

Who will look upon the temples and tombs of Memphis and of Thebes, dating 2,000 years still further back, or 5,000 years before our era, and say that the people who built them werenot "civilized?" Even the orthodox Bunsen, upon study of them, abandoned the, till then, implicitly received Mosaic or biblical chronology, and was compelled to relegate the genesis of man back to 20,000 years B.C. ("Aegyptens Stelle," Bd. V., Th. V., pp. 342, 359.) How many thousand years Egypt must have taken to arrive at the stage of civilization in which Mariette, Lepsius, Renan, and Bunsen show her to have been seven thousand years ago, we have no means of knowing.

I would also ask what is to be done with the fossil man of Denyse, of Mentone, of the Neanderthal and other locales; of the remains of man found commingled with those of the cave bear, the woolly rhinoceros, and other extinct mammalia of the diluvium, and so commingled as to leave no room to doubt their cotemporaneity? What explanation can be made of the discoveries of Wokey Hole, Kent's Cavern, the Cavern of Aurignac, the Trou de Frontal, and the numerous other bone caves of France and Belgium; of all the labors of Schmerling, Sprung, Baer, Vogt, Boucher de Perthes, Lartet, l'abbé Bourgeois, Lyell, and Lubbock?

Were Professor Newcomb less eminent as a man of science, or had his opinions appeared in some journal less prominent as an educator than the SCIENTIFIC AMERICAN, I should hardly take the trouble to call attention to them; but coming whence and through the medium that they do, they are well calculated to do harm by conveying false impressions to the many hundreds of readers who look to your journal solely for accurate information on all scientific topics.

Respectfully,

FRANK L. JAMES, Ph.D., M.D.

Osceola, Ark.

A New Flying Machine.

The first open air exhibition of Professor C. F. Ritchell's flying machine was conducted at Hartford, Conn., on Wednesday afternoon, June 12. It went up to a height of fully two hundred and fifty feet, past the spire of the Colt Memorial Church, and sailed off until over the Connecticut river, the operator meanwhile exhibiting his power to change its altitude and direction at will. When he ascended there was but little wind blowing, and the machine appeared to be under perfect control; but gradually a breeze sprang up, and it was deemed safest to make a speedy return, as there were indications in the sky of a gathering storm. The machine turned and made its way back in the teeth of the wind until directly over the ball ground whence it had ascended, and then alighted within a few feet of the point from which it had started.

From this demonstration of its capacity it was generally conceived that it could do much more than its modest inventor claimed for it. He never expected it to move against a wind of any strength, and has not had the attainment of that end in view in its construction, as may readily be seen by a glance at its proportions, but he does claim that it can be raised or lowered at will to leave adverse currents and enter favorable ones; that it can be made to tack so as to effect a little headway even against a breeze, and that in a still atmosphere it can be moved about as readily and perfectly at the will of the operator as a boat can be moved upon quiet water. All that, and even a little more, there is abundant evidence of its having done on Wednesday.

The inventor, Mr. Ritchell, is a Maine man, but has during several years past lived at Corry, Pa. The project of constructing a flying machine has been a favorite subject for contemplation with him during nearly ten years past, and for the last seven of that time he and his friend, Mr. W. H. Lyman, of Corry, Pa., have incubated his idea together. In November, 1876, they went to Bridgeport, Conn., to put their plans into execution, as they believed they could there obtain most readily just the peculiar materials they required, and have them put together in the most perfect manner. Their confidence in Yankee resources and skill was not misplaced, but their crude ideas were not immediately crystallized into a perfect machine, nevertheless.

In the first apparatus which they constructed, some parts were too heavy, others too large, and there was an ineffective application of power. Then a second one was built, that now upon exhibition, and though it cannot be said to be so far perfected as to be capable of application to practical service, such as serving a mail route, or even as a popular vehicle for travel, it is still of very great importance as proving the correctness of the theories upon which it was based. Mr. Ritchell took it to the Permanent Exhibition at Philadelphia, May 10, 1877, and so succeeded in effectually concealing it from public knowledge for a long time. Now he has put it into the proper course for either securing its development or making it a worthy pioneer for other inventors in this branch of science.

The flying machine is all clumsiness above, all lightness and grace below. The lifting power is afforded by a horizontally placed cylinder of "gossamer cloth," fine linen coated with India rubber, twenty-five feet in length and thirteen in diameter, weighing only sixty-six pounds, and charged with hydrogen gas, which is made by the usual process from iron turnings and sulphuric acid. Broad worsted bands extend over that and down to a rod of mandrel drawn brass tubing, nickel plated, 1½ inch in diameter and 23 feet long. From that rod the machine is suspended by slender cords. The after portion of the machine is at the

base a parallelogram of rods 2 feet wide and 5½ feet long, from which rise, lengthwise, curved rods 18 inches high in the center, and drawn near together at the top. All these rods are in reality hollow tubes of mandrel drawn brass, light and very strong. Above the apex of this form rises a cog edged steel wheel, 11 inches in diameter, with double handles so geared to a four bladed fan moving horizontally directly beneath, that the operator can give the fan 2,000 revolutions per minute. The four blades of the fan are of white holly, each having a superficial area of about 50 square inches, and the extreme diameter of this revolving fan is 24 inches.

The blades are set at a slight angle, like those of a screw of a propeller. Just behind the wheel is a very small seat, upon which the operator perches. His feet rest upon two light treadles above and in front of the fan. From the front of this form spring other rods, carrying at their extremity a vertically working revolving fan, like that beneath the operator's seat, except that it is but 22 inches in diameter. It is so geared to the main or horizontal fan that it may be operated or not, at the pleasure of the driver of the machine, and can be made to turn from one side to the other, so as to deflect the course of the machine in the air. This fan will make 2,800 revolutions per minute when the other is making 2,000. All its movements are controlled by the operator's feet. When he presses the left treadle he throws it into gear, when he presses with the toe of his right foot it turns to the left, and a slight pressure of his heel whirls it over to the right. He can also reverse the action of his main fan, so that when it whirls one way he goes down, and when its course is reversed he mounts in the air.

That this is not merely a claim, has been clearly demonstrated. Then the weight of the operator and machine and the lifting power of the gas cylinder have been so nicely adjusted that they were exactly balanced; six pounds have been added to the weight of the machine, and the working of the horizontal fan has caused the apparatus to rise and continue to ascend as long as the lifting power of the machinery was exerted. The weight, normally, of the machine, and the rod from which it is suspended, is 48 pounds. This, then, gives 114 pounds as the weight of the entire apparatus. The operator, Mark Quinlan, who went up on Wednesday and again yesterday, weighs 96 pounds, and to balance him and the dead weight against the lifting power of the gas, he had to carry along with him about nine pounds of shot and stones.

The second exhibition was given June 13. The weather was far from favorable. The wind came in quite sharp gusts, and there were threatenings of a coming storm. Nevertheless, the ascent was made. Little Quinlan, even if he does only weigh ninety-six pounds, has confidence and nerve enough to go up in a gale. Some time was spent in getting the weight and lifting power so neatly balanced as to show that the machine could exert a lifting power of its own. When this had been effected to Professor Ritchell's satisfaction, the apparatus rested quietly on the grass, but could be lifted or set back with the light pressure of one finger. Then the word was given to "Go." Quinlan began turning the wheel, the horizontal fan revolved with a noise like a buzz saw, and the machine darted up almost vertically to a height of about two hundred feet. There a strong, steady current of wind setting toward the southwest was encountered, and the machine was swept away by it, broadside on to the spectators. Then the operator was seen throwing his vertical fan into gear, and by its aid the aerial ship turned around, pointing its head in whatever direction he chose to give it. All this was the work of but a few seconds. Although Quinlan could move the apparatus about, he could not make any headway against the strong wind. Reversing the motion of his horizontal fan, he descended apparently about one hundred feet, to get out of the current, but, finding that impracticable, reascended to a much greater height than he had first reached. Still he was swept off toward New Haven, and after a little time went out of sight. He had vanished behind a distant hill, and for a while it was supposed he had alighted. Then he was again sighted, far away and not less than one thousand feet above the earth. The cylinder of the machine looked no larger than an orange. At length he disappeared altogether.

At 6¼ o'clock P.M., having been up battling with the wind very nearly an hour, he descended safely at Newington, and at 10 o'clock was back in Hartford. He said that at one time he was eight or ten miles away from his starting point, but by tacking and working between the gusts of wind, won his way back as far as Newington, only five miles from Hartford. He says that the working of the machine is so easy that he could continue it for four consecutive hours, without fatigue, in a quiet atmosphere.

Mr. Lord, the Superintendent of the Colt Arms Factory, has watched the experiments with much interest, and his opinion as a practical scientist is of value. He says that while he does not see an immediately practical use in this flying machine, he cannot but regard it as a great step in progress, one which should be recognized as of immense importance and encouragement for hope of speedy good results in the way of aerial travel.—*New York Sun.*

The Musical Phonograph.

Professor Johnson lately exhibited in this city a new instrument supplied by Mr. Edison, which reproduced Levy's "Last Rose of Summer," the "Carnival of Venice," etc. Every ear was on the alert to listen to the performance of the phonograph. Levy came in front of the mysterious

thing, and blew a blast on his bugle horn strong enough, as it would seem, to blow the whole concern out of existence, and when he subsided Professor Johnson reversed the crank, affixed a sort of horn to a disk on the cylinder, and out came all of Levy's music, with all his variations, to the last note. The wonderment and delight of the audience were great in the extreme, and they applauded the articulating phonograph as if it were a living and breathing thing. When Miss Cole sang to it "Comin' thro' the Rye," there was intense curiosity to hear how it would be returned, as her voice has a birdlike quality in the upper register that it was thought impossible for the phonograph to counterfeit. When Professor Johnson turned the crank Miss Cole herself sat petrified in astonishment as she heard her very trills imitated by the insensible piece of machinery before her. Of course the song of the phonograph was nothing to that of Miss Cole, because the voice was metallic and without the attributes of flesh and blood, but its close rendition of the words and accent was really marvelous to hear.—*New York Herald.*

NOTES FROM THE PARIS EXHIBITION.

Mr. Patrick Adie, Broadway Works, Westminster, London, shows in operation the Fraser type-setting and distributing machines. In the composing machine there are long lines of vertical type discharging at the end into vertical gutters converging to a point below; a keyboard causes any required letter to be advanced from its line and to slide down its gutter into the common destination at the bottom—the "stick" or "galley." Thus a long line, or a number of short lines, may be rapidly set up; but there is the great disadvantage that except for figure work, poetry, or similar "takes," the lines must be justified by hand. The distributing machine, which is the reverse of the composer, seems but little improvement over handwork. A speed of 10,000 types (not ems) per hour is claimed; but we should hardly feel inclined to admit such speed, at any rate for more than a short run, and with a "fat take" and practiced hands.

Messrs. Gwynne & Co. show a line of centrifugal pumps for wrecking purposes, etc., and some centrifugal gas exhausters. In the former we note the abandonment of the foot valve and the addition of a small air pump of the reciprocating type, to take its place. There is a pendent self-oiling tube from the center of the shaft, performing the same office as that employed in the "Buckeye" engine, and of somewhat the same construction. The slide valve eccentric on the gas exhauster is shiftable, and an index pointing to abscissas scribed on its plane face indicates very neatly the amount of alteration.

Thomas Winans.

Mr. Thomas Winans, eldest son of Ross Winans, the well known inventor of the modern railway coach, recently died at Newport, R. I. Mr. Winans served his apprenticeship in his father's shops, and at twenty years of age he went to St. Petersburg, Russia, with a locomotive engine of his father's manufacture and pattern, to compete for the equipping of the then new Nicolai railroad. He was fortunate enough to secure the contract, and this led to his undertaking other public works in Russia, which proved so lucrative that in 1850 he returned to the United States with a fortune of ten million dollars.

It is said that he spent a fifth of this vast sum in making experiments, mainly of a mechanical nature, for his own amusement. He designed and built a cigar shaped vessel, by which he undertook to revolutionize modern notions of marine architecture; at the outbreak of the war, he devised a gun in which bullets were to be projected by steam instead of by gunpowder. He also attempted a new method of ventilation, for which he erected many curious structures, including a huge chimney some 100 feet high. His last efforts were directed toward the fitting up of large organs, to be operated by steam and hydraulic pressure. Mr. Winans died at the age of 58 years.

RAILWAY MILEAGE.—The Cleveland, Columbus, Cincinnati, and Indianapolis railway claims the most remarkable locomotive mileage on record, one of its engines having run 44,526 miles in nine months, or at the rate of 72,000 miles a year. This is more than double the average of the best roads. The engines of the Union Pacific averaged 34,248 miles last year. The record of five engines of the New York Central and Hudson River road shows that their average yearly mileage for seven consecutive years was 46,776 miles, at an average cost for repairs of 2.44 cents a mile; one engine running over 323,100 miles at an average of 1.87 cent for repairs.

A GREAT LOG DRIVE.—Over a thousand choppers were engaged along the Upper Connecticut last winter, and the largest log drift ever driven on that stream has just been got safely home. The drift was started early in April in charge of 250 trained drivers from Maine, New Hampshire, and Quebec, and high water enabled the crews to complete the work in an unusually short time. Of the forty millions constituting the drive, ten millions stopped at McIndoe's Falls, Vt., ten millions to Southern Massachusetts, and the remainder to Hartford.

ALABAMA CORUNDUM.—A correspondent writes us that large quantities of corundum, for emery wheels, are shipped from Tallapoosa county, Ala., to Massachusetts.

American Trade with France.

Consul Bridgeland, at Havre, reports a large increase in the demand for American grain and provisions in France. The general substitution of corn for oats in feeding tramway and cab horses has increased the demand for this grain to double what it was a year ago. The demand for wheat has also increased. Our principal exports of provisions to France are bacon, pork, lard, tallow, and beef. The shipments of bacon have doubled, and of lard have trebled, those for the corresponding period of last year. The shipment of fresh beef is also an important item, nearly half a million pounds having been received at Havre between November and May.

IMPROVED SHEARS FOR MARKING STOCK.

The accompanying engraving represents an improved instrument for marking the ears of cattle, so as to enable them to be identified. It consists of three plates or jaws, provided with three handles, and combined as shown. On the faces of the outer jaws are grooves to receive blocks, by which the cutters, one of which is shown separately at A, are held in place. The holders are secured in place by bolts provided with hand nuts. The cutters may be made straight or curved, so as to make different shaped marks, or the latter may be varied by different adjustments of the cutters in the holders. Patented April 30, 1878, by Mr. William Wright, of Warrior Station, Jefferson county, Ala.

New Telephone Diaphragm.

M. Louis Olivier has lately devised a form of telephone which differs from the ordinary Bell apparatus chiefly in the shape of its diaphragm. This, instead of being a merely circular plate, is concave, of unequal thickness and elliptical in shape. Its general plane is also inclined to the axis of the instrument. It is attached by the edges, and a thread of silk is fastened to it at its thickest part. The inventor states that the idea is to imitate the construction of the drum of the human ear more perfectly, and that the timbre of the voice is preserved by the improved diaphragm with great accuracy.

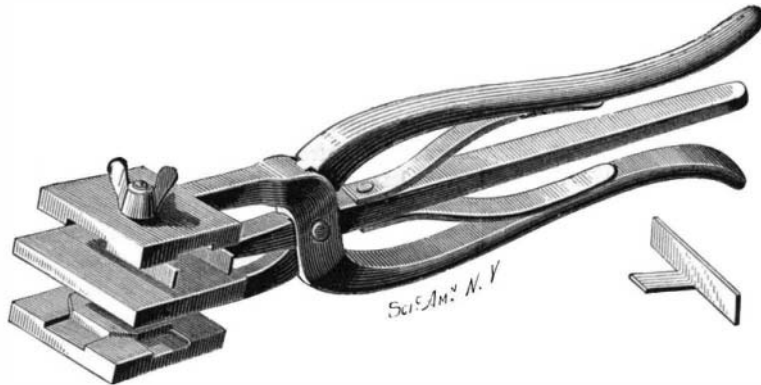
FILE SHARPENING BY THE SAND BLAST.

It is not possible to cut file teeth to perfect chisel shape by ordinary cutting processes. There is always a burr thrown up by the entry of the cutting tool, which gives the teeth a backward curve, as shown in section at A, Fig. 2. It will readily be understood how, in course of use, this burr breaks off, taking with it a portion of the edge of the tooth and leaving the latter rough and jagged, while the detached portions frequently clog the grooves, causing the file to scratch and pin. The remedy for dull files is recutting, but this costs nearly as much as it does to replace the tool with a new one, the metal is greatly reduced in grinding off the old teeth (this is especially the case with rasps), and the temper of the tool is often impaired, or warping or cracking is caused. As a matter of practical fact, consequently, it may be said that dull files cannot be sharpened, to any advantage, by recutting processes.

Latterly, however, an ingenious application of the sand blast has been made to this purpose, and, as appears from samples of work exhibited to us, with remarkable success. The sand blast, as all are aware, consists of a stream of sand driven by steam or compressed air with sufficient force against any hard resisting material to abrade the latter. The adaptations are numerous and valuable, and it may be said to have revolutionized the art of glass engraving. Its employment for file sharpening, and not only to this but to the sharpening of all edge tools, even to razors, is entirely novel, and we are inclined to think it of more than ordinary importance. A moment's consideration will show that there is really no difference between grinding metal with sand compacted in the solid form of the grindstone or with the same material in the finely pulverized condition, impelled by air or steam blast; but it will further be seen that the sand blast has capabilities which no grindstone or grinding process can in any particular equal.

Referring to Fig. 2, at A, we have represented file teeth

as ordinarily cut; at B, the teeth are regular and perfectly chisel shaped, and the difference is clearly apparent. The mode of changing one form of tooth into the other simply depends upon directing the sand blast against the back of the teeth at an angle of from 10 to 15 degrees to the tanged end of the file. Naturally, however, it will be asked why the blast has, as it obviously must have, a selective action; that is, why it does not cut away the tooth uniformly, with the apparently unavoidable result of dulling instead of sharpening the tooth. Here, however, comes in one of those exceedingly neat performances which are always a pleasure for the mechanic to appreciate. The effect of the sand blast is in some measure proportionate to the resistance offered. Thus, a layer of rubber varnish or even a piece of paper will turn a blast which cuts into the hardest stone, simply because the particles rebound from the elastic surface. Now, a tooth from its wedge shaped form may be regarded as

**SHEARS FOR MARKING STOCK.**

offering a constantly decreasing resistance from base to point, the latter becoming, as it were, more and more spring like. The consequence is that while the sand cuts, say, with full force into the resisting base, its force is decreased by the yielding and elasticity of the point. Hence more metal is abraded at the base than at the apex, and the obvious result is that the point is ground away in very much less ratio of rapidity than the body of the tooth. Hence the latter must have at all times a keen edge. It is, furthermore, an obvious corollary that repetition of the process cannot affect the result. A file may be used until dulled, subjected to the blast again, and the teeth are at once restored to their former shape, and this may be continued as long as the teeth preserve their general shape.

The process is equally applicable to the dead smooth file

same time is moved forward, with also a to and fro side-wise motion. Sand and water from the bucket below is impelled upon each side of the tool by the steam from the pipe, C, entering the injector nozzles at D. The jets mingle and enter the large inclined tube, out of which the water and sand run back into the pail.

When dead smooth files or delicate edge tools are to be sharpened, the pipes to the nozzles are raised, so that water holding but little, and that the finest, sand in suspension is injected, and in this way, by lowering the inlet, the quantity of sand taken up, and hence the abrasive force of the blast, may be varied.

The inventor informs us that many shops in Bridgeport, New Haven, Hartford, and other New England manufacturing towns are availing themselves of the process at a large saving of expense. The Nicholson File Company of Providence have also contracted for its application to the files manufactured by them. For further particulars relative to licensing, etc., address the patentee, Mr. Milo A. Richardson, Bridgeport, Conn.

New Agricultural Inventions.

In an improved Churn, the invention of Mr. G. W. Jones, of Farmington, Ky., the apparatus for reciprocating the dasher consists of two differential pulleys and adjustable levers and connecting rod, whereby power and speed may be varied, as required by the condition or quantity of the cream to be churned at a given time.

Mr. John Clayton, of Brainerd, Minn., has invented a Wheel Attachment for Plows, for which it is claimed that the construction is such as to admit of adjustment for use with different kinds of plows, and to cut any desired width and depth of furrow; that it will cause the plows to work at uniform depth, and hold them to their work without attention from the plowman, except at the beginning of a furrow.

Mr. D. G. Rich, of Sand Bank, N. Y., has patented an improved Milking Pail, the cover of which is made with a central strainer of gauze wire, having about its edges a raised and flaring funnel which is permanently fixed to the cover, and into which the stream of milk is directed.

Messrs. G. F. Newell, Sr., and Joseph Croft, of Osseo, Wis., have made an improvement upon that form of grain separator in which the mixed grain and impurities are passed over a perforated screen by the frictional contact of a revolving endless apron. It consists in arranging the screen at an incline, to facilitate the passage of the grain, and in combining therewith a peculiar tension-adjusting device,

which serves to keep the apron tight and flat down against the grains on the surface of the screen, to prevent the cockle grains from jumping the holes, as they would, in passing down the incline from their own momentum, if the apron became loose and baggy and only touched the grains at certain points.

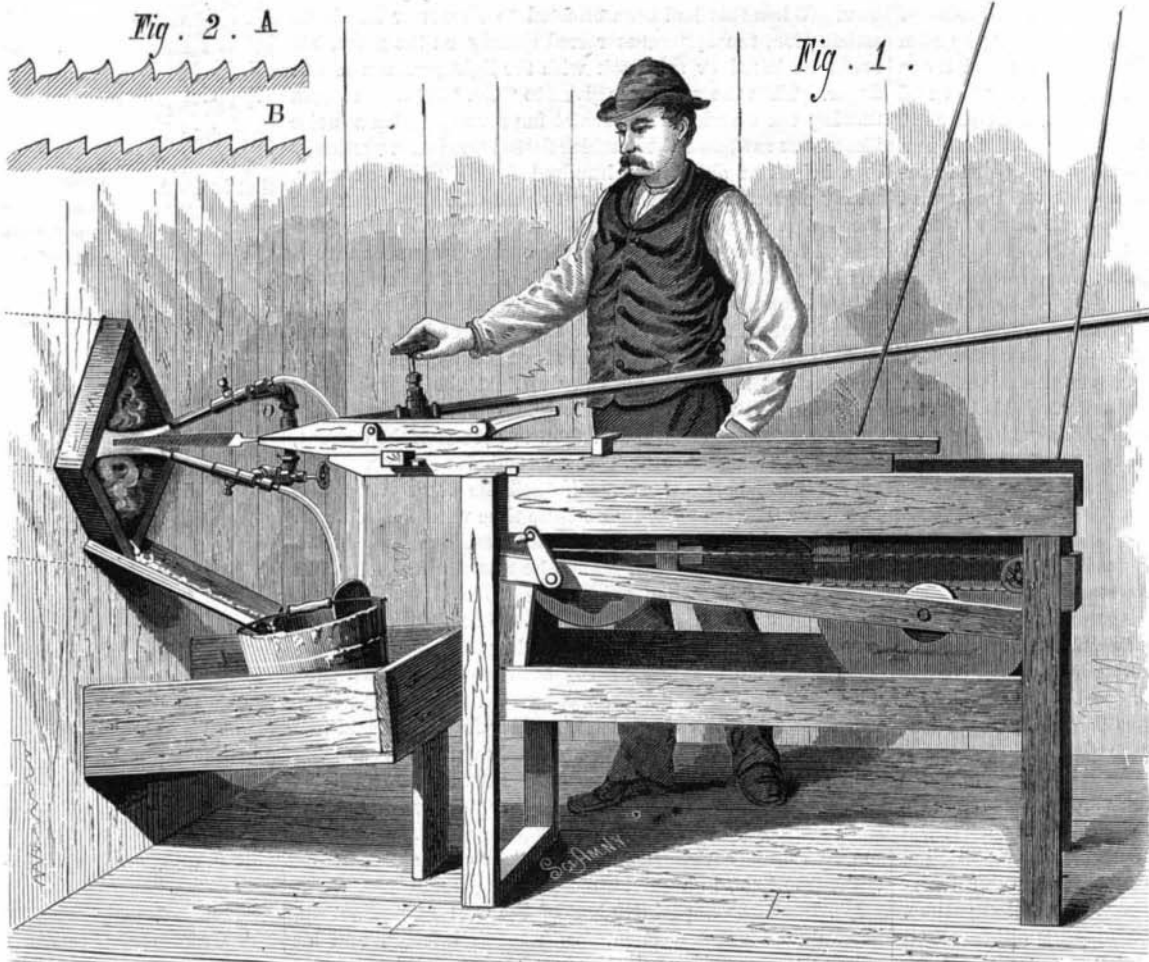
Mr. John Wisda, of Defiance, Ohio, has devised an improvement in the Braces of Thrashing Machines, and for holding similar large and heavy machinery steady while being used. The brace is formed of a base bar having a hook which is hooked upon a wheel of the machine, and having notches upon its upper side, into which the lower end of an inclined bar is placed. The upper end of the latter is pointed and rests against the frame of the machine, and is secured by a hand screw.

A new Cultivator, invented by Mr. D. L. Wellman, of Frazee City, Minn., has the advantage of a form of construction which permits considerably increased width without impairing its strength or making it unduly cumbersome and heavy.

In a new Plow, the invention of Mr. J. Oldendorph, Jr., of Waterloo, Ill., the special feature is the mode of

securing the handles to the iron beam, so as to firmly brace them against vertical strain. This is effected by an arrangement of braces which bear upon the beam, mouldboard, and handles, binding the parts securely together.

MOTHER-OF-PEARL may be polished with finely powdered pumice stone which has been washed to separate the impurities and dirt, and then finished with putty powder and water applied by a rubber, which will produce a fine gloss.

**FILE SHARPENING BY THE SAND BLAST.**

or the coarsest rasp, and the temper of the tool is in no wise injured. The inventor informs us that a new file sharpened by the sand blast has outlasted six others of the same make and size not so sharpened, and has displaced fifty per cent more metal with the same number of rubs, and the inventor further claims that an old worn out file resharpened by the blast will do more service than any new file not so treated.

The simple apparatus used for applying the blast is represented in Fig. 1. The file is suitably held, and at the