shot at the steps to the back workings, that the fearful casualty was due. Now, that the use of gunpowder does very much facilitate mining operations, is beyond question—the power is easily applied in the desired position, and the amount of work done with a given expenditure of manual labor is sufficiently large to satisfy the workmen. But, valuable as blasting agents are, in ordinary cases, it can be readily understood that, to explode gunpowder in the immediate neighborhood of so explosive a gas as that of fire-damp is, to say the least, anything but a safe operation, more especially when conducted, as it is in coal mining, in a comparatively small and inclosed area, from which escape is practically impossible. It cannot, therefore, be surprising that the desirability of abolishing the use of gunpowder in coal mining should have been acknowledged, or that so competent an authority as Mr. Geo. Elliot, M. P., for Durham, in his excellent address to the North of England Institute of Mining Engineers, should have pointed to the discovery of a means of superseding gunpowder in collieries as one of the most important that could be made.

Messrs. Jones and Bidder, of England, have made an invention, illustrated in the accompanying engraving, intended for breaking down coal, slate, and other minerals, without the use of powder. Instead of the usual blast, two or more wedges are caused to be driven consecutively by hydraulic or screw power between the surfaces of the substances to be broken down. The arrangement of apparatus for this purpose may be variously modified, but by preference they employ apparatus constructed as follows: Two tension-bars or rods, either formed of two separate pieces or of one looped piece, are inserted into the hole cut in the coal or other substance, the outer ends of which bars are connected to the cylinder of a hydraulic ram or press, or to the framing, or screwed nut or boss carrying a screw spindle. Between the tension-bars, at their innermost end, is placed a clearance-box, and then two metal pressing blocks, between which is afterwards forced first a single wedge by the action of the ram of the hydraulic press, or of the screw spindle; the ram or screw spindle is then withdrawn, and a second wedge is inserted, either between the one side of the first wedge and that of one of the pressing blocks, or the first wedge may be made as a split wedge, and the second wedge be driven between the two parts thereof. If requisite, a third wedge may, in like manner, be driven in, and so on until a sufficient wedging action is obtained to effect the breaking down of the mass desired to be removed. The wedges and pressing blocks may be formed either so as to cause the pressing blocks while expanding to retain at first a position parallel to each other by making these with inner inclined surfaces, similar to the inclined surfaces of the wedges, or they may be arranged so as to form from the commencement a gradually increasing angle with each other. The wedges can pass beyond the pressing blocks and into the clearance box, which thus allows them to impart a greater lateral motion to the pressing blocks than would be the case were the clearance box not employed; it may, however, in some cases be dispensed with when no great lateral motion is required. The ends of the tension bars are by preference made detachable from the hydraulic press for introducing the wedges consecutively. When the apparatus is worked by hydraulic power they prefer to construct the hydraulic press with the force-pump formed in one therewith or fixed directly thereto, and it may be constructed either with a closed receptacle containing the requisite charge of water for working it, or the water may be supplied through a suction pipe from a separate reservoir. This arrangement of apparatus may also be employed in some cases with effect with one wedge only, as by forming the pressing blocks parallel—that is, without inclined surfaces corresponding to those of the wedge, as heretofore proposed—they are enabled to obtain an expansion equal to the entire thickness of the wedge, instead of equal only to a small portion thereof, as would otherwise be the case.

The advantages claimed for the improved apparatus, in addition to the absence of the noxious vapors in the mine and the danger resulting from the use of blasting powder are—first, a great saving in the time employed in effecting the breaking down of the coal or other material, owing to the almost unlimited power which is available by their system, enabling them to break down at one operation far greater masses than can be effected by blasting; and, secondly, the avoidance of the great deterioration of the coal or other mineral which takes place when blasting powder is used, owing to the large quantities of small fragments or "slack" which are produced thereby.

In the annexed diagrams, Fig. 1 shows a part sectional side elevation of the apparatus; Fig. 2 shows a plan of the same; and Figs. 3 to 8 show details to an enlarged scale. Similar letters of reference indicate similar parts in each of the figures. A A are the tension bars of wrought iron, steel, or other metal capable of withstanding considerable tensional strain. These bars may either be formed of one piece bent round at *a* so as to form a loop, or they may be two separate bars connected together at *a*. These bars are inserted into a hole cut in the coal or other mineral, B, to be broken down in the manner shown, the ends thereof, which project beyond the face of the mineral, being widened out for the reception of the cylinder, D, of the hydraulic press between them, to which they are connected by T-heads formed at their extremities, being made to catch against lugs, *c c*, on a collar, C, secured to the cylinder. Before the tension bars are placed in the hole a clearance box, E, is first placed between them at the extreme end of the loop, after which the two pressing blocks, F F, are inserted, the sectional form of which blocks is shown more clearly at the enlarged section of Fig. 3; lastly, the two wedges, or the double or split wedge, G G, shown enlarged at Fig. 6, are introduced between the bars, A A, so that their points just enter the small interstice between the pressing blocks. The parts A, E, F, and G thus put together are then inserted into the hole in the material, B, and the hydraulic press, D, is connected to the bars, A A, as above described. The press, D, has a plunger, d d^1, the front part, d^1, of which projects between the tension bars, A A, as shown, and is formed either as shown in enlarged cross section at Fig. 4, or as at Fig. 5. To the back end of the press, D, is fixed the pump, H, worked by means of the handle, L, and inclosed in the reservoir, I, containing the water required for working the press.

The press being put in action the plunger forces the double wedge G forward between the pressing blocks, F, thereby forcing these asunder in an angular direction, and, consequently, causing them to exert a powerful bursting strain upon the sides of the hole. By forming the inner surfaces of the pressing blocks inclined, corresponding more or less with the taper of the wedge, this first expansion of the blocks may be effected in a more or less parallel direction instead of angular. The object of the clearance box is to allow of the points of the wedges being driven past the inner ends of the pressing blocks, so as to effect an increased expansion of these ends; where this is not required the clearance box may be dispensed with. The double wedge, G, having been driven into the required extent, the press is detached from the tension bars, A A, which is effected by first opening a passage of communication between the reservoir, I, and cylinder, D, by means of the screw, J, so as to allow the water to flow from the latter back into the former, after which the press is pushed forward slightly, so as to release the T-heads of the tension bars from the lugs, *c*, whereupon the tension bars are sprung open and the press removed. Another wedge, G^1, shown enlarged at Fig. 7, is now placed between the tension-bars, A A, so that its point fits into the space, *g* (Fig. 6), formed between the two parts of the double wedge, G. To facilitate the correct insertion of the wedge, for this purpose a handle, K (Fig. 8) is screwed into the rear end thereof, which is removed when the wedge is in position. The press is then again attached to the tension bars, and the wedge, G^1, is forced in between the two parts of the double wedge, thereby effecting a still greater expansion of the pressing blocks; and in like manner one or more other wedges may be consecutively forced in, as indicated at Figure 2, until the accumulated pressure thus produced is sufficient to break down the mass of coal or other material operated upon.

The invention can also be modified so as to employ screw instead of hydraulic power. The arrangement of the tension bars and pressing blocks is similar to that used with hydraulic power; but the hydraulic press is replaced by a frame wherein is a slot with a worm wheel in it, fitting with a female screw thread upon a screw spindle formed with flat upper and lower surfaces, and passing through correspondingly-formed holes in the bosses of the frame, so that it can move through but cannot turn in the latter. In gear with the wormwheel is the worm, the spindle of which is carried by brackets on the frame, the ends of the spindle being formed to receive a ratchet lever for rotating the same. The ends of the tension-bars are formed with lugs, which catch behind keys bearing against other lugs formed on the frame, so that the frame is by this means connected to and disconnected from the frame by merely inserting the keys, and without having to spring open the tension bars. As the projecting ends of the tension bar may thus be made considerably shorter than in the previously-described arrangement, this mode of connecting the tension bars might with advantage be employed in that case also. By rotating the worm wheel by means of the worm the screw spindle is advanced, and is caused to force the wedge between the pressing blocks, as in the hydraulic arrangement.

Messrs. Jones and Bidder do not limit themselves to the precise details described, as these may, of course, be variously modified without departing from the nature of the invention. Thus, for instance, where only one wedge requires to be driven in, the arrangement may be reversed—that is, the wedge may be placed at the inner end of the tension bars, with its point facing the pressing blocks situated at the front end, and which are then forced in by the press so as to cause the wedge to enter between them, or the wedge might, in that case, be drawn forward by the press against the pressing blocks; but what they specially claim is—first, the construction and employment of apparatus for breaking down coal, slate, stone, and other minerals, wherein two or more wedges are caused to be driven consecutively by hydraulic or screw power between the surfaces of the material to be broken down, in such manner that the pressure exerted at one and the same point can thereby be increased at will; and, secondly, the arrangement of tension bars connected in a readily detachable manner to an hydraulic press or frame carrying a screw spindle, operating in combination with pressing blocks and one or more wedges.

Singular Case of Poisoning by a Fly.

We learn from the Troy *Press* that Captain Green, of that city, Deputy Inspector of Boilers and Assistant Engineer of the Fire Department, about a fortnight since (August 25), was bitten by a common horse fly, which had been feeding on carrion, and had communicated the poison. The wound was on his right hand, between the thumb and index finger, and he soon experienced considerable pain, which gradually increased. The bite was at first supposed to be from a mosquito, and treated accordingly by a druggist, and afterwards by a physician. The pain and swelling continued to increase, and erysipelas setting in, a surgeon was consulted and pronounced it a bite by a fly. Medical treatment has succeeded in placing Mr. Green out of danger, but it will be a long time before he can recover the use of his arm.

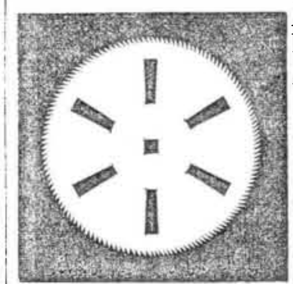
Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Oldest Circular Saw.

MESSRS. EDITORS:—I noticed in your valuable paper of September 11th an article entitled, "First Circular Saw," by Lemuel Read.

I have a circular saw in my possession which I obtained in the year 1827, and have kept it on account of its antiquity, as I was informed that it was the first circular saw ever forged in America. It was made in the year 1792 by Benjamin Bruce, of New Lebanon, N. Y. It is 12½ inches in diameter, and very different from saws in use at the present time, having an eye in the center 1⅝ inch square and six slots in the plate to keep the saw from heating when at work, thus the teeth are three to one inch, and filed about the same angle as a common hand saw. I am informed by an aged person, now living, that he came here in the year 1806, and there was at that time a circular saw in use for edging boards and sawing rims for spinning wheels, and had been in operation 3 or 4 years.



The idea of a circular saw for cutting boards was taken from a small saw first made of tin and used in a turning lathe by Amos Jewett, of New Lebanon, N. Y., a clock-maker; and he made use of it in cutting the teeth of wheels, which were V-shaped, for his clocks. I have conversed with him in my younger days upon the subject, but never ascertained the time to date his first experiment with circular saws. We have a large building standing in our village of which the covering and floors were edged and matched with circular saws in the year 1815 or 1816. So I think friend Read is not at the top in antiquity. GEO. M. WICKERSHAM.

Shaker Village, New Lebanon, N. Y.

[We remember to have seen and examined the Bruce saw a few years ago, when visiting the Shakers at New Lebanon. Friend Wickersham then called our attention to it as being probably the oldest circular saw in the country. If any of our readers can refer to one of earlier date we hope they will write us the particulars.—EDS.

Curious Antique Astronomical Watch.

MESSRS EDITORS:—The very interesting account in your paper of 21st August of the great astronomical clock of the Beauvais Cathedral, and also of the Strasbourg Cathedral clock, reminds me of an astronomical watch that I often delight to look at, which is no less remarkable in its way. A short review of its performances may interest your thousands of readers, as it is a curiosity of science and mechanism.

It is not one of those mere mechanical toys contrived to amuse the monarchs and other grown-up children of luxury of a century or two back, which, besides keeping incorrect time, when running at all, could be made (by touching certain springs or otherwise) to strike a bell or play a few bars of music, or display soldiers moving past a window in its face. On the contrary, this elegant watch, made in the highest finish and good taste, and without a tawdry ornament, is a perfectly reliable time-piece. It performs all its movements with the most accurate punctuality, showing the exact time of day, the hour, minute, and second, the month, the day of the month and of the week, the age of the moon, the moon's phases, the zodiacal and planetary phenomena of the present time, etc.

In outward appearance, it is a plain gold watch, with two enameled faces protected by crystals. Each face, with its own features, will be described separately. Its size is two and three eighths inches in diameter and about five eighths of an inch in thickness.

The principal face exhibits three dials, two smaller ones occupying opposite positions in the upper and lower halves of the greater dial. Above this face on the rim of the case, is the legend, in Roman capitals, "INCERTA EST HORA, AETERNA RESPICE," which may be rendered, *The hour is uncertain—look at things eternal.*

The outside edge of this face contains a circle divided into seconds, and traversed by an independent second hand once in every minute; while balanced on the same central point is another similar delicate hand which makes its circuit only once in two years! one end pointing to the months, the other to the twelve signs of the zodiac corresponding with each month in the year. The figures representing these signs are most exquisitely done in miniature, in black on the fine white enamel face, as is also the lettering of the names, in French, of the months.

The divisions and subdivisions of this and every other dial are spaced with geometrical precision, and the works perform their part so accurately that the point of each one of the twelve hands of this watch arrives at the proper instant exactly on or over its marked position, a proof of the superiority of the workmanship.

The upper small dial on this face has three hands pointing severally to the day of the month and the days of the week, in French, and their corresponding celestial bodies in the following order: The sun, the moon; the planets Mars, Mercury, Jupiter, Venus, and Saturn. The lower small dial on this face shows the hours and minutes in the usual manner of watches. Below this face, on the rim of the case, is the inscription, *Tempus rerum imperator*—"Time, the ruler of all things."

The opposite face of this superb watch presents the same general arrangement of three dials, but the larger dial is also divided into equal upper and lower parts, the latter enameled in black to represent night, with the moon, stars, etc. This dial is figured differently from modern dials, having 24 hours, 12 for the day and 12 for the night, with the subdivisions and hour and minute hands accordingly. On the case around the lower and dark half of this dial is the inscription, *Sapiens insipientibus sicut luna in nocte*—"The wise man to the ignorant is as the moon to the night." On the case around the upper half of the dial is engraved, in Italian, *Non vi son tenebre per chi creo la luce*—"There is no darkness for Him who created the light."

In the dark half of this dial is a smaller dial with hands showing the age of the moon, the moon's phases, and the day of the lunar month. The small dial in the upper half of this face has an index gage and pointing hand for regulating the grand movement, which controls the entire twelve hands and movements. Being also wound up as well as regulated from the outside, the works within are permanently closed from dust as well as excluded from prying and meddlesome curiosity, to which precaution we attribute its present perfect condition, being more than two hundred years old. The durability of watches when well made is very remarkable.

This valuable, complicated, and beautiful piece of mechanism is in perfect running order, and performs with astonishing precision in all its movements. It is a French watch, made by Robert et Courvoisier. It must have occupied many months, perhaps years, of time and labor in its construction, and though it is small and handy enough to be carried in the rich man's pocket, it is well worthy a high place in the cabinet of the gems of science and art. It is now the property of Mr. F. W. Chamberlain, 233 Hanover street, Boston.

F. H. F.

Steam and Hot-Water Pipes.

MESSRS. EDITORS:—In an article on the causes of fires in manufacturing establishments from steam pipes, etc., in your paper of the 4th inst., I notice the terms steam and hot-water pipes, are so commingled that one would suppose that they were so nearly alike as to produce the same results, the only real difference being a few degrees in temperature.

In a steam heater a portion of the water (at least that in the pipes) is converted into *steam* before the fixture operates, while a hot-water heater, properly constructed, is simply a circulation of water, filling boiler and radiators, warmed, but never reaching so high a temperature as to form steam, and working with the same pressure that is sustained by the lead pipes of the plumbing fixtures in our houses, consequently no more liable to explosion, and limited to a temperature of 200° at the boiler there is about as much danger of a plumbing job setting the house on fire as from a properly-constructed hot-water fixture.

My impression is, that in all the cases where hot-water pipes have been reported as producing the effects described they were in reality steam pipes.

To save the material requisite in the radiators for heating at a very low temperature is the inducement to use steam. If specifications for constructing hot-water heaters required that the requisite heat in the rooms warmed, say 70°, should be produced with not exceeding 200° at the boiler, there would be no such chemical action as Mr. Braidwood describes, or consequent danger from fire, not to mention the superior quality of heat obtained from surfaces at such low temperatures.

A SUBSCRIBER.

Baltimore, Md.

New Wall Covering.

MESSRS. EDITORS:—In the concluding remarks of Mr. Wight's paper on "Fire-proof Construction" in your issue of the 28th ult., the following remarks occur: "The stone slabs of Mr. Eidlitz are the only rigid material thus far used successfully with iron beams—they are doubtless the handsomest material that can be used for that purpose, but are open to the objection of being heavy and expensive"—it will be pertinent to our inquiry, therefore, to ask if there are any other rigid materials adaptable to this purpose, and possessing the desired qualities of lightness and cheapness. Further on, he remarks that "the cheapest material for wall covering in natural materials would be slabs of white marble, which would cost $1·50 per foot, and three coat plastering laid on iron lath $1·34 per foot." I would inform Mr. Wight that there is in use by the architects of the Southwest, a composition called by the inventor Lithomailite, produced by a method of hardening and marbleizing plaster of Paris, and giving it a high and durable polish. This, I think, is the desideratum in fire-proof buildings, with the material advantage over marble slabs and plastering, that it does not cost over one seventh the price of either of the above styles of finish. It can be put on walls or ceilings in ashlers to suit, at twenty cents per foot. An office 20x40—16 feet high, finished with marble slabs would cost for the walls alone $2,886, while both ceiling and walls could be finished in Lithomailite for $544. The imitations of precious marbles in it are inimitable. It is hard enough to shiver a door knob or key when slammed against it. It has the hearty indorsement of the leading architects of the South, and is the strongest and most elegant substitute for plastering that I have seen in a building during an experience of over thirty years.

G. W. LINCOLN.

Memphis, Tenn.

Explanation of a Curious Phenomenon.

MESSRS. EDITORS:—You are herewith offered an explanation of your "Curious Phenomenon," published a few weeks ago.

Subject: Jar cracked across the bottom. Jar leaks on hard, unpainted surface; is tight on painted surface.

A painted surface is tenacious; oil makes it more so. An unpainted surface is not tenacious; oil makes it less so. The former holds the jar together. The latter offered no resistance to the outward expansion of the bottom of the jar (caused by its own weight) and consequent opening of the crack.

Z.

Pittsburgh, Pa.

A Night Gun-Sight Wanted.

MESSRS. EDITORS:—Could not some one invent a contrivance for illuminating the sights of guns and rifles at night, so as to enable to shoot with certainty when dark? Everyone knows what difficulty attends taking aim with rifles when dark. Might it not be done by a small electric spark on each sight, produced by a miniature battery, concealed in the stock of the rifle or gun, and led to the proper place by a thin copper wire, covered with silk thread, and which could be removed or put on at pleasure?

I leave this idea to some inventive genius, and I have no doubt, by producing some simple and easy-managed contrivance, a patentee might make a good thing for himself and earn the thanks of many a sportsman and frontiersman, if not a glorious place in history.

FRONTIER.

New Mexico.

Railway Ties.

MESSRS. EDITORS:—In reading a recent answer to a correspondent in your paper, touching the life of oak railroad ties, stone ties, etc., a few practical thoughts, the result of 14 years' experience, suggested themselves.

The lasting of oak ties depends very much upon the manner of putting them down, and the condition of the wood at the time they are laid. Take a red-oak tie from the stump with all the sap in and it will not last *three years*; but if piled up and well seasoned before laying, it will last six years. The same remarks will apply to white oak.

There is often a great deal of carelessness on the part of the foreman of repairs in this particular.

Speaking of stone ties, I think the day is not far distant when wrought iron stringers will be used, broad on the surface, so as not to sink under pressure, and bolted together. There would be sufficient spring on such ties, and the rails can be thoroughly fastened to them. They would not present the rigidity of stone blocks, or fail in durability.

Belvidere, N. J. JACOB STONE.

Testimony of an Advertiser.

In a recent issue under the head of "Business Hints," we took occasion to speak of the value of the SCIENTIFIC AMERICAN as an advertising medium. We are frequently receiving evidences of the correctness of our statement from advertising patrons, an example of which we present herewith:

You are following my wishes. You may continue to advertise until I notify to the contrary. I have found during the short time I have had the cupola notice in your paper it has called the attention of iron founders to my improvement, and increased my orders and sales more than all the circulars I have ever sent, and I am compelled to believe and free to admit that the SCIENTIFIC AMERICAN is the best paper for mechanics to advertise in I know of. ABIEL PEVY.

Lowell, Mass.

(For the Scientific American.)

THE MANUFACTURE OF PLATE GLASS IN ENGLAND AND THE UNITED STATES.

BY THOS. LOCKWOODE.

It is curious to note, that while the glass manufacture in most of its forms has prospered in this country, and factories have multiplied almost without number, yet the manufacture of plate glass has been almost quite left out, and there is at present but one rough plate glass works in operation in the United States, and only one in process of erection.

We propose, therefore, to describe the processes connected with its manufacture in England, hoping that our efforts will be of some use, or, at any rate, will be of interest. There are at present six plate glass factories in England; namely, three at St. Helens, Lancashire—the British plate glass factory at Ravenhead, the Sutton Company, and the Union Company—one at Newcastle-upon-Tyne, one at London, and one at Smethwick, near Birmingham. The British company is the oldest established, having been in successful operation nearly 200 years, the manufacture having been introduced from Venice somewhere in the seventeenth century, and established at Ravenhead shortly after. Three of these British factories melt their "metal" in the Siemens furnace, a process which is also used by the works now in existence in Massachusetts. The process of melting and casting the glass may be familiar to some, but it will be new to most of our readers. The mixture was formerly melted for twenty hours in a pot or crucible, and then ladled out into another vessel called a "cuvette," which was placed by its side in the furnace. But this operation is now dispensed with, and the glass is cast direct from the pot after a melt of from fifteen to twenty hours. A description of one factory will necessarily be a description of all, and therefore we will give an account of the Birmingham factory from personal observations made at that establishment.

The casting house is a building of about one hundred yards long by twenty-five wide. The furnaces are in the center of the building and the annealing ovens are arranged along the whole length of the room on both sides. The pot room, mixing room, and coal sheds, are arranged conveniently around the outside of the building. The mixture being placed in the melting pot, by installments—three fillings being the usual number—is gradually melted down into a homogeneous mass; its perfect fusion is tested by dipping an iron rod into the pot, and drawing a portion of the metal out with it. When the metal is ready for casting, it is allowed to cool down for about an hour. The furnace is then opened and a pair of tongs arranged on wheels, is thrust into the furnace and made to clasp the pot, which is drawn out and placed on a carriage running on a railway to the casting table. The contents are skimmed until all the dross is removed, and the pot is then run up to the side of the table where it is lifted by a crane and tilted over on to the casting table, a large mass of cast iron, about twenty feet long, with side ribs to prevent the metal from flowing off. It is then rolled by a massive iron roller, and as soon as the plate is cool enough to admit of its being moved without crushing it, it is slid off into the annealing oven, which is just on the other side of the table. The table is also on rails, so as to admit of being moved from one oven to another. The plates, after being placed in the annealing ovens, are allowed to stay there, from a week to ten days—the longer the better. When taken out they are either taken to the grinding shed to be submitted to the second process or cut into proper sizes and sent away as rough plate, to be used as skylights, pavement, etc. The plate to be finished for lookingglasses, windows, etc., is then laid on a grinding bench, which may be briefly described as follows: The machinery is nearly all under ground, in a vault, which runs the whole length of the room. The driving shaft from the engine runs in this vault, and is supported by bearings between every bench. This shaft is horizontal and drives a vertical shaft by means of bevel gearing. The upright shaft carries a clutch for the purpose of starting and stopping the machine. The vertical shaft is in the center of the machine, the working part of which is ten feet square, and which has four corner shafts; each of the five shafts has a crank which, in turn, supports and moves a fly, which is literally a square of cast iron having long rods extending from it on both ends, which move with an alternate rectilinear motion, and with a kind of lateral swing at the same time. The glass is laid down and fixed with plaster, on firm stone tables, one on each side of this machine, and these connecting rods move runners over them at a rate of sixty revolutions per minute. The runners are composed of a wooden framework, faced with either iron plates, or with another plate of glass, and sand and water are thrown between the two surfaces by a boy until the whole is sufficiently ground. The Birmingham company have in operation twenty-six grinding machines, which turn out a total weekly product of upwards of twelve hundred feet of glass. It should be stated that after the sand grinding, emery of three different degrees of fineness is used before the plate is taken up. When the glass is fully ground it is raised up and taken to the smoothing shop, where it is smoothed. Formerly this operation was performed entirely by hand, the plates of glass being laid one upon another, having courses of emery running from No. 4 to No. 7 between them, and being plentifully supplied with water. This operation is very similar to grinding, but is a great deal finer and slower. It is now almost universally performed by machinery, the machine being on the same principle as the grinder, but with a speed of only fourteen revolutions a minute, whereas the grinder has sixty. When the glass is smoothed it is taken to the polishing shop, where the finishing process for window plate is given. In the polishing room the glass is again laid on tables and the polishing is performed by means of two bars, which run longitudinally over the glass, carrying blocks which are covered with felt; the table on which the glass is fixed by means of plaster, at the same time traveling, alternately from right to left, and *vice versa*. The glass, during the process, is sprinkled plentifully with a mixture of the red oxide of iron and water until sufficient polish is given, when the plate is taken off and taken to the warehouse, or, if required to be silvered, it is carried to the silvering room, where that process is performed. However, this process is so well known that it is needless to describe it. Large quantities of this glass are sold in the country and much of it is also exported. So much for British plate glass.

We will now turn to the American side and see what is the progress of plate glass there. Some fourteen years ago an attempt was made by a New York company, to commence a factory at Williamsburgh, N. Y., and one or two plates, were really cast, but the enterprise failed. A short time after a couple of window glass blowers and a few capitalists made the attempt at Chelsea, Mass., and shortly after at Lenox, in the same State, still in operation there, and the one alluded to above. It was attended with a large measure of success in the casting of rough plate. Some years ago they commenced experiments with a view to polishing, and a gentleman from Chicopee, in conjunction with some of the stockholders of the company, have patented an invention for that purpose, but from some cause or other they do not seem to be making much progress. Last year they commenced using the gas furnace of Siemens, and are still using it. For a long time the Lenox works was the only establishment of its kind in the United States, but now a rival is to appear on the scene. This is situated at New Albany, Ind., and is owned by Capt. J. B. Ford, a gentleman whose public spirit has done much for that city. He has already set in motion several founderies, glass and other factories, and last winter turned his attention to plate glass. He is about to commence its manufacture on a large scale, and the buildings for that purpose are far advanced towards completion. He expects to make glass by the middle of October. Mr. Bankard, one of the original plate-glass makers of Lenox, has been engaged by Capt. Ford to superintend the making of his glass. Capt. Ford intends to commence polishing immediately, on the European plan, and to effect this has ordered several machines from St. Helens, England, and has the services of an experienced glass polisher from that country. The word fail is not in Capt. Ford's dictionary, and this enterprise cannot fail of success.

As soon as this enterprise gets fully under way the readers of the SCIENTIFIC AMERICAN are promised a detailed account of the establishment.