

# CASSIER'S MAGAZINE

Vol. XXIV

MAY, 1903

No. 1

## COINING MACHINERY IN CHINESE MINTS

By Oberlin Smith and Henry A. Janvier



SEVERAL years ago it fell to the lot of the writer first mentioned above to design some machinery for producing certain coinage issues for the Chinese Government. One of the plants in ques-

tion was to be located in the city of Wuchang, capital of the province of Hoo-Pe, and was to be used exclusively for making the small brass coins with a square hole in the middle, popularly known as "cash," or, as they are called in China, "tsen." The machines for this particular mint were to produce something over 300,000 pieces per day, the design of these coins being shown, in obverse and reverse, on page 5.

Another plant was to be located in the city of Chentu, in the province of Szechuen, which a reference to a map of China will show to be in the central western portion of the Empire. The coins made therein were brass "cash," of the same weight as those made in Wuchang, but of a somewhat larger diameter, and a slightly different design. The production in this mint was required

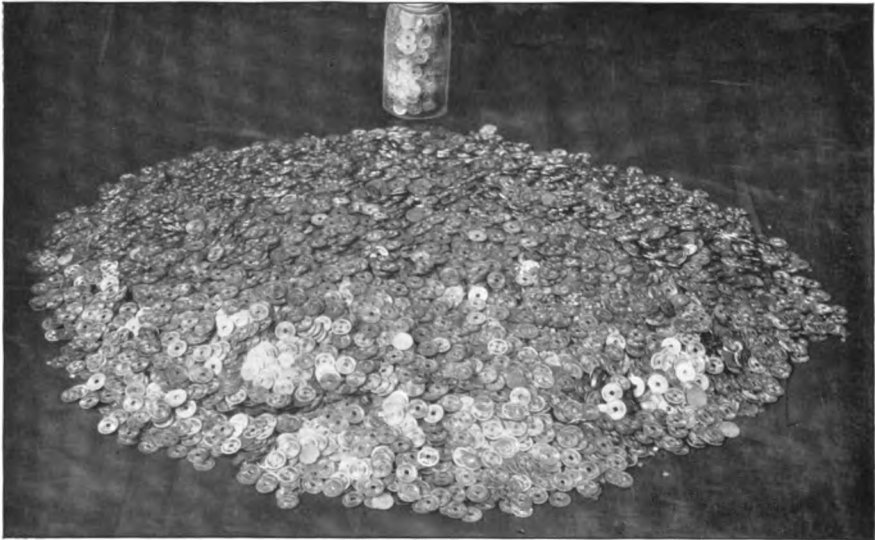
to be at the rate of something over 250,000 coins per day.

The third plant was also for the province of Szechuen, and was exclusively for the production of silver coinage of the denominations, respectively, of 5 cents, 10 cents, 20 cents, 50 cents and \$1, as shown grouped in pairs in the illustration at the top of the next page, each coin appearing in obverse and reverse. The total capacity required for silver pieces, in the aggregate, was about 150,000 per day.

An inspection of these silver coins will show a very beautiful design, the purely Chinese inscriptions on the reverse being, of course, more graceful than legible to the ordinary reader. On the obverse the horrible dragon has not only an expressive countenance, but an exceedingly graceful pose. The inscription surrounding him is simply a literal translation of the outside, similarly placed, inscription on the reverse side. The central inscription on the reverse relates to the name of the Emperor and dynasty, and is in ordinary Chinese characters, except the very small central portion, which is Manchurian. It will be noticed that the design and inscription on all five sizes of the coins are identical, except that portion below the dragon (and its translation on the other side), which relates to the denomination of each individual piece.



CHINESE SILVER COINS



A HEAP OF MISCELLANEOUS COINS. TEST PIECES FROM NEW COINING MACHINERY

In making a study of these coins, entirely outside of mechanical and artistic points of view, we may trace some curious facts which point to the general feeling of the Chinese regarding America, and to their ideas, probably entirely unformulated, regarding future political and commercial relations with that country. Not only were these coins freely spoken of in correspondence as dollars and fractions thereof, but the weight of the silver dollar was made exactly the

same as that of the American standard dollar, viz.,  $412\frac{1}{2}$  grains. The composition of its alloy was also made the same, being what is technically known as nine-tenths fine,—that is, nine of silver to one of copper. Furthermore, the inscriptions were all put in English upon the obverse of the coin, in close communion with the holy dragon. Do not such significant facts afford a peep between the portals of the "open door" and indications that this opening is to

be a wide and ever widening one? The fixing of the weight and the consequent value of the coins in question is still more remarkable as being in disagreement with the Chinese decimal system, in which 10 tsen make one candareen, 10 candareens one mace, and 10 mace one tael,—the tael, as is well known, being a national standard of value throughout China. It is, however, a certain weight of silver merely, and not a coin.

It will be noticed from the coins that in breaking up, so to speak, their decimal system, its remnants were used for stating the value of the silver pieces in the inscriptions upon the new coinage. Thus, the value of the dollar is made to read 7 mace and 2 candareens; the 20-cent piece, 1 mace and 4.4 candareens; the 5-cent piece, 3.6 candareens, and so on.

An interesting fact in connection with the minor coins belonging to the series in question is that the half-dollar is exactly half of the dollar, and the dime exactly one-tenth of the dollar, with the others in like proportion. Whether this arrangement is due to native honesty or



"CASH"

what not, it is in marked contrast to the American plan, where the so-called aliquot parts of the dollar are depreciated to a somewhat less value than their name would imply.

In the lower illustration on the opposite page is shown a heap of miscellaneous coins photographed from a pile as it lay on a table, after having been run through the new machinery in the shops where it was made. These coins were merely test pieces produced in a trial run, and were, of course, carefully melted down afterwards.

In many parts of China it is still the custom to use silver bullion for values which cannot be conveniently paid in



THE MINT OFFICIALS



CHINESE HOUSE-BOATS FOR RIVER TRAFFIC

cash. A friend of the writers, who has lived for about thirty years in a northern province not very far from Peking, is still obliged to take bars of silver to his tradesmen for making ordinary purchases, having them cut by his blacksmith to as near the size as he can guess for the particular purchase in question. The plus or minus amount, due to imperfect guessing, is made good by "cash," either to or by the purchaser, as the case may be. Financial difficulties similar to the above mentioned were more than once experienced by the members of our party during their journey.

Another instance of the inconvenience of the Chinese style of "cash" payments may be cited in regard to certain gentlemen who, having sold about \$30,000 worth of goods, received their payment in these interesting little coins. The result was several days' work with horses and carts to get the money to a bank, where it could be changed into silver. The coining machines under con-

sideration, together with various driving and transmitting machinery, as boiler, engines, and shafting, were duly shipped to China, followed after a proper interval by Mr. Janvier in person, who, while acting in the rôle of money furnisher to whole provinces of a great empire, might fitly be termed the consulting financier of the expedition. As, however, he had not become a proficient conversationalist in the various languages of China, and was going into a part of the country unpeopled by, and almost unknown to, English-speaking persons, he was duly joined in Shanghai by an interpreter.

The first part of the journey of the voyagers was made in a comfortable steamboat up the Yang-tse-Kiang as far as Wuchang, where the first consignment of machinery was to be set up. The country along this portion of the river is mostly devoted to farming and fishing, the land lying low and flat and the scenery being monotonous. The city of Wuchang has a population of

about 800,000, and is the seat of the provisional government of Hoo-Pe. Besides the government buildings it contains an agricultural college and an arsenal, in which latter building the coining machinery was to be erected. Here it was found that the Chinese engineers and mechanics had unpacked and put up the machinery in a perfectly proper way, although they had never seen anything of the kind before. Their only guide to this work was a somewhat elaborate written list of directions, accompanied by photographs of the machines, both complete and in parts. These directions they evidently must have had translated, so as to enable them to work from them. As, however, the power supply was not ready, the running of this machinery was deferred until the return trip of the party.

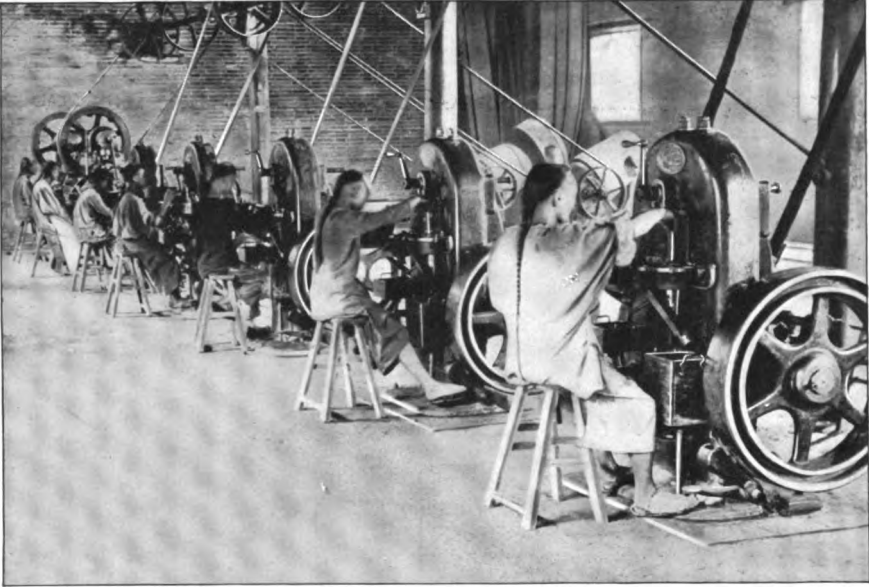
The city of Hankow, on the north side of the river opposite Wuchang, is a very wideawake town, having many cotton factories and machinery supply stores. After a day or two of waiting, the voyage up the river was resumed in a much smaller steamboat, which was by no means so comfortable as the other. Through this part of the country the natives began to show some of their traditional jealousy and dislike of foreigners, manifesting them on several occasions when the boat stopped at a wharf by throwing sticks and mud at the passengers, sometimes even hurling stones of considerable size. Their conversation, to say the least, was of a lively character, the subject of it seeming largely to be connected in some way with "pigs" and "foreign devils." It is a frequent occurrence for passengers to amuse themselves by returning these attacks with stones which are provided in buckets by the steamer management. After an interval of seven days the head of

steam navigation was reached at Ichang, which is between 700 and 800 miles from Shanghai, by the course of the river. At this place, which has something over 30,000 inhabitants, a decidedly ugly spirit toward foreigners is usually manifested by a considerable part of the population. The foreign devils, however, did not appear to care much for this, and, under the moral protection of the British and American consuls, seemed to enjoy frequent excursions back from the river, where they got beyond any actual protection, even going so far as to play golf in the country north of the town without any special molestation.

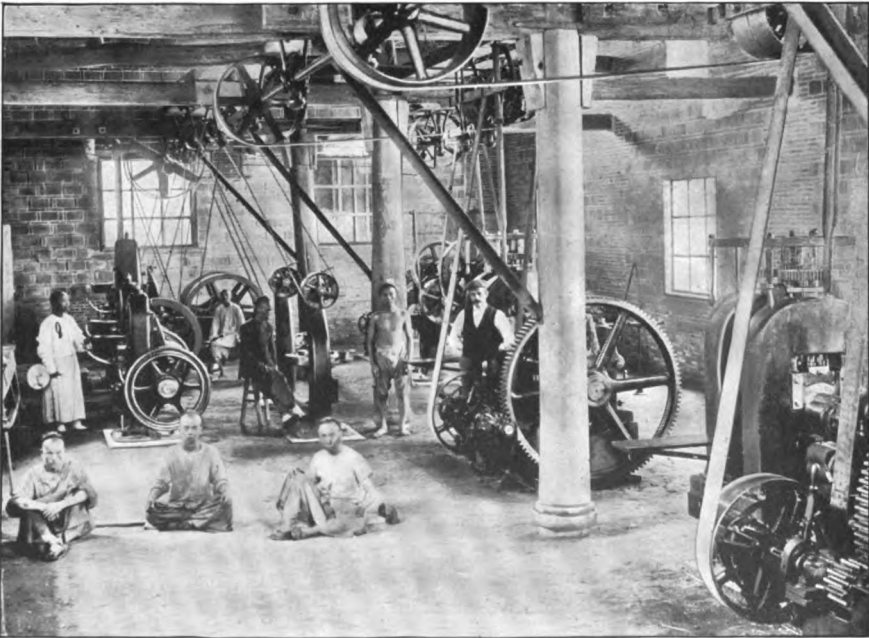
For the resumption of the voyage a change of boats was made at Ichang, an ordinary houseboat, so-called, being substituted for the steamer. This was a craft about 35 feet long by 8 feet wide, with a flat bottom and scow-like ends, numerous boats of this kind being seen upon the river at all times. It was pro-



THE PILOT AND CAPTAIN OF ONE OF THE HOUSE-BOATS



"CASH" COINING ROOM IN ONE OF THE MINTS



A SILVER COINING ROOM

vided with a captain, a cook, and a crew of twelve men, being in this case a yacht especially provided by the government for the party, who were provided with servants in addition to the regular boat's crew.

The propulsion of this sort of craft is by sails whenever there happens to be a fair wind, but otherwise by poling, rowing, or towing. The crew, when the latter method is used, take the part of the tow-path mule, the tow-path itself in many cases being merely the very rough river banks in their natural condition.

The monotony of this section of the voyage was varied by a couple of shipwrecks. The first one was caused by striking on a sunken rock, which punched a hole through a planking as big as a dinner-plate, more or less. The boat and its occupants were saved, however, by a brave Chinaman, who sat in the hole, with rare presence of body, until the craft could be gotten ashore for repairs. On the other occasion the towing rope broke, and the boat was hurled in an unmanageable condition for a mile or two down a rapid-infested part of the river, finally running aground, but without any very great damage.

Numerous accidents of this kind occur in navigating this somewhat treacherous stream, and many natives are drowned. None of the boats attempt to navigate at night, on account of the dangers incurred; every evening as darkness approaches whole fleets may be seen tied up along the banks.

The menu usually served to cabin passengers during a voyage of this kind is, for breakfast, rice and beans; for dinner, rice, beans and rice; for supper, beans and rice. This bill of fare was occasionally enriched by small fish, caught from the river. Our party, however, fared sumptuously every day on European food brought with them from Shanghai. The usual beverages among the poor of China are rice-water and tea, all natural water being unfit to drink.

After a trip of twenty days, nearly due west from Ichang, the town of Wan

was reached, and there a convoy, furnished by the government, was awaiting our party for a march overland of about 400 miles to the city of Chentu, the rivers Yangste and Min, which connect the two places by water, making a long detour to the southward. This would require a voyage of a great many days, and, therefore, the overland route is usually chosen for the up-trip, although in returning eastward the river route is the quickest, on account of the rapid current.

The convoy in question consisted of soldiers, sedan-chairs, bearers, baggage carriers, cook, and other servants. The trip was in many places through a beautiful country, sometimes over high hills, but more often over roughly-made roads, following the valleys, and winding in devious ways between rice fields in all stages of cultivation.

A noticeable feature of Chinese agriculture is the immense amount of trouble taken by individual small farmers to use every square foot of ground that is possibly available, thus showing the overcrowded condition of the country. The poverty of many of the natives is indeed pitiful to see, their chief and urgent needs being sufficient rice to keep them barely alive, together with such clothing as will keep them partly warm. Their houses are usually made of bamboo and mud, with an occasional 10 by 20-foot mansion having walls of the same materials, but enjoying the distinction of a tile roof.

The warming of these houses is accomplished by lighting an open fire of grass and sticks on the middle of the dirt floor. There is no chimney. Such illumination as their denizens occasionally indulge in is attained by the use of paper lanterns equipped with very poor candles, or by a primitive lamp made of an iron dish of grease with a stick for a wick. A strikingly noticeable feature of the topography of this part of the country is its extreme hilliness, a large proportion of the whole surface being unfit for tilling, even by the very industrious and economical toilers who utilise all the land available.

In passing through villages frequent



A CHINESE IDEA OF RAPID TRANSIT

opposition and abuse were encountered, it being on more than one occasion necessary to draw pistols for threatened defence against the small mobs with their noisy, but bloodless assaults. Fortunately, however, nobody was hurt. The most amusing part of the proceeding of driving off the mob was usually the disappearance of the soldiers, who hid themselves until the trouble was over. Had much fighting been necessary, however, the weapons carried by this guard, consisting of bamboo sticks, would not have been very deadly in effect.

The various village inns where the nights were spent were fairly comfortable, the food served consisting chiefly of rice, with beans, cabbages, and carrots for entrées,—and a possibility of eggs and chickens for festive occasions. It was, however, difficult to secure that degree of privacy in the guest chambers of these hostelries which is conducive to sound and healthy slumber, the natives attempting to inspect and purloin any loose articles left around the room by the sleepers at any and every hour of the night. The overland pilgrimage ex-

tended over about fourteen days, terminating at the city of Chentu, the capital of Szechuen, which is the largest province in China, with a population approximating 68,000,000. This city, by the route taken, is about 2,000 miles from Shanghai. Here it was found that in all this great city of 700,000 population there were no English-speaking people, except a few missionaries, who were scattered through various quarters of the town. In commercial or official life, however, nobody could be found who spoke other than Chinese. Such western civilisation as up to this time exists in Western China is due largely to the faithful work of the missionaries, who bravely stand their ground against many difficulties and dangers. Too much cannot be said of the kindness of the Chentu missionary colony to our little party, who were cheered and comforted throughout their sojourn by continued courtesy and hospitality.

Our party of travellers were promptly met by the officials of the government arsenal, who were extremely polite and friendly, and whose words of welcome were understood through the good of-



fices of the interpreter. The same jealous care, or attempted care, that had been taken of these envoys by the government authorities was here continued, quarters being assigned them inside the arsenal walls,—not only that they might be available for the official business on hand, but that their lives might be protected against mobs or any other possible dangers existing in the town outside.

It was now discovered that all of the numerous cases of machinery had not arrived, although they had been many months in transit. The missing ones were soon found to be stranded a short distance down the river Min, which runs through the city at this point. The excuse for not bringing them up to the arsenal was "low water" and "high water," the boats being just then stuck

having a dam built, which raised the lower end of the stream without letting the water approach too near the bridge at the upper end, much to the joy of the Chinese observers. This scheme was perfectly feasible by reason of a considerable fall between the two points.

When the unpacking process commenced it was found that on certain of the machines the strongly and carefully made boxes had been entirely removed somewhere en route. It was afterwards discovered that this wood had been taken off by some Chinaman who wanted to use it for patching up his house. As it afterwards proved, he had been caught, severely whipped, and tied up for two weeks with a large board around his neck. A majority of the boxes, however, appeared intact; but



PLOUGHING IN A RICE POND

in the mud for want of water, and having been unable to get up the stream when the water was high because they could not pass under a certain bridge. This trouble was soon remedied, by

when they were opened it was found that some of the delicate machinery was imbedded in fine dried mud, which had silted in through small cracks.

Another portion of the contents of

these boxes which, beside the mud, was foreign to the cognizance of the American packers, were various colonies of rats, which, it seemed, had eaten their way through the wood and made nests among the straw, paper, and mud surrounding the machinery. Further inquiry as to the source of this mud elicited the fact that the machinery had been transferred from the steamer at Ichang to the sloping bank of the river. The intention was to ship it upon a houseboat within a day or two; but one of the numerous floods to which the Yang-tse is liable happened to arrive inopportunely, with the consequence that the cases were left submerged in a muddy current for about six weeks.

This submergence was not calculated to improve the accurate work of iron and steel, which was thoroughly coated with rust, in spite of its thick coating of grease, thus necessitating the entire taking apart and repolishing of many pieces which had been assembled and supposed to be ready for operating. One great difficulty in this case was to convince the Chinese officials (some of them excellent mechanics) that the machinery was new, some of it, indeed, being condemned at first as old junk.

Everything, however, was finally restored to fairly good condition, except the finely engraved coining dies. Some of these were apparently ruined, numerous blotches appearing in the dragons and other parts of the design. However, the damaged parts were tried in the coining presses for the sake of showing the officials their general operation, with the most agreeable disappointment to find that the Chinese were highly pleased with the accidentally altered designs, thinking them much superior to the original, on account of the difficulty that counterfeiters would have in imitating them. Everybody, therefore, was happy, and both the plants were started up, to the entire satisfaction of the Chinese authorities in charge.

In this city it was rather surprising to find a fairly well-equipped arsenal, with its accompanying machine shops and foundries, everything being run by native Chinamen, although some of the

machinery had been made in England. When the new engine for the coining work was set up, it was started with dozens of admiring onlookers. When its speed reached about 100 revolutions per minute they began to stare; as it went on to 150 many of them decamped in mortal fear; and as it got up above 200 the room was vacated, and the astonishment of those who afterwards ventured to return to see the machine running at nearly 300 was something rather amusing.

A remarkable episode in foundry work was to see a live chicken brought out and invoked for good luck at the beginning of the melt, being afterwards cut in half, with further invocations to its departing spirit that the melt might be hot and might run well into the moulds. Its favourable influence was then augmented by smearing the blood and feathers over the trough through which the iron was to run. The castings afterwards made were fairly good, but nothing would convince the foundrymen that they could have been made without the chicken.

The workmen who assisted in erecting the new machinery were tractable and tolerably intelligent, that is, upon days which they considered lucky; but when they elected to call a day, or days, unlucky, nothing could make them start to work. Nearly all the operations in hand had to stop meanwhile.

A curious condition of the civilisation of Chentu was forcibly brought to notice when it was found that in the whole city there was absolutely no paint, sorely as it was needed for repainting the mud-damaged machinery; nor were there any materials with which to make paint. The only pigment that could be discovered was pig's blood, which is used freely, both for textile fabrics and woodwork. Another lack was kerosene oil, or, in fact, oil of any kind, the city being lighted by a very poor quality of candles. What little kerosene there was, was considered very precious, and was kept at the arsenal for the cleaning of machinery.

After everything was successfully set up and started running, a number of

Chinamen were taught the various operations of working the silver, they having known nothing whatever of the subject previously. This consisted in melting and mixing the proper alloy, pouring into ingot moulds, rolling the ingots out in thin strips with various annealings of the metal between operations, cutting from the strips round, flat blanks, pickling and cleaning these blanks, milling the blanks into planchets, which operation consists of thickening up and rounding the edges in a special machine, and finally running these planchets through the coining presses to make of them completed coins. All this teaching was done in a few weeks.

The return voyage was made entirely by house-boat, propulsion being considerably aided by drifting with the current. The course was southward and somewhat eastward by the river Min until its confluence with the Yang-tse at Szechuen was made. Thence the boat proceeded down the Yang-tse. During this voyage two more shipwrecks occurred, caused by dashing against rocks

and by meeting great waves due to floods in tributary rivers. The voyage was continued past Wan to Ichang, whence a reversal of the former journey took place by a small steamer to Wuchang, and afterwards a large one to Shanghai.

Another evidence of the mechanical ability of the Chinese was shown when the mint at Wuchang was inspected. The party intended to stay there a few weeks to finish erecting and to operate the machinery, together with the giving of proper instructions to the native workmen. It was found, however, that not only had the Wuchang engineers started up the machines and made good work with them, but they had made up their minds to make the coins smaller, owing to the rise in price of copper, which took place at about that time. They had, therefore, refitted the machines with new sets of new dies, not only for coining, but for punching square holes. These they were running successfully, refusing to receive any assistance or instruction.

