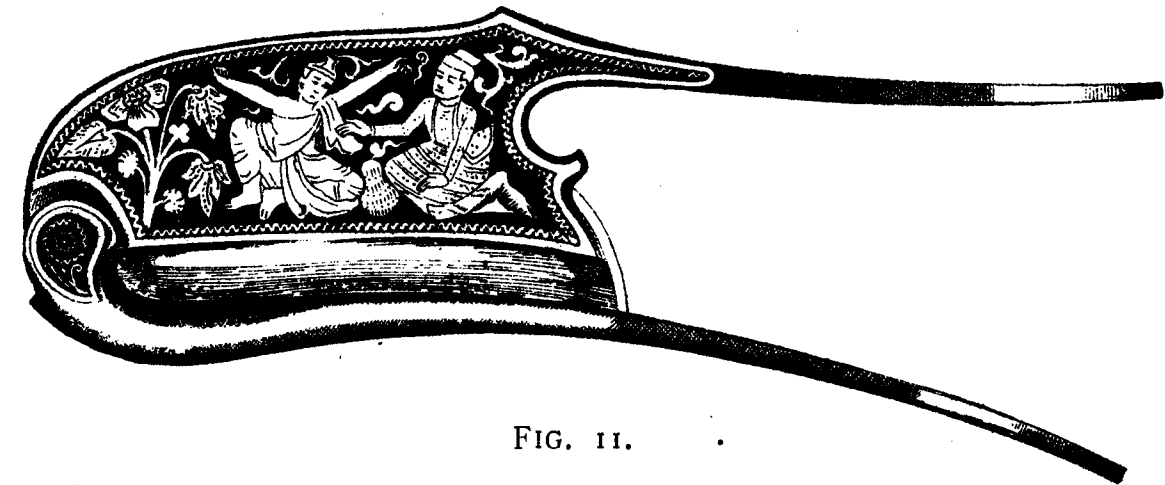


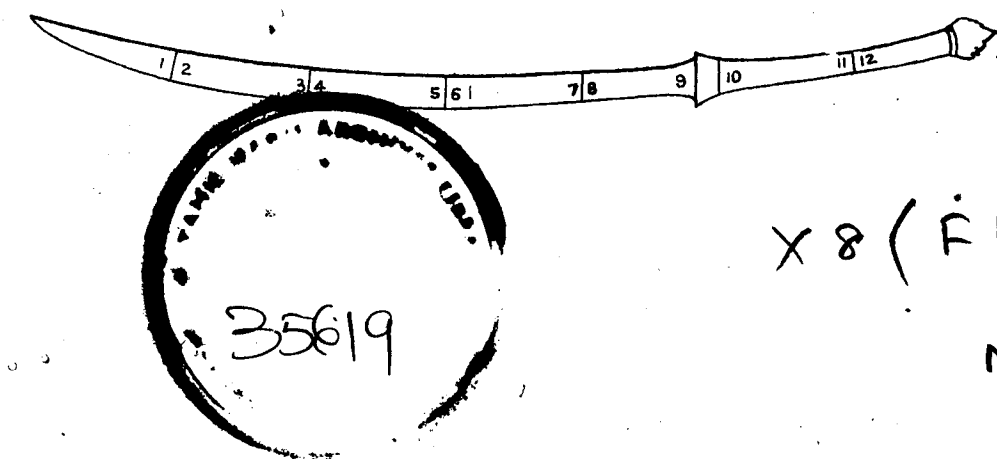
FIG. 11.

CHAPTER VIII.

CONCLUSION.

FOR various reasons space has not been allotted to one of the most fascinating of the side-issues which might have been included: Alchemy, which still retains a large hold on the imagination of the credulous among the Burmans, treatises on the subject, *Etgiya-than-hnyun-za* (အဂ္ဂိယံ ထံ ညွှန်း ဝေ), being still published.

I should like to express my thanks here to the district officials who have responded so generously to my demands for information; and in particular to Burman friends of my own, especially to Maung Ne Dun (3), Additional Magistrate, Rangoon Town District, Maung Po Tha, Treasury Officer, Myingyan, and Maung Tin (2), A.T.M., Myoôk of Pagan.



X 8 (F 182). 4.38
N 07

Printed by order of the Government of Burma.

GOVT. OF BURMA CENTRAL PRINTING OFFICE,—NO. 1483, REV. SECY.—9-12-1907—253—J.C.

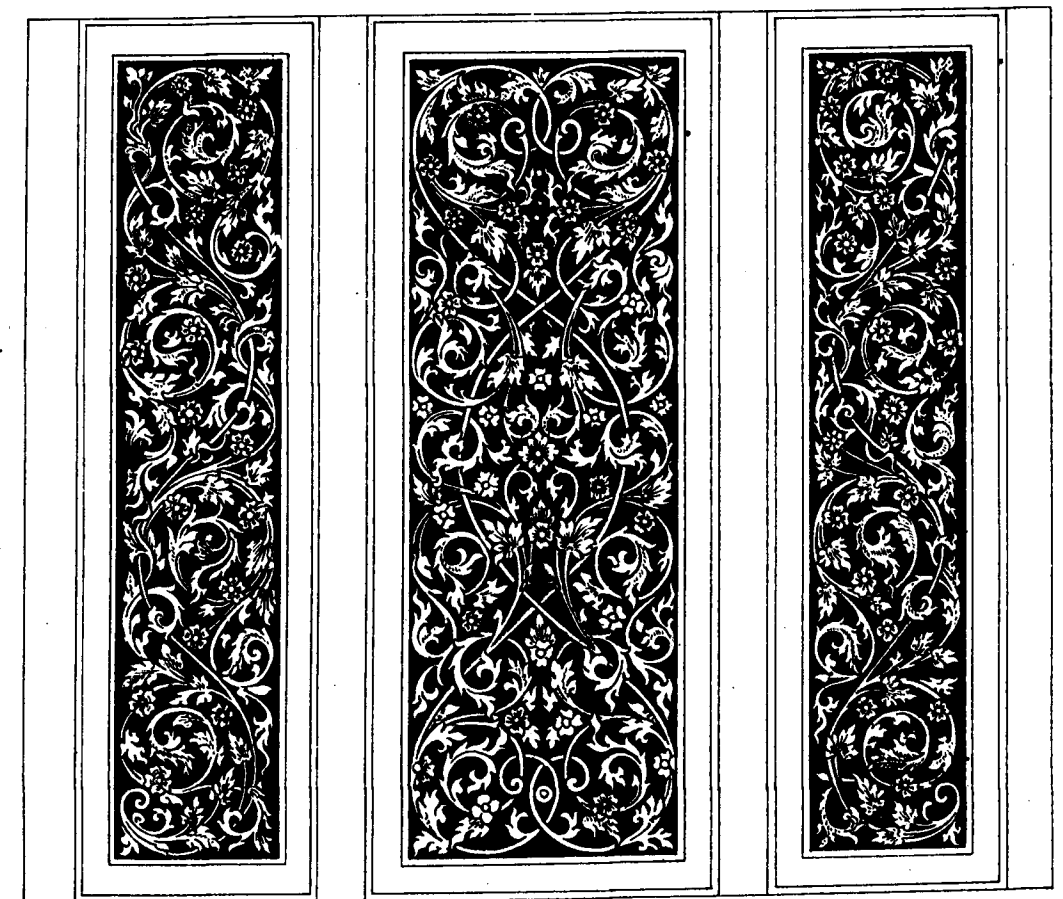


Fig. 12