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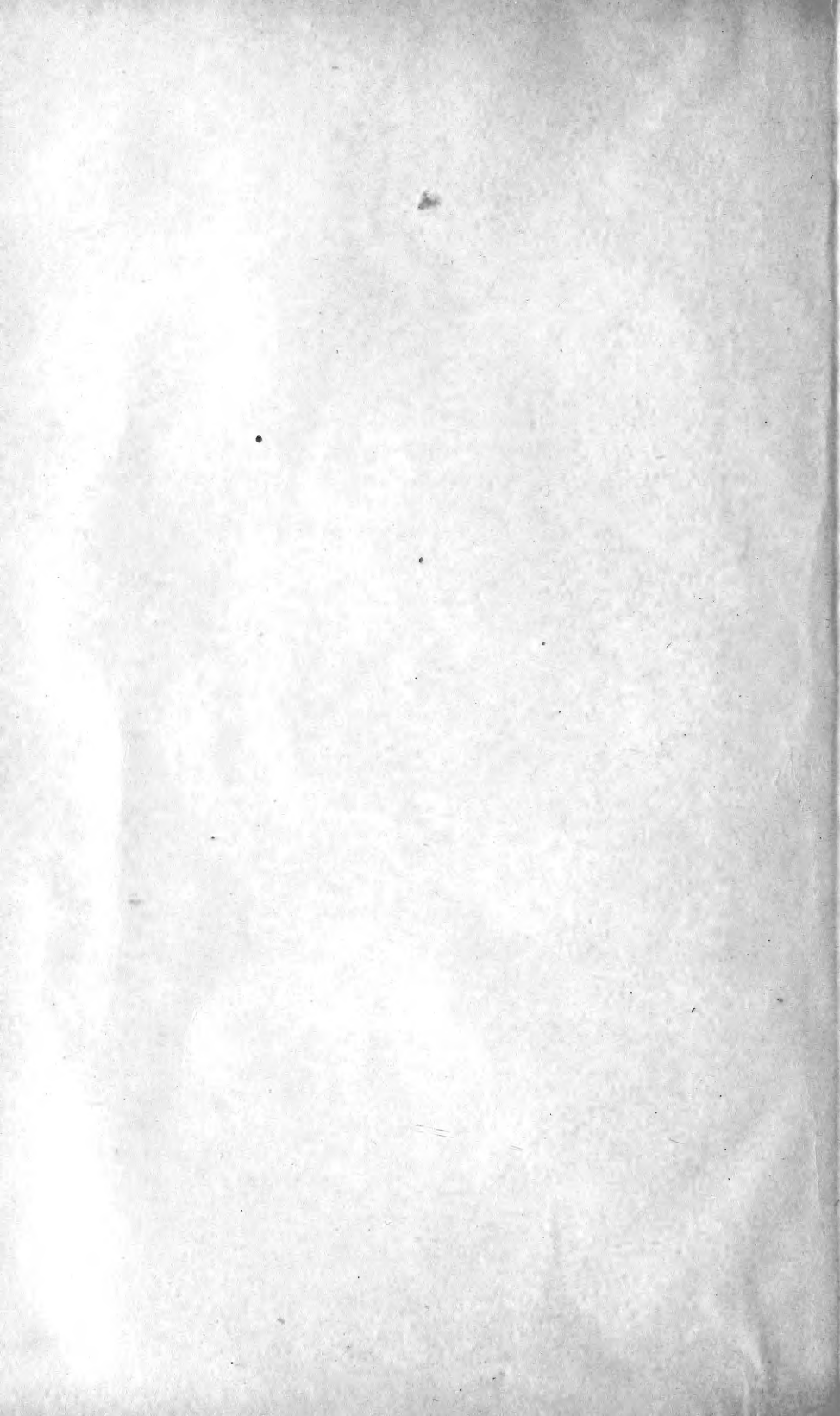
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UNITED STATES OF AMERICA.















U.S. Department of State
POUNDING AND POLISHING RICE

IN

ENGLAND AND GERMANY.

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POUNDING AND POLISHING RICE IN ENGLAND AND GERMANY.

POUNDING AND POLISHING RICE IN ENGLAND.

REPORT BY CONSUL-GENERAL WALLER, OF LONDON.

It is interesting to notice that in a pamphlet published in London in 1701, "On the importance of British plantations in America," it is mentioned as a recent circumstance "that a brigantine from the island of Madagascar happened to put into Charleston, S. C., having a little rice seed left, which the captain gave to a gentleman named Woodward. From part of this he had a very good crop, but he was ignorant for some years how to clean it. It was soon dispersed over this province, and by frequent experiments and observations they found out ways of producing and manufacturing it to so great perfection that it is thought to exceed any other in value." The seed of which the pamphlet speaks soon became famous. It was exported to Java, Italy, Spain, and other countries, and now the finest East Indian rice is grown from this seed.

In the early part of the present century Great Britain was principally supplied with this grain from the States of South Carolina and Georgia.

This trade, for a variety of reasons, has practically ceased, and now England exports to the United States about 250,000 cwts. of rice annually.

THE MANUFACTURE.

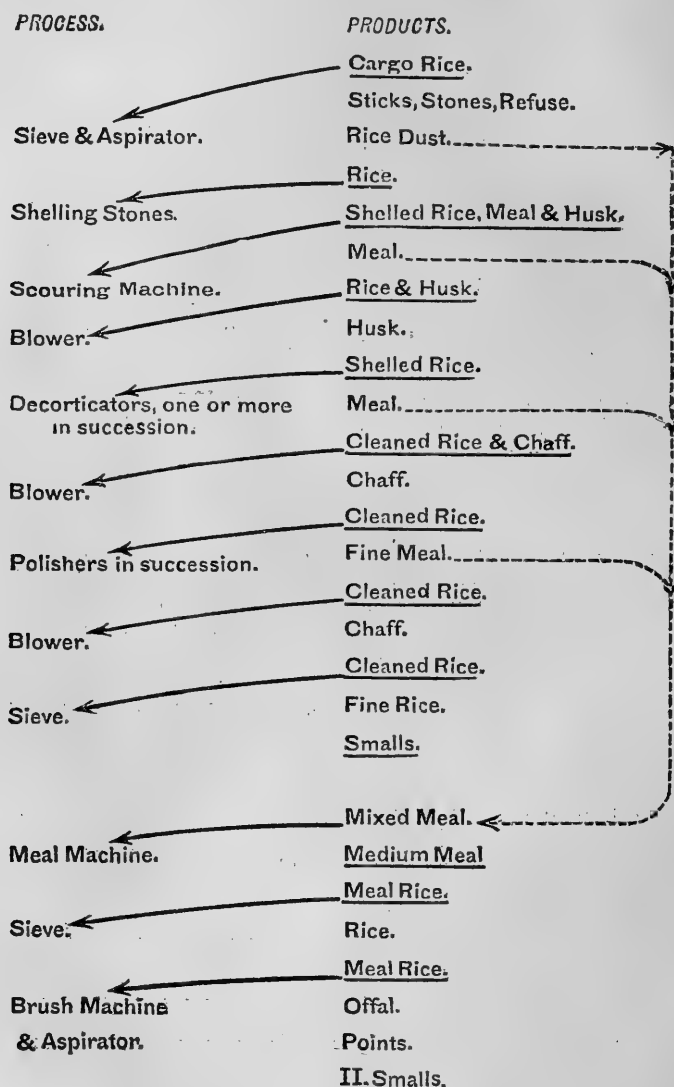
The manufacture—the pounding and polishing—of rice is nearly all done in England, in the cities of London and Liverpool. The following table of customs statistics shows the sources and amounts of supply in the year 1884:

	Cwts.
Germany	117, 180
Holland	145, 735
Italy	12, 120
Austrian territories.....	13, 035
British India	5, 338, 082
Straits Settlements	65, 261
Java	9, 970
Siam	250, 714
Cochin China.....	486, 041
Japan	131, 553
Other countries.....	9, 767
Total.....	6, 579, 458

Nearly all of this was received, as usual, in a condition requiring preparation for the market, and about one-half of it will be consumed here.

PROCESSES.

The details of treatment may differ, but the general system of rice pounding and polishing in the mills of England is substantially the same. These processes, in their order and products, are shown in a general way in this diagram, taken from a recent rice-trade publication.

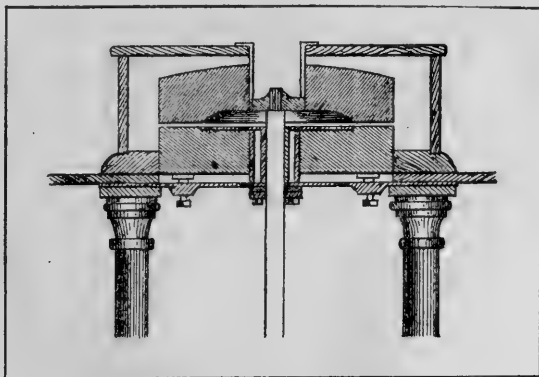


In describing these processes and the machines employed it may be observed that for the sake of accuracy the technical and identical language of experts and authorities on rice milling is often used in preference to my own.

(1) Rice is generally elevated first to the top story of the mill, where it is blown or aspirated to get rid of the dust that would otherwise soon glaze the shelling stones and spoil their work. It is then sieved, either through a six-sided wire screen, or preferably through a long sieve sup-

ported on wooden springs and worked transversely off a crank, to get rid of sticks, straws, stones, &c.

(2) This being done, shelling-stones, resembling ordinary wheat-stones, are used for removing "paddy" or husks. This is sometimes accomplished, however, by passing the rice over a common form of sieve having a jumping action or tapping motion at the bottom of it. In Burmese rice mills, it is said, they use artificial stones made of emery and magnesian cement. Four parts by weight of No. 18 emery are added to one part of ground calcined magnesite (a rock carbonate of magnesia), and tempered with a saturated solution of chloride of magnesium. This mixture is laid about 1 inch thick on the iron plates made specially for the purpose; it sets in a few hours and becomes hard enough for use in a few days. It is far more durable than the best mill-stone, and it always keeps a sharp face, owing to the difference in hardness between the emery and the cement that agglomerates it. Shelling-stones covered with cork have been tried and given up in England. In Italy a surface of hard wood set on end is sometimes used, like the Burmese native hand-mills, but they are being gradually superseded by the common shellers, either of cement or stone. The shelling-stones generally used in the mills of London and Liverpool, a diagram of which I am able to give here, are of the texture of "peak," not "burr."



They are from 5 to 6 feet across, having a "swallow" or cut in them of about 2 feet 6 inches, and a "skirt" or plane surface of about 2 feet 6 inches. They are set horizontally, and usually about three-sixteenths of an inch apart. This, however, varies according to the size of the grain to be treated. They work at about 120 revolutions per minute. The centrifugal force impels the grain towards the periphery, and as it passes through the narrow space at the working face the grain is tipped up on end and the husk is cracked off. When the stones run true, with good rice, the breakage is about 3 per cent. In some mills the rice is shelled twice and winnowed twice.

(3) In the process of shelling, a meal or flour is made from the crushing of the rice paddy and the three pellicles which, inside of the paddy, inclose the grain. This meal is separated by a common screen scourer or meal machine. Within the last year, however, an improvement has been made in this part of the process, not used, it is said, and perhaps not known, in the United States. It is called the "conical flapping brush," an invention of Mr. I. W. Gray, of Trinity Square, London. The cone of this machine is covered with a wire case, through the meshes of which the meal, by the operation of the flapping brushes, is made to pass

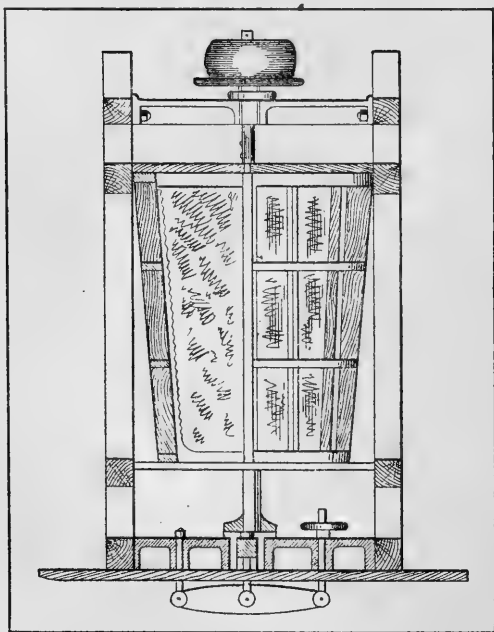
(4) The rice is now left with only the husks and the pellicles that still adhere to the grain; otherwise it is perfectly clean. The husks being separated by the action of a common blast or exhaust, the pellicles are removed by the use of mortars. Ordinary mortars have been used many years both in England and America. Recently the "Gray mortar" has come into use. It has an inner coating composed chiefly of emery. The coating, it is said, adds to the activity or motion of the grain in this cleaning operation, and greatly lessens the time required for it. The rice passes from the mortars by valves at their base.

(5) The rice is again winnowed by flapping cone brushes or blasts, and the chaff that has escaped previous operations is finally got rid of, and the grain is now ready for milling.

(6) Milling is generally done by the ordinary machine known as the barley mill. The objection is made to this mill that its rotary motion breaks the germ end of this brittle grain, and so alters its natural shape and lessens its market value. It is being superseded here by a mill that has an emery drum, with fans at its base to keep the grain cool, and that is worked horizontally. I regret my inability to give a plan of this machine. The inventor, with whom I conversed, reluctantly refused it, and admission to the mills where it is used is not obtainable.

(7) The rice is now again screened or subjected to flapping brushes, the meal made in the last process removed, and it is now ready for polishing.

(8) Polishers generally consist of a sheep-skin-covered drum, that revolves, inside of a fixed wire casing, about 1,800 feet to 2,000 feet per minute at the periphery. The form mostly used is that of an inverted frustum of a cone, a diagram of which is here given.



The skin of a South-Down sheep is preferred for a cover, because of its thickness of wool. Sometimes the rice, as it passes into the polisher, is subjected to an infusion of indigo toned down with rice flour to a pale

blue. This gives the rice a bluish tint, that is liked better in England than the natural creamy whiteness of the grain itself.

(9) On leaving the polishers the rice is usually again blown or aspirated, and then separated into whole rice, broken rice, and rice of different sizes.

(10) Recently, for certain markets—the English included—rice is pressed through an oiling machine, to give it a smoother and glossier surface.

In London there is a representative journal for almost every trade and manufacture. "The Miller," published at 24 Mark Lane, is the name of the one devoted to the interests of rice millers and brokers.

THOMAS M. WALLER,
Consul-General.

UNITED STATES CONSULATE-GENERAL,
London, August 29, 1885.

POUNDING AND POLISHING RICE IN GERMANY.

REPORT BY CONSUL LOENING, OF BREMEN.

In reply to your communication of the 25th ultimo, directing me to obtain information in regard to "the method of pounding and polishing rice in Germany," I have to say that the information desired is very hard to obtain, as the rice millers here closely guard the secret of their process of cleaning and polishing rice, and have heretofore allowed *no one* to visit their mills.

I have, however, been permitted to visit several rice mills, and witnessed the cleaning and polishing, &c., of rice; but as lucid explanations of the several processes have not been given me, I can only give you a description of and report on what I actually have seen. My being no practical rice miller will no doubt excuse all technical mistakes I may make. I shall endeavor to treat each process separately, beginning with

PRELIMINARY CLEANING.

The crude rice is almost all received here from India, and is of a quality about 75 per cent. free of shell or husk.

This rice is passed through a mill (for cleaning and separating the shell or husk from the rice) consisting of two * circular stone grinding-wheels, 6 feet in diameter by 6 inches thick, revolving horizontally and reversely upon each other.

The rice (shell and substance) product of this grinding process is conducted on to a flat horizontal sifter 10 feet by 2.

The rice, shell, and husk, after being sifted of all fine dust, &c., fall off this sifter on to a short trough or conductor, that empties them into a bin or receiver; as the rice falls off this trough or conductor a strong blast of wind blows the shell and husk away from the rice; there are also, at the end of this trough or conductor, magnets (inlaid in the wood), to attract all particles of metal that may be in the rice.

* In some mills only one stone grinding-wheel is used.

CLEANING RICE.

Rice, after being separated from the husk or shell, and all extraneous substances, by the process of "preliminary cleaning" and sifting aforesaid, is subjected to a process of cleaning, which is done in a machine consisting of a circular wheel (either of fine stone or composition) about 6 feet in diameter by 15 or 20 inches thick, fitting closely into and revolving horizontally inside a mill (box) lined on the top with smooth steel and on the sides with smooth perforated steel.

The rice enters this mill at the top, and is turned out cleaned of the yellow, mealy, coating common to all rice.

The rapid motion of this "wheel," while grinding and rubbing the rice against the perforated steel sides of the mill, forces out the fine meal, dust, and scrapings.

This process of cleaning is repeated several times until the rice is sufficiently clean and white.

As the process of shelling and cleaning is by *forcible grinding*, some of the grains of rice are unavoidably more or less broken and crushed.

These broken grains or granules must therefore be separated from the rice by a process of

SIFTING.

This is done by means of a horizontal revolving cylinder sifter about 4 feet in diameter by 10 feet long, slightly inclined.

The sieves in this cylinder are of steel wire, divided into four or five sections or sizes. Thus as the rice enters this revolving sifter the smallest granules or particles of broken rice fall through the first section of sieve (which is of the smallest size), and are collected separately; then the next larger grains are sifted through the next following section, gathered separately; and so on through four or five different sections and sizes of sieve until the whole grains only remain, fall off the sifter, and are gathered separately.

By this process of sifting rice four or five different grades and classes of broken rice or, so called, granulated rice is obtained.

POLISHING RICE.

Polishing is the finishing process of cleaning rice.

The rice obtained from the cleaning and sifting processes before mentioned, is carried into a "polishing machine" consisting of a roller (truncated-cone shaped) covered with soft sheep skin, fitting closely into and revolving horizontally in a cylinder the same shape, lined either with smooth skin, or finely perforated smooth steel, or very fine "gauze sieve."

The rice entering one end of this cylinder machine is turned out at the other beautifully polished.

A fine quality of transparent rice is also produced here by a chemical process and application of fine oil, presumably done by the same process as polishing rice, with only the addition of oiled and chemical substances.

ALBERT LOENING,
Consul.

UNITED STATES CONSULATE,
Bremen, August 6, 1885.

GRANULATED RICE IN GERMANY.

REPORT BY CONSUL LOENING, OF BREMEN.

I have been requested by the consul-general at Berlin, under date of July 25, to "obtain information in regard to the method of pounding and polishing rice here in Germany," and I reported on that subject under date of August 6.

In addition to and in connection with the above-mentioned report I have the honor to report to the Department on the subject of "granulated rice," a commodity sold here in the market as *Bruchreis* (broken rice), or, so-called, granulated rice, used here *entirely* by brewers and starch manufacturers, and of which large exports have been lately made from here to the United States.

As I have said in my report to the consul-general, rice is shelled, cleaned, and polished by a process of *forcible grinding*, in which grinding operation some of the grains of rice are unavoidably broken more or less fine, and are afterwards sifted through sieves of various sizes, thus producing different grades and classes of *Bruchreis* (broken rice) or granulated rice.

As far as I have been able to observe in the rice mills here, I find no *special grinding* process for manufacturing "granulated rice," although it can be easily be done, and a prominent rice miller here proposes that if the United States Treasury Department "object to his *Bruchreis* (broken rice) as granulated rice, in the sense of the term, to submit it again to a supplementary grinding process, although that would not materially alter the appearance of the broken rice, as it had already been broken and granulated by a special forcible grinding process" in the shelling and cleaning aforesaid.

Some rice millers here claim that their process of cleaning rice is at the same time intended as a *special process* of granulating rice.

I also have the honor to forward herewith to the Department fifteen tin boxes containing samples of rice, numbered, marked, and labeled as follows, with explanation and description of each:

- No. 1. Raw rice as received from India, about 75 per cent. free of shell.
- No. 2. Rice after the grinding process of "preliminary cleaning" or shelling.
- No. 3. Rice after the "cleaning" process (half polished).
- No. 4. Polished *mittel* (middle) table rice.
- No. 5. Polished table rice.
- No. 6. "Transparent" or oiled table rice (finest quality).
- No. 7. *Bruchreis* (broken rice) or granulated rice, classed here as Nos. 2 and 3 (smallest).
- No. 8. *Bruchreis* (broken rice) or granulated rice, classed here as No. 1 (small).
- No. 9. *Bruchreis* (broken rice) or granulated rice, classed here as No. 0 (coarse).
- No. 10. *Bruchreis* (broken rice) or granulated rice classed here as No. 00 (very coarse).
- No. 11. Husks (shells) the result of shelling and sifting.
- No. 12. Rice meal or flour obtained in cleaning process, classed here as No. 3.
- No. 13. Rice meal or flour obtained in the cleaning process, classed here No. 2.
- No. 14. Rice meal or flour obtained in the cleaning process, classed here as No. 1.

10 POUNDING AND POLISHING RICE IN ENGLAND AND GERMANY.

No. 15. "Rice-meal flour," a special manufacture from the broken or granulated rice.

There are four rice mills in Bremen, and large capital is invested in the business.

I am told that the *profit* in rice milling is in the advantageous disposal of the "waste," such as broken or granulated rice, rice-meal flour, &c.

The cost of cleaning and polishing rice is such as to allow very little, if any, margin of profit on "table rice."

ALBERT LOENING.

UNITED STATES CONSULATE,
Bremen, August 10, 1885.

POLISHING RICE IN HAMBURG.

REPORT BY CONSUL LANG, OF HAMBURG.

I have the honor, in response to your letter of the 28th of July, 1885, to present herewith such information as to the method of pounding and polishing rice in Germany as I have been able to gather.

At present the "Nagel" mill is most in use in Hamburg, although several others are in activity. This system is constructed by a Hamburg engineer, Mr. Nagel, jr.

It comprises all manipulations needed to clean the raw rice, to pestle, shell, and polish, and to assort it.

(1) The cleaning is done by exposing the grist to a moderate current of wind, caused by a ventilator, and by passing it over or through a system of sieves.

(2) The cleansed grist is now shelled and partly broken by running it through two systems of grinding or mill stones. One of the latter is cylindrical, and contains a hard millstone of 6 feet or 6 feet 7 inches diameter. Through this operation a quantity of rice flour is received, and therefore the whole mass has to be sieved again.

(3) The most important process of polishing the rice is done very differently, and every manufacturer has his own system, which he keeps secret. The general principle, however, is a wooden cylinder revolving in a wooden mantle, between which the rice has to circulate and to be rubbed. The Nagel machine does it in the following manner:

The mantle is made of wire work, thus offering a rough surface, in order to retard the grains on the way downwards; the revolving cylinder is furnished with brushes, which clean and polish the rice. Some millers color their rice with fluid indigo, by suspending a basin containing the fluid over the cylinder and allowing it to drop slowly into the cylinder of rice.

In other mills the mantle is made of wood and the cylinder filled with small pieces of sheep-skin nailed on its surface, or the mantle is made of stone and the cylinder of wood without any cover on the surface.

(4) After leaving the polishing cylinder the rice passes over a system of sieves, which assort the grains as follows: Full grains and broken grains; and the latter into small, middling, and coarse broken grains. A Nagel machine cleans and polishes 5,400 kilograms within twelve hours.

WM. W. LANG,
Consul.

UNITED STATES CONSULATE,
Hamburg, August 20, 1885.







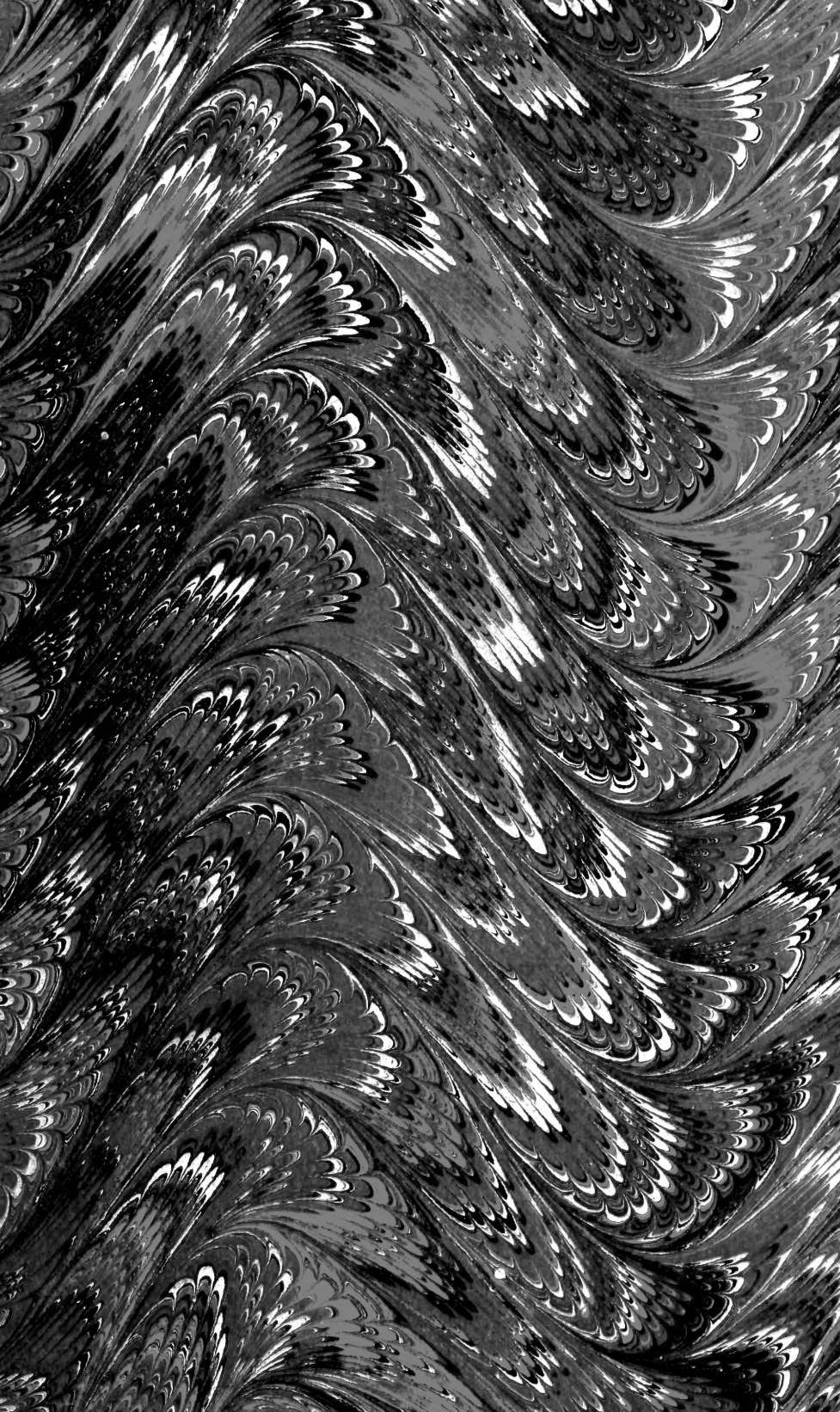












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