Machinery and Appliances.

THE PREPARATION AND SPINNING OF BARCHENT AND WASTE YARNS. II.

In our first article on this subject, which appeared in *The Textile Mercury* of June 29th last, we dealt with the functions of the willow and the scutcher, and described these two machines, belonging to the series designed for this system by Messrs. Platt Brothers and Co., Limited, Oldham. The next machine calling for attention is the

BREAKER CARD,

shewn in fig. 1.

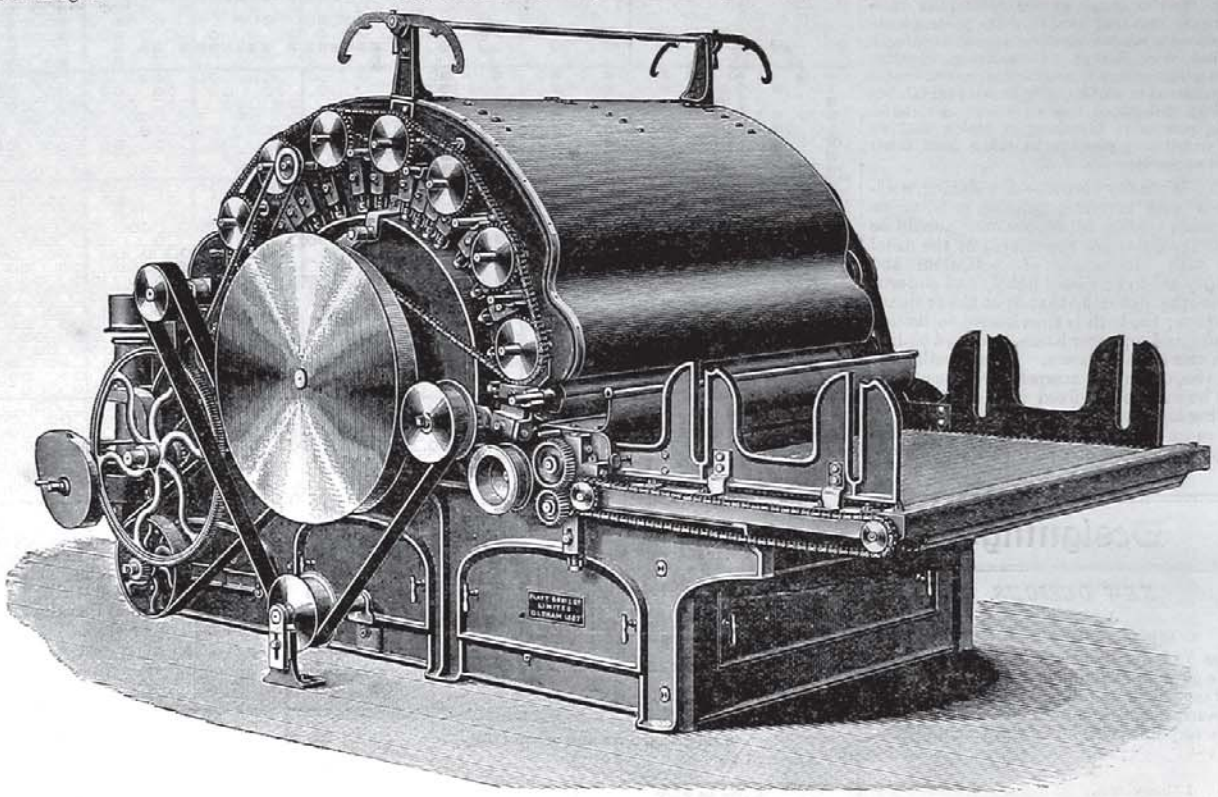

Fig. 1.—BREAKER CARD.—MESSRS. PLATT BROTHERS AND CO., LIMITED, OLDHAM.

The economical production of waste yarns imperatively requires that the number of processes, or passages of the material through machines, should be reduced to as few as possible. This fact in turn requires that the construction and arrangement of every machine should be such as will advance the object in view as much as possible, namely, the attainment of regularity in the disposition of the material, whether in the lap, the breaker card sliver, or at subsequent stages. Keeping this object in view and remembering the nature of the material, the makers have provided the breaker card with an extended creel and lattice for the reception of two laps to run off together, so that by commencing the doubling process at this early stage the object sought may be attained all the earlier, the inequalities of one tending to correct those of the other. This feature is prominently shewn in our illustration. Passing from the lattice, the material is received by a pair of feed rollers covered by a patent metallic wire and delivered to the taker-in, which is also covered by a similar wire and supplied with two knives. These in their combined action extract a great amount of dirt. The material next passes to the cylinder, which is 50in. in diameter and 50in. across the face. Another notable feature of this card is the increased number of clearers and workers that are brought into operation, besides the usual dirt roller, the fancy, and the fancy stripper. This has been accomplished by a special construction of the framing. As will be obvious the improved arrangement greatly increases the carding power and the productive capacity of the machine. There are two ways of dealing with the material as it leaves the doffer, from which it is stripped in the ordinary manner. The ordinary method would be to coil it in a can, and form it into a lap on the Derby doubler, but an alternative is offered, if desired, which dispenses with the latter machine and process, and this is to wind it on a lap drum, from which it may be cut when it has attained the proper thickness, and be taken straight to the finisher card. When it is preferred to doff in the can and retain the Derby doubler, an ingenious appliance is introduced to prevent the breakage of the web as it leaves the doffer. This greatly diminishes the amount of waste that would otherwise occur. Experience has demonstrated that the retention of the Derby doubler in the system is decidedly the best, as by its use greater regularity can be attained.

THE DERBY DOUBLER.

This machine is a well-known one, and the particular type forming part of this system does not differ from the ordinary construction beyond in a few small details, to suit it better for its special purpose in this case. We give an illustration of this machine in fig. 2.

The cans of sliver from the breaker card are brought and passed through this machine, making the whole into laps half the width of the finisher card. Knowles' powerful compression rollers are used, and by their means a very solid lap is made, weighing from 15 to 20 lb. each.

THE FINISHER CARD.

We now come to a point where the system diverges greatly from the methods usually followed in the manipulation of cotton, and passes over to that of woollen. This is seen in the finisher card, which, instead of doffing its product in the ordinary manner in a sliver, is fitted with a condenser, as will be seen in our illustrations. The condenser, it may not be superfluous to remark to those of our readers who are only acquainted with the cotton system, divides the sheet of carded material, as it leaves the cylinder, into a large number of ribbons or strips, rolls each into the form of a slub or rove and winds them upon two, three, or four bobbins as may be arranged, after which they are ready for the mule. It will be seen, therefore, that this attachment to the card dispenses with the drawing and all the flyer frames, thus saving quite a number of processes.

(To be continued.)

THE PERPARATION OF RAMIE FIBRE.

MACHINES AND PROCESSES.

The *Kew Gardens Bulletin* for November contains an article on the subject of the preparation of ramie fibre in connection with the exhibition held at Paris this year of machines and processes invented to render the fibre available for commercial enterprise. The following is an extract from the article in question :—

In connection with the Paris *Exposition Universelle*, 1889, a special series of trials was held of machines and processes for decorticating ramie (Exposition Universelle: Essais spéciaux de machines et appareils pour la décortication de la Ramie),

and at the request of the India Office, and in continuation of similar action taken last year, Mr. D. Morris, F.L.S., the Assistant Director of Kew Gardens, was appointed to represent this country, and to prepare a report of the results. This report contains the following information :—

A series of interesting trials of machines and processes designed for the decortication of ramie was held by the French Minister of Agriculture at Paris in 1888, and a report on the subject, which I had the honour to prepare for the information of the Secretary of State for India in Council, was published in the *Kew Bulletin*, 1888, pp. 273-280.

These trials were resumed this year as an integral part of the *Concours spéciaux des instruments agricoles* of the Exposition Universelle, and opened on the 23rd September last. The jury consisted for the most part of the members of the Commission of 1888. The attendance of foreign representatives was considerably larger than in 1888, and the greatest interest was manifested in the proceedings by a large concourse of visitors.

The machines and processes this year were confined to those which had been shown as a regular part of the general exhibition. As will be seen later, all the competitors were French, and this, in spite of the fact that more than a dozen machines and processes have lately been designed in this country, which are now in course of being carefully tested.

It was a noticeable feature throughout the proceedings this year that no importance whatever was attached to the decortication of dry ramie stems. The trials were entirely confined to results obtainable with green stems, and in order to make them still more applicable to field operations, some of the stems were supplied freshly cut with leaves and some without leaves.

The following six machines and one process were submitted to the jury :—

1. E. Armand—Paul Barbier, 46, Boulevard Richard-Lenoir, Paris.
2. P. A. Favier—Société la Ramie Francaise, 14, Rue Saint-Fiacre, Paris (for treatment of dry ramie stems).
3. P. A. Favier—Société la Ramie Francaise, 14, Rue Saint-Fiacre, Paris (for treatment of green ramie stems).
4. Norbert de Landtsheer, 2, Place des Batignolles, Paris (large machine).
5. Norbert de Landtsheer, 2, Place des Batignolles, Paris (small machine).
6. Félicien Michotte, 43, Rue de Saintonge, Paris.
7. Ch. Crozat de Fleury et A. Moriceau, Villiers-le-Bel, Seine-et-Oise (process for the treatment of green ramie stems in the field).

Barbier Machine.—The machine of M. E. Armand, constructed by Barbier, and more generally known as the Barbier machine, was in every respect the same as that tried in 1888, and described in my previous report. It is constructed to be worked by hand or by steam power. It weighs 625 kilos., and the price is £48. The construction of the machine is comparatively simple, and consists of a number of cylinders and beaters with a reverse action attached. This latter allows the stalks to be withdrawn when about five-sevenths cleaned, and of the other ends being put in to complete the operation. The disadvantage of this method, as regards time and output of ribbons, is more fully discussed under the De Landtsheer (small) machine. During the trials this machine caused a considerable loss of fibre, carried away with the pith and wood. In the first trials 10 kilogs. of green stems without leaves were passed through the machine in six minutes. The result was 1·300 kilogs. of wet ribbons of fair quality. This would be at the rate of 130 kilogs. of wet ribbons per day of 10 hours, or of 96 lb. (avoir.) of dry ribbons for the same period.

In the second trials 24 kilogs. of stems with leaves were put through the machine in 10½ minutes. The result was 1·200 kilogs. of wet ribbons of moderate quality. This would be at the rate of 68·500 kilogs. of wet ribbons per day of 10 hours, or of 50 lb. (avoir.) of dry ribbons for the same period.

Taking into consideration the cost of this machine and the power necessary to drive it, the out-turn of ribbons is much too small to prove remunerative, and the machine in its present form is useless. Better results than these have been obtained by decorticating ramie by hand.

Favier Machine.—Two machines were shewn by M. P. A. Favier, whose name is well known in connection with the ramie industry. Machine No. 1 was designed for the decortication of green ramie stems, while machine No. 3 was designed for the treatment of dry stems. In this report the remarks apply only to machine No. 1. This machine was 2 m. long, 80 cm. broad, and weighed 800 kilogs. The price was not stated. It required three-quarter horse power to drive it and two persons to feed and receive the ribbons. The machine is adapted to be worked by four persons, but at the trials, owing to want of space, it was worked with only two persons. M. Favier stated that it was designed to produce ribbons entirely free from wood and pith, ready to be converted by a chemical process, also by the same inventor, into the finest filasse ready for weaving. In outward appearance the machine was a long, narrow iron box, furnished with numerous small cylindrical crushers and beaters. These were entirely covered by a number of moveable iron sheets, which both protected the intricate system of cylinders and prevented the escape of dust and *debris*. The feeding apparatus consisted of a long narrow trough, in which the stems were arranged in lots of four to six, and fed to the machine at two apertures leading to the rollers. The first pair of rollers was furnished with fine corrugations to grasp the stems and pass them on to a somewhat complicated system of crushers and beaters. The ribbons passed continuously through the machine, and were ultimately delivered into the hands of a workman at the other end, perfectly free from wood and pith. In the first series of trials 10 kilogs. of green stems without leaves were passed through the machine in 4½ minutes. Once or twice some of the ribbons were caught in the rollers, and the machine had to be stopped. The time occupied in these stoppages was not counted. The wet ribbons yielded by 10 kilogs. of stems weighed 2·820 kilogs. This would be at the rate of 376 kilogs. of wet ribbons per day of 10 hours, or 276 lb. (avoir.) of dry ribbons for the same period. In the second series, stems more or less with leaves, weighing 60·350 kilogs., were passed through the machine in 18 minutes. They yielded 18·100 kilogs. of wet ribbons. This would be at the rate of 603 kilogs. of wet ribbons per day of 10 hours, or 443 lb. (avoir.) of dry ribbons for the same period.

The ribbons in both cases were well cleaned. There appeared to be no waste. The *debris* under the machine consisted almost entirely of wood and pith.

These results I regard on the whole as satisfactory.

The somewhat intricate character of the various parts of this machine would be against its general use by planters in the colonies, but there can be but little doubt it is a great advance on most other ramie machines now available. It might, however, be adapted for use in central factories or *usines*, where skilled labour would be obtainable and for this and similar purposes the Favier machine may be recommended.

Michotte Machine.—The Michotte machine, called "La Francaise," at first glance resembled the Barbier and De Landtsheer (small) machines. It was driven by steam power, and consisted of a pair of large rollers, each furnished with helicoidal grooves running their whole length. The large rollers first crushed the green stem, and then passed them on to beaters with moveable bars intended to get rid of the wood and pith. In the first trials 7 kilogs. of green stems were passed through the machine in 1½ minutes, yielding 1 kilog. of badly cleaned ribbons. In the second trial 17·400 kilogs. were passed through in 2½ minutes, yielding 6 kilogs. of similar ribbons. In both cases the ribbons were mixed with crushed and mangled stems, full of wood and pith. The fibres were also cut transversely (probably by the helicoidal grooves) and rendered useless.

This machine in its present state, possesses no merit whatever. It is difficult to realise under what circumstances it could have been entered for trial.

De Landstheer Machines.—M. de Landstheer exhibited two machines. The small machine was very similar to that exhibited by him in 1888, but meanwhile it had received some slight modifications intended to accelerate its movements. It was driven by steam-power, and required two men to attend to it. It had a horizontal feed-plate, and consisted of a series of rollers and beaters which received eight or ten stems at a time. These were cleaned for about five-sevenths of their length, and by a reverse action (operated by a long handle pushed by the workman), they were then withdrawn and the other ends put in and cleaned. It will be noticed that each lot of stems under this arrangement had to be presented twice to the machine before they were cleaned. This involved a consider-

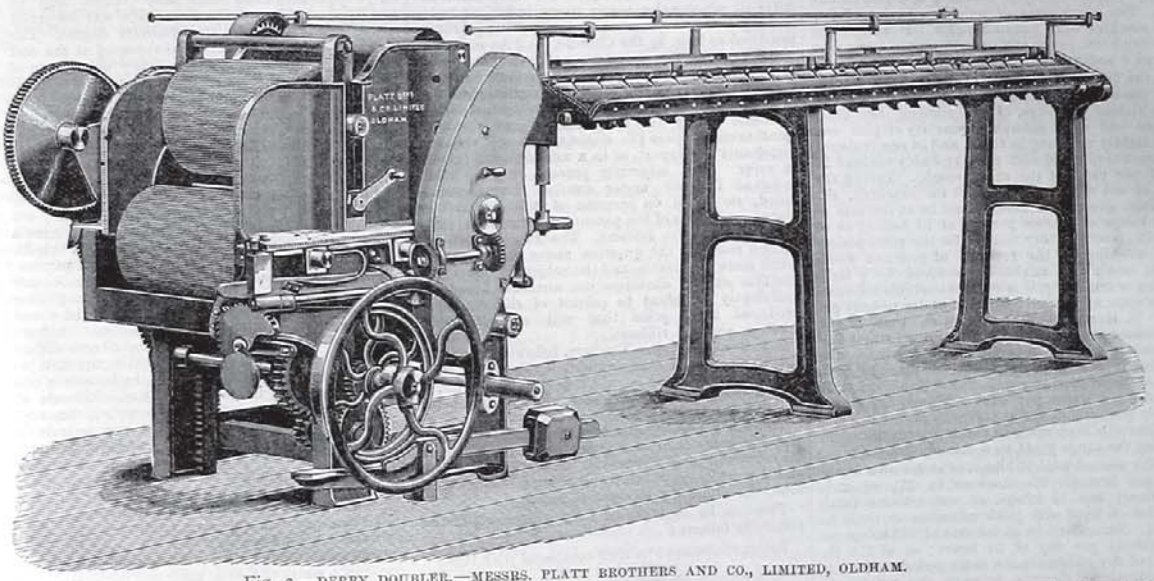

Fig. 2.—DERBY DOUBLER.—MESSRS. PLATT BROTHERS AND CO., LIMITED, OLDHAM.

able loss of time and reduced the daily out-turn of ribbons. In the Favier machine, as also in the De Landtsheer large machine, this difficulty has in a great measure been overcome. The De Landtsheer small machine was used for green stems, in the second trials only. In these 24·400 kilogs. of stems, with leaves, were passed through the machine in 10 minutes. The yield was 6·500 kilogs. of wet ribbons of good quality. This would be at the rate of 390 kilogs. of wet ribbons per day of 10 hours; or 286 lb. (avoir.) of dry ribbons for the same period.

In the first trials this machine was used by De Landtsheer to complete the cleaning of ribbons previously passed through the large machine. In this instance 15 kilogs. of partially cleaned and wet ribbons were passed through the machine in 6½ minutes. The yield was 10 500 kilogs. of excellent fibre, worth, according to the opinion of experts, about 70 to 80 centimes per kilog.

The large machine of M. de Landtsheer, like the Favier machines, had a continuous movement, by means of which the stalks passed through the machine, without withdrawal, and the ribbons were delivered at the other end ready for drying. This is an important point gained. Indeed, this was the principal improvement noticed in the machines presented at the Paris trials of 1889, and in all in which it had been adopted there was a marked increase in the out-turn of ribbons. M. de Landtsheer's large machine consists of two pair of cylinders. The first pair is furnished with grooves opposite one another, while the second have the grooves alternate. Beyond these are two sets of beaters (*batteurs à ailettes*) which break and get rid of the wood and pith, and deliver the ribbons on a revolving stage placed beneath, whence they are quickly picked up by a workman and laid on one side. The particulars of weight and price of this new machine were not obtainable. It was driven by a two-horse power engine, and required two men to feed it and remove the ribbons.

In the first trial 36 kilogs. of stems without leaves were passed through the machine in 2½ minutes. They yielded 10 kilogs. of wet ribbons, but these ribbons had a considerable quantity of pith and wood lightly adhering to them, and in one instance the amount of wood and pith probably reached 20 to 25 per cent. of the gross weight. Taking the yield of wet ribbons as they left the machine, the 10 kilogs. above mentioned would be at the rate of 2,400 kilogs. of ribbons per day of 10 hours; or of 1,763 lb. (avoir.) of dry ribbons for the same period. Even allowing for the presence of pith and wood, which, when dry, might be removed by a light shaking or scutching, it is evident that this machine will prepare more than half a ton of dry ribbons per day. It is not at all improbable that M. de Landtsheer will be able to effect some further improvement in this machine. In any case, the machine is worthy the attention of planters, who, with a single instrument, could work off about 50 tons of green stems per week. This is an exceptionally good result, and it serves to show what progress has now been made in perfecting machines for treating the ramie plant on a commercial scale.

In the second trial 46 kilogs. of stems with leaves were put through the machine in 11½ minutes. The result was 15 kilogs. of wet ribbons (with particles of wood and pitch adhering to them as before). This would be at the rate of 783 kilogs. of wet ribbons per day of 10 hours; or of 575 lb. (avoir.) of dry ribbons in the same period. There is a considerable difference between the results obtained by this machine in the first and second trials. This was also noticeable in the Barbier machine. The construction of these machines evidently does not enable them to cope with stems with leaves attached. On the other hand, the Favier machine did better with stems with leaves than those without leaves. This, however, is not a matter of great importance. In the field the leaves could be easily detached during the cutting; and if not removed then, they would fall off of their own accord after lying in a heap (including a slight fermentation) for a few hours.

Fleury-Moriceau Process.—Only one process was shewn. This was singularly simple, and consisted of steeping the fresh (or dry) stems for a short period in boiling water and removing the ribbons by hand. An open galvanised tank about six feet long, 2 feet wide, and about 4 feet deep, filled with water, was raised on bricks (or stones) about 18 inches from the ground over an open fire. When the water had reached boiling point a crate containing 50 to 100 fresh stems was lowered into it and (depending on their age and character) left in it for 5 or 15 minutes. At the end of that time the crate was lifted out, the stems left to drain while another lot was put in. The stems already steeped were then taken up by a couple of workmen and quickly and effectually cleaned by hand The action of the boiling water had apparently thoroughly loosened the attachment of the cortex to the wood, and ribbons were produced perfectly clean and regular, and apparently without any loss of fibre.

This method was tested in the first trials only. The operation began by placing 18 kilogs. of fresh stems in boiling water and allowing them to remain there for 10 minutes. In 36 minutes (or in 46 minutes, including the time occupied in immersing the stems) the workmen, apparently not specially trained in the work, produced 5·6 kilogs. of excellent ribbons. This would be at the rate of 73 kilogs. of wet ribbons per day of 10 hours; or 161 lb. (avoir.) of dry ribbons for the same period.

This process, it will be noticed, is of the simplest possible description. The only apparatus necessary is a tank. This tank could easily be moved from place to place in the field, and the wood of the stems after the ribbons are removed would probably furnish most of the fuel necessary. The process can, however, only be utilised in a few special countries where labour is very cheap.

M. Crozat states that ribbons produced by this process can be dried, baled, and delivered ready for shipment, at a cost not exceeding 8 to 10 centimes per kilog (about 85s. per ton). In Tonkin it could be done for even less than this.

It will be noticed that the Fleury-Moriceau process follows somewhat on similar lines to that of the Favier process of 1882. In this latter the stems were steamed for some time in a closely-fitting cylinder. The former is, however, much simpler, and requires absolutely no skilled labour, nor any plant except an open tank, large or small, according to the circumstances of the grower.

The inventors of the Fleury-Moriceau process are evidently of opinion that wherever cheap labour is obtainable it is in every way preferable, in the production of ramie ribbons, to the best machine. After all, placing the ramie stems in boiling water is only a modification of the old retting process practised so long by the Chinese, and by means of which probably the China grass of commerce is still produced. In any case the Fleury-Moriceau process deserves to be carefully considered, and especially in its applicability to the circumstances of India. There the ryots might grow ramie in small areas, prepare the ribbons, and sell them to merchants for export, or to a neighbouring factory or *usine*. The steaming process of M. Favier, designed for use under similar circumstances, failed, no doubt on account of the restrictions placed on the use of the patent, and the uncertainty of the demand for ribbons. The Fleury-Moriceau process re-opens the question under circumstances much more favourable, and the subject is one which deserves careful consideration wherever labour is sufficiently abundant to permit of ribbons being produced at a price that will compete with machine-cleaned ribbons.

Awards of the Jury.—The jury, following the rules applicable to the other exhibits at the Exposition Universelle, awarded a gold medal to M. Favier, a gold medal to M. de Landtsheer, and a silver medal to MM. Fleury-Moriceau.

To those generally interested in ramie culture it may be mentioned that the trials of 1889 have proved much more favourable than those of 1888, and the subject is evidently ripening for solution in many directions not thought of before.

This can be best shown by a comparison of the results as follows:

RESULTS obtained in 1889 compared with those obtained in 1888.

Machine.	Quantity of Dry Ribbons producible in a day of 10 hours (pounds Avoir.) working on Green Stems.	
	1888.	1889.
De Landtsheer:		
Large machine	—	1,763*
Small machine	120	287
Barbier	71	96
Favier, No. 1 ..	—	443
Fleury-Moriceau..	—	161

It will be noticed that the best results obtained in 1888 were at the rate of 120 lb. of dry ribbons per day of 10 hours. This was with the De Landtsheer small machine. In 1889 this machine, with improvements, produced at the rate of 287 lb. of dry ribbons (more than double the quantity) for the same period. With the large machine (make due allowance for the pith and wood lightly adhering to the wet ribbons) the returns of dry ribbons would be at the rate of over half a ton per day.

* This large yield of ribbons must be reduced about 20 per cent. on account of the pith and wood lightly adhering to them.

TYNESIDE CHEMICAL TRADE.—Soda crystals are nominally £2 2s.; soda ash, 1½d. less 5 per cent.; bleaching powder, £4 15s. to £5; and caustic soda, 77 per cent., £8 10s. net, or ground, in casks, £11.

THE BAR-LOCK TYPE-WRITER. — The London agents for the sale of the Bar-Lock Type-Writer described in a recent issue of *The Textile Mercury*, Messrs. Richardson and Co., of 12 and 14, Queen Victoria-street, gave on Saturday a special display of the powers of the machine, to which numerous gentlemen were invited. In reference to this the London *Times* says: "The Bar-Lock Type-Writer, like most if not all of the other forms of the contrivance, is of American invention, and the proprietors claim for it, with much show of reason, that it is in many respects the best of them all. It differs from the Remington, its chief competitor, in that the type bars stand vertically upwards from the pivots on which they work instead of depending from them, so that they are depressed by the key action instead of being elevated. They are arranged in a semi-ellipse in two rows, the convexity of the curve being towards the writer, while the cylinder carrying the paper is below the types, and almost in the major axis of the ellipse, so that the writer looks down upon it over the types and sees every letter or other character as it is impressed. The name of the machine is founded on an arrangement by which each type-bar in its descent falls near its free extremity into one of a series of slits cut in a semi-circle of brass placed near the cylinder, with the effect that the bar, instead of being fixed only at its pivot, is 'locked' in such a manner that it cannot shake, and that its stroke is absolutely steady and always precisely from the same spot. By this contrivance perfect alignment is obtained, and in the course of Saturday's experiments the same line was printed five or six times following, the paper being put back each time and receiving the types again in the same places on which they had originally fallen, and so exactly that although the impression was deepened it was not blurred in the slightest degree. The action by which the cylinder is replaced at the end of a line is more simple than any other form of type-writer with which we are acquainted; and, indeed, all the mechanical arrangements have been brought to a high degree of excellence. It seems to be impossible in this instrument for the manual dexterity of the writer to overtake the limits of speed of the machine, which can, therefore, be used without loss of time, and without the intervention of shorthand for the direct dictation of letters, which are ready for signature as soon as they are finished. Mr. Langford, a shorthand writer, gave a display of the powers of the instrument in this direction, and was said to have succeeded in surpassing any previous record of speed. It is also claimed for the Bar-Lock that it is less noisy than any other form, and that by placing it on a felt bed the sound which it does produce may be almost entirely muffled. The arrangement of its riband differs from that of other type-writers, while the ink resembles printers' ink, and is not hydrometric like the aniline inks heretofore in use. Ribands of various colour, copying or non-copying, are supplied, and the riband-bearing spool can be quickly exchanged for another when a change of colour is desired. Together with the type-writer there was shown a most ingenious method of producing any number of copies of its work. The matter was first impressed in the ordinary way upon a specially prepared thin paper covered by a coating of wax. The blows of the types removed the wax from the parts of the surface which they struck and formed the paper into a sort of stencil plate not perforated, but pervious to printers' ink where the types had fallen and impervious elsewhere. An ink-roller passed over this stencil plate, and then the momentary action of a hand-press produced a perfect impression on a sheet of paper placed below, and there seems scarcely any limit to the number of copies which might be taken and which were practically undistinguishable from each other or from original type-writing. For the producton of circulars the method would be difficult to surpass."

The art of tempering copper without destroying its value, by amalgamating it with tin and other metals to harden it, has been considered a lost art, as from samples of edge tools and other relics of the ancients, composed of pure copper, hardened or tempered, the process was undoubtedly known to them. Now, however, we are informed that the process has been discovered, or at least a process producing these same results, and the company holding it offer to supply the trade with any and all kinds of copper, cast solid and tempered to any guage that the work to be performed demands. As a proof of this we are shown sworn statements of tests of this material furnished by the Eureka Tempered Copper Company of North-East, Pa., made at the Brooks Locomotive Works, showing beyond a doubt that the claim of the company is justifiable. This process, which renders pure copper available for many uses to which it is better suited than any other metal, will "fill a long-felt want," and the company is to be congratulated upon its useful discovery.—*Manufacturers' Gazette* (Boston, U.S.A.)