

have been carried away, and the body of the bloody Marat, once entombed in this church, was exhumed, and in a freak of passion thrown into a sewer. These events occurred years ago, but they serve to verify the declaration I have made about ancient Paris. Architecturally the city is rapidly changing its character by the opening of broad boulevards, and the necessary destruction of those old streets and houses where revolutions have kindled their fiercest fires. This wholesale demolition has turned thousands of people out of their old homes, and they have been compelled to seek new ones and to separate from associations which had become tender to them by the lapse of time. This also has created a feeling against the Emperor, as he is charged with the responsibility of all these innovations, but no one can fail to see that these changes are making for Paris an interest which relics and ruins of ancient time could never accomplish.

There is, however, but one Paris. It is the capital of Europe, and seems to lie in everybody's way; for all the monarchs, from the time of Catharine de Medici to the present Emperor, have exhausted their genius and lavished their treasures to make it the great show-place of the world. Frenchmen throughout all France are proud of their capital and seem to regard it as the only proper residence for all mankind. There are no rival cities, as in the United States, to feel jealous of the growth of the metropolitan city. I do not regard the French as a very inventive people, but they have wonderful power of adaptation, the love of experiment, and the spirit of emulation and inquiry, and seem ready to adopt any improvements that will minister to the interests of strangers.

The more thoughtful French character contemplates the future of France not without some forebodings of evil; and some even declare that it may not be long before the Orleans family, in the person of the Count de Paris, may recover the rule of the nation. Louis Napoleon is growing old, and some say infirm. The little Prince Imperial is delicate, the Prince Napoleon is not very popular, and many profess to see in these manifestations of weakness signs of the approaching decay of the Napoleonic rule in France. I think, however, that those who rely upon the fulfillment of these signs will be disappointed. There is something in the name Napoleon which electrifies the people of France, and the great deeds of this family are so thoroughly traced upon all one sees, that it would require a greater revolution than has yet taken place, to erase them.

I think myself fortunate to be in Paris at this time. The Exhibition which was foreshadowed by the English press to be a failure, is, to my mind, one of the wonders of creation. The illustration of the building, recently published in the *SCIENTIFIC AMERICAN*, is one of the best I have seen.

I have thus far spent the best part of four days in attempting to see its objects of art and utility, and I can truly say that I have not seen the Exhibition, so vast is it, and as I shall leave Paris in a few days for a journey eastward through Prussia, Austria, and Switzerland, I reserve my impressions of it, possibly till some other time. I met an American the other day who has made forty visits to the Exhibition, and who declared that his interest was still unabated. I think what one can see in the various buildings outside the Grand Palace of Industry, such things as indicate the manners, trades, and customs of the older and ruder nations of the world, are full of marvellous interest. But Paris is interesting now from the fact that in all probability there are upwards of a half million strangers now in the city, and also from the fact that it contains two Emperors, a King and the Crown Prince of the three most powerful nations on the continent—Napoleon, Alexander the Czar of Russia, and King William of Prussia—and Prime Minister Count Bismarck, a man more feared in Europe than any of the crowned heads. *Chambré*, the *Punch* of Paris, facetiously announces the "arrival of Bismarck and his servant King William."

Napoleon has extended to his royal visitors a most marked and to all appearance a most cordial welcome. Balls, operas, reviews, and other exhibitions are constantly prepared for their entertainment, and the whole city is alive with excitement. Apart from the great influx of strangers, it is a mystery to me how so many French people can afford to idle about these displays of pageantry. The review at Long Champs on the 6th was perhaps the most brilliant that has ever occurred. At an early hour in the morning carriages and pedestrians were pressing their way by thousands toward the Park, expecting to gain eligible positions to witness the display. Having fortunately secured seats in the tribune, we did not depart from Paris until noon, which was two hours before the review. So great was the rush, however, we did not get to our position until half-past one. The police of Paris are much more skillful in managing a crowd than ours in New York. Had it been otherwise we could not have gained the places assigned to our party. There were sixty thousand troops, "horse, foot, and dragoons," drawn along in lines around a vast parallelogram, the whole being visible from the position we occupied. At the precise hour a flourish of trumpets announced the arrival of the reviewing party, which was composed of the grandees of Europe. The two Emperors and the King rode side by side at the front and were followed immediately by their suites—all mounted upon fine horses and dressed in brilliant costumes. Having passed around the entire inner line of troops, which occupied about three quarters of an hour, the reviewing party rode across the field and took a station immediately facing the tribune. Then commenced the movement of the entire military force, infantry, artillery and cavalry—passing immediately in front of the Emperors and King. The marching of the infantry, the rattling of the artillery, the grand charge of the cavalry, and the inspiring strains of the numerous bands of music, together with the brilliant uniforms of officers and men, pro-

duced a scene which those who witnessed it will never forget, and one that is not likely to occur again in Europe. The attempt made by a desperate young Pole—Berezowski—to take the life of the Czar as he rode away from the review, produced a most intense excitement, and before we were aware of what had happened we found ourselves surrounded and hemmed in by an agitated crowd who were pressing the officers as they attempted to carry away the would-be assassin. It took us nearly an hour to get out of the confusion. The escape of the Czar was the subject of general joy, and the Parisians were especially thankful that the attempt was not made by a French subject. S. H. W.

Special correspondence of the *Scientific American*.  
**MACHINE TOOLS AT THE EXPOSITION.**

PARIS, June 4, 1867.

#### STEAM HAMMER.

A tool which from its novelty attracts considerable attention, is Davies' steam striker, designed to imitate as clearly as possible the action of a sledge, and to be able to strike a blow in any direction, so as to be applicable to work of irregular shape, or to forgings which are too unwieldy to be got under an ordinary steam hammer. The form of hammer head is retained as in a blacksmith's sledge, and this is carried at the end of a stout wrought iron arm working on a pin, the other end being in connection with a steam piston. The whole of the working parts are placed in a cast iron ring or cylinder, which may be revolved within a fixed casing so as to bring the plane of motion of the hammer in any direction, and the only provision that has to be made for the rotation, therefore, is that of a stuffing box around the steam pipe where it enters the inner casing. The valve gear is made self-acting by the impact of the hammer, and the force and time of the blow is regulated by a lever at the anvil which the blacksmith works with his foot. The whole machine is mounted on the top of a hydraulic ram, by which it can be raised or lowered a certain distance, or be turned around to work on a number of anvils placed in a circle about it. This tool is made and has been a good deal used at the Viaduct Works, Crumlin.

#### MINING MACHINE TOOLS.

A very simple tool for coal mining is exhibited by Messrs. Jones & Levick of Blaina. A flat pick is carried on a vertical shaft so as to work horizontally. The bearings of this shaft are cast on a ring arranged to revolve as in the steam striker, so as to bring the plane of motion of the pick in coincidence with that of the coal stratum. A horizontal cylinder placed concentrically with this ring is employed to work the pick; compressed air being used for the purpose. The valve gear is self acting and appears to be quite simple. The whole is mounted on wheels suitable for a railway, and the height is not more than two feet.

By the side of this stands the rock-tunneling machine of Capt. Beaumont of the Royal Engineers, also driven by compressed air. It consists of a heavy circular head, carrying at its circumference as many as fifty drills, and receiving motion forward and back from the air piston, to the rod of which it is attached. A slow rotary motion is also given to the head by frictional parts operated by the motion of the piston, so that a circular rift is made in the rock as the drilling advances. A single drill is placed at the centre of the head, and the hole bored by this is used for the blasting charge necessary to remove the circular block.

Passing this, we come to a simple pump which throws an immense stream of water. It is merely a common chain pump with india rubber disks for the buckets, and these fitting the barrel tightly, yet without great friction, enable a good duty to be done without waste of power.

#### BRICKS AND BRICK MACHINES.

A large brick machine, or rather a series of machines, for this manufacture is next in order, and this is generally in operation. A great deal of attention has of late years been given in England to this class of machines, and a number of different forms are produced. As a rule, the ordinary bricks used in that country are of the most miserable kind, possessing neither strength nor comeliness, but good bricks are produced there. Many of the better class used for houses are made with holes passing through them, and these, if properly laid, are said to be much less subject to dampness than the solid ones, as the air has access to them more freely and tends to carry away the moisture. In Paris this form of brick seems to be exclusively used. In the American department, a model of a brick machine from Philadelphia is exhibited, and a full size machine is at work not far from the exhibition. It appears very ingenious in its construction, and is capable, according to the statement of the exhibitor, of making 35,000 to 40,000 bricks per day of ten hours.

#### WOOD-WORKING MACHINERY.

One of the best portions of the English department is that devoted to wood-working machinery, of which a very great variety is exhibited. This class of machines is one, as everybody knows, to which great attention has been paid in America, and it is there that most of the designs have originated. The English, however, in copying them, have not done so blindly, and the visitor will find that not only are these tools constructed with far greater perfection of workmanship than with us, but that many improvements have been made in the design of tools, besides the addition of some that are not in use in America. Most of these tools are in operation, and I notice that they are not afraid to give a high speed to the cutters, which will be acknowledged to be one important point in wood-working. To do this and at the same time have a durable machine, they claim that the bearings must be of ample dimensions and be fitted with nicety, and indeed the appearance of these tools is scarcely inferior to those designed for working in metals. One of the best, simplest and

commonest tools is the band saw, and for some singular reason this is hardly ever used in America. It consists merely of an endless saw passing over two pulleys, one above the other, by which it is kept in tension and driven. One pulley is made adjustable so as to regulate the amount of tension, and is furnished either with a spring or a counterweight to allow of the expansion and contraction that necessarily occur from the heating and cooling of the saw when in use, without either causing the band to become loose and slip, or to snap from over-tension. The advantages of this tool are most obvious: as the motion is always in the cutting direction no time is lost in reciprocations, and for the same reason much more delicate work can be done with it, as there is no alteration of strain which would tend to break thin portions of wood, and, moreover, a fan is rendered unnecessary, as all the saw dust is carried down beneath the table. The pulleys generally have leather coating for the saw band to run on, though this is not always the case. The English are certainly ahead of us on this tool, for if, as I have heard it said, we have not been able to make it go, they have, and there is no shop of any consequence without it.

A good tool among those exhibited is a cross-cut circular saw for cutting off stuff to a gage, in which the saw moves up to the work instead of having to move the gage. This is very simply effected by placing the saw arbor with its pulley shaft placed below, so that as the upper end is moved forward or back, the length of the belt connecting the two is not affected and the small rise and fall in the position of the saw is of no consequence. This is made to move automatically by reducing gearing from the shafting, and in such a way as to give a quick return motion to the saw; but it would of course be equally possible to bring the saw up by a hand lever if desired, which would somewhat simplify the machine, though it cannot be called at all complicated.

In another machine the end of a circular saw arbor carries a slotting drill for mortising, acting on the same principle as those now so generally used for metal-working. The drill of course remains stationary, and the table on which the work is placed is moved back and forth by hand before it. This tool does its work very quickly and well, and only requires a second operation to square out the ends of the mortise, which is of course easily done under any of the ordinary tools for that purpose.

A tenoning machine capable of working at any angle is also shown. Two arbors, one above the other, with overhung tool heads, carry the cutters, and the work is traversed between them by a table with a gage by which the desired angle may be given to the plank.

Another good machine is one for planing at one operation the sides and edges of a piece of stuff. The arbors are made stout and of good length, and this allows the tool heads to be overhung without injury to the stability of the machine. The heads are forged solid with the arbors, but have a hole bored out of the centre of them which reduces their weight materially. The feed is driven by a friction gear, bearing against the face of a large disk, and this arrangement enables the speed to be varied while the machine is in operation, instead of making it necessary to shift the belt, as in some tools. For this purpose a screw is provided, by turning which the friction gear is brought nearer to the centre of the disk and so receives a slower motion from it. In this way the speed may be easily reduced from 25 ft. to 10 ft., when the workman sees a loose knot or anything that would endanger his cutters. This may also be used for tonguing and grooving staves for circular work. The arbors of the two tool heads working on the edges of the stuff are made so that they may be set at any angle, according to the width of the stave or the diameter of the cylinder of which it is to form a part, and the two are necessarily inclined at the same angle. Into the iron table of this machine, directly under the cutters for planing the upper side of the stuff, is dovetailed a piece of hard wood, its upper surface, being slightly rounded and rising by the amount of its curvature above the general face of the table.

A machine for cutting moldings either straight or curved, presents, I believe, no special feature not already familiar in America. It has a vertical arbor with a small head and cutter, so as to enable it to work on curves of short radii, and the work is traversed before it on a suitable table.

SLADE.

#### THE ALLEN-PORTER-WHITWORTH HIGH-SPEED ENGINE.

PARIS, June 11, 1867.

In one of my earlier letters I alluded to the Allen engine now at work in the Exposition, and promised to give a more detailed description of it at some future time. I will now redeem that promise and endeavor to explain the principles on which it is constructed. The distinctive feature which gives it its name is the arrangement of the valve gear for advantageous expansive working, the invention of a well known New York machinist of that name. Mr. Chas. T. Porter, who has undertaken to introduce it in England, has however combined in the engine a number of qualities which together tend to make a machine of unusual excellence. The first object that has been sought has been to produce an engine adapted to a high speed, and as the valve gear is a positive and not a detaching one it is particularly suited for this purpose. The advantages of high speed theoretically considered are quite obvious, since weight, space, and cost are all saved by setting a small engine working rapidly to do the work of a large one moving slowly. The difficulty however has been to produce an engine in which it was possible to maintain a high speed without a destructive wear and tear of the parts. A high speed engine must have no rattle traps about it, must have ample bearings and wearing surfaces, and all its adjustments must be such as to have no slack, though without the intro-