at first ridiculed; the idea of a shot rising was preposterous and contrary to the first principles of dynamics. One might as well expect Newton's apple to rise in the air instead of tumbling to the ground. Facts, however, are stubborn, and it was asserted that, although theoretically it should not, practically the shot did rise. The first careful experiments in this direction made in this country were carried out by the late Ordnance Select Committee in 1864. The 12-pounder breech-loader rifled gun of eight cwt. was fired with an elongated shot of 11½ lbs., and a charge of ½lb., at an upright wooden target of forty yards. The gun was laid with the axis of the bore truly horizontal, that is, parallel with the ground, and the exact level of the center of the muzzle was taken on the target by a theodolite. Theoretically, the shot would fall by gravity in passing over the forty yards, and its center should have struck about two inches below the level; practically, however, it was found to strike ten inches above it! This fact once established beyond all doubt, many theorists set about accounting for it; their speculations, however, cannot here be recapitulated. The probable explanation is that the recoil is sensibly felt before the shot has left the gun, and that the resultant of the forces acting on the gun and carriage tends to throw the muzzle up—thus the projectile, although seemingly fired point blank, really leaves the gun at an angle. With the 12-pounder breech-loading gun this angle was found to equal about thirty minutes, while with the 9-pounder muzzle-loading Indian gun it equals only about thirteen minutes. The difference is probably due to the projectile taking a longer time to pass through the bore of the breech-loading gun. It may be mentioned that when the gun is swung as a pendulum and fired with its axis horizontal the shot strikes below the level.—*London Globe.*

Well Boring and Pumping Machinery.

An interesting paper on the above subject was recently read before the Institution of Mechanical Engineers, at Birmingham, England, by William Mather. In the operation of excavating boreholes for wells and other purposes, the principle adopted and carried out by the writer for all depths of boring has been the use of a rope for working the boring tool in the hole; and this principle obviates the serious expense and delay attending the plan of using rods for working the tool, when great depths of boring have to be executed. In the plan described in the paper, the boring tool is worked by a flat hemp rope, which is wound around the drum of a winding engine, and on quitting the drum passes over a large pulley carried in a fork at the top of the piston-rod of a vertical single-acting steam cylinder. The boring tool having been lowered by the winding drum to the bottom of the borehole, the rope is clamped secure at that length; steam is then admitted underneath the piston of the vertical cylinder, and the tool is lifted by the ascent of the piston-rod and pulley; and on arriving at the top of the stroke the exhaust valve is opened for the steam to escape, allowing the piston-rod and carrying pulley to fall freely with the boring tool, which falls with its full weight to the bottom of the borehole. A cushion of steam prevents the piston from striking the bottom of the cylinder, and the steam and exhaust valves are worked by tappets on a plug-rod; a rapid succession of blows is thus given by the boring tool on the bottom of the borehole. The boring tool is composed of a number of chisels or cutters, fixed in the cast-iron head at the bottom of the long wrough-iron boring bar, which is guided vertically in the borehole by a couple of collars; and it is made to rotate a little between each blow, so as to strike in a fresh place each time, by means of a simple self-acting arrangement. The lifting shackle at the top of the boring bar is allowed to slide up and down through a short distance on the neck of the boring bar between two fixed collars; the upper face of the lower collar is formed with ratchet-teeth, and the under face of the top collar is formed with similar ratchet-teeth, but set half a turn in advance of the teeth on the lower collar. The intervening boss of the lifting shackle is also formed with corresponding ratchet-teeth on both its upper and lower faces, these teeth being in a line with one another. When the boring tool falls and strikes the blow, the lifting shackle, which during the lifting has been engaged with the rachet-teeth of the top collar, falls upon those of the bottom collar, and thereby receives a twist backwards through the space of half a tooth; and on commencing to lift again, the shackle rising up against the rachet-teeth of the top collar receives a further twist backwards through half a tooth. The flat rope is thus twisted backwards to the extent of one tooth of the ratchet, and during the lifting of the tool it untwists itself again, thereby rotating the boring tool forwards through that extent of twist between each successive blow of the tool; and this turning is found to be quite certain and continuous in action during the working of the tool. When a sufficient quantity of material has been broken up at the bottom of the borehole by the blows of the tool, the working of the percussion cylinder and pulley is stopped, the rope unclamped, and the boring tool wound up with great rapidity by the winding drum. A shell-pump is then lowered down the borehole by the rope, consisting of a long cylindrical shell or barrel, with a clack valve at the bottom opening inwards, and a bucket, containing flap valves opening upwards. The rope is attached to the bucket, and when the pump reaches the bottom, the bucket is worked up and down by the rope several times, so as to draw in the broken material through the bottom clack; after which the pump is drawn up again with the material contained in it, and the boring tool again lowered into the hole for continuing the boring. In the event of accidents from breakages or from any of the implements sticking fast in the borehole in rising, grappling tools with hooked claws of suitable shape are employed for laying hold of the obstacle and raising it; or if it cannot be brought up by this means, a solid wrought iron breaking bar, of very great weight is lowered into the hole, and allowed to fall upon the obstacle from a sufficient hight to break it up into fragments, which are then raised either by grappling tools or by the shell pump.

Ransome's Induration Process.

We learn from *Engineering* that Mr. Ransome's method of waterproofing walls by means of successive solutions of silicate of soda and chloride of calcium, which has been applied with so much success to many public and private buildings in England, is being used extensively in India to arrest the decay of many brick structures upon railways in that country. Among others it mentions the Waree Bunder Works, upon the Great Indian Peninsula Railway, which were constructed of such inferior material that a rapid deterioration speedily followed the construction of the works, and the crumbling of the bricks left no alternative apparent save that of rebuilding. It was, however, determined to experiment with Mr. Ransome's process, and accordingly, in 1868, it was extensively applied to the failing buildings, with the result of effectually stopping the decay, and of placing so fine and hard a surface upon the bricks that the material, which before could be crumbled by the touch, received a surface so hard as to resist the scratching from a steel point. In this manner extensive workshops and a chimney shaft were, at an insignificant outlay, rescued from destruction, and rendered sound and durable.

Heating Surface of Boilers.

The quantity of steam generally produced on every 39 inches square of surface or cylinder boilers, is from 44 to 66 pounds per hour. In marine boilers it averages about 77 pounds per hour.

For high-pressure engines, the heating surface is generally calculated, per horse power, as follows: Small boilers, 85 inches; medium size, 55 inches; large size, 40 inches, and even less.

For low-pressure engines, per horse power, as follows: Small boilers, 60 inches; medium sized, 40 inches; large size, 39 inches, and even less.

Recent comparative experiments have shown that 42 feet of boiler surface made 22 pounds of steam from 35·2 pounds of coal; 52·5 feet surface made 220 pounds of steam from 30·75 pounds of coal; 63 feet surface made 220 pounds of steam from 29 pounds of coal; 84 feet surface made 220 pounds of steam from 27·55 pounds of coal; 105 feet surface made 220 pounds of steam from 27·21 pounds of coal.—*Deby's Steam Vade Mecum.*

Preservation of Eggs.

The *Journal de Pharmacie et de Chimie* contains an account of some experiments by M. H. Viblette, on the best method of preserving eggs, a subject of much importance to France. Many methods had been tried: continued immersion in lime-water or salt water; exclusion of air by water, sawdust, etc., and even varnishing had been tried, but respectively condemned. The simplicity of the method adopted in many farms—namely, that of closing the pores of the shell with grease or oil had, however, attracted the attention of the author, who draws the following conclusions from a series of experiments on this method: Vegetable oils, more especially linseed, simply rubbed on to the egg hinders any alteration for a sufficiently extensive period, and presents a very simple and efficacious method of preservation, eclipsing any methods hitherto recommended or practiced.

Watch Repairers' Shop.

A correspondent in the *Horological Journal* makes the following practical suggestions:

"How vexatious to drop a small article and spend a quarter of an hour of valuable time in fruitless search for it—getting on your knees, dirtying your pants, growing red in the face, partly from your inverted position, and partly from anger. All this may be easily avoided. Thus:

"First, sweep very clean every nook, and corner, and crack about your bench and window, then get a pound or two of putty (no matter 'what's the price of putty'), and a few strips of nice soft pine, then putty up every crevice that is large enough to conceal a jewel screw; the large cracks stop partially with bits of pine and finish with putty; don't miss a single place. The whole job won't take you longer than you will be searching for a lost second-hand, and then when anything does drop, you can find it in a moment by sweeping your floor with a little broom brush."

Our Impending Doom.

A public lecturer in this city recently argued that religion was useless because "man's existence on the earth is momentary. Science teaches us that in 6,300 years more a grand deluge will end his race and make him a fossil. You may think this an idle tale, but it is not. Astronomy shows that the earth is oscillating in the angle of its axis to the sun in periods of 21 000 years. The zones are undergoing a constant change. Now, at the North Pole it is growing colder each year, and at the South Pole warmer. Thus, an immense accumulation of glaciers or icebergs at the North Pole will result, while at the South they will not form at all. In 6,300 years the glaciers will have accumulated so much that they will suddenly over-balance the earth. Then the waters of the sea will rush from the south to the north, and there will be a deluge." Stand from under!

THE yearly mortality of the globe is 33,333,333 persons. This is at the rate of 91,554 per day, 3,830 per hour, 62 per minute.

H. W. STAPLES' AUTOMATIC LAMP-FILLER.

In our description of this invention, published on page 344, current volume (issue of Nov. 27, 1869), an important point claimed by the inventor was omitted. If the reader will again refer to the engraving he will see that the vent tube, which also acts as a brace bewteen the nozzle and breast of the can, terminates at the letter A, which represents an opening in the side of the nozzle, through which air enters while the oil is flowing out of the nozzle. As soon, however, as the oil rises in the lamp as high as the vent hole, A, it covers this hole, and the flow of oil from the filler is checked. The fluid as it flows over the end of the vent tube, produces an audible whistling sound, which ceases when the vent hole is stopped by the rising of the fluid in the lamp, as the flow then ceases.

Thus a metal lamp or one made of any opaque material, as well as one of transparent glass, can be filled without danger of its running over, the filler stopping automatically when the lamp is filled to the proper hight. The advantage of controlling the flow is gained by the simplest means, and all danger of overflow prevented.

Editorial Summary.

FROST CRYSTALS UPON DRIED GRASS.—Several persons have by this time laid up to put into bouquets the beautiful grasses which they gathered in the autumn and summer of the present year. In order to add variety and some pleasing effects to portions of such grasses, they may be covered with imitation frost-crystals, some white, others blue-green, and amber. To crystallize dry grass white, steep it in a solution of one pint of hot water containing one pound of alum. As it becomes cold, crystals will adhere to the grass, which will increase in size if left for a day or more; but small crystals look the best; and in order to keep them so, the grass should be often moved and turned about. When taken out of the solution and dried in the air, they are fit for mounting with the other grasses, and greatly add to their beauty. For the blue-green crystals use sulphate of copper, and for amber crystals use chromate of potash instead of the alum. Feathers may also be crystallized in the same way. Art and taste will arrange them into forms of beauty.—*Septimus Piesse.*

A NEW THING IN POSTAGE.—The Austrian Government has introduced a novelty in postage, which might be introduced with great benefit in all countries. The object is to enable persons to send off, with the least possible trouble, messages of small importance, without the trouble of obtaining paper, pens, and envelopes. Cards of a fixed size are sold at all the post offices for two kreutzers, one side being for the address and the other for the note, which may be written either with ink or with any kind of pencil. It is thrown into the box, and delivered without envelopes. A halfpenny post of this kind would certainly be very convenient, especially in large towns, and a man of business, carrying a few such cards in his pocketbook, would find them very useful. There is an additional advantage attaching to the card, namely, that of having the address and postmark inseparably fixed to the note.

TO CURE THE RANK SMELL OF HORSE STABLES.—Sawdust, wetted with sulphuric acid, diluted with forty parts of water and distributed about horse stables will, it is said, remove the disagreeable ammoniacal smell, the sulphuric acid combining with the ammonia to form a salt. Chloride of lime slowly evolves chlorine which will do the same thing, but then the chlorine smells worse than the ammonia. Sulphuric acid on the contrary is perfectly inodorous. The mixture should be kept in shallow earthenware vessels. The sulphuric acid used alone, either diluted or strong, would absorb more or less of the ammonia, but there would be danger of spiling it about and causing serious damages, and besides this the sawdust offers a large surface to the floating gas. The experiment is easily tried, and it may prove successful.

THE Boston *Advertiser* reports that a curious phenomenon is frequently taking place at Machiasport, Maine, in the harbor opposite the wharves. It is an upheaval, by some power altogether unknown, of vast quantities of water, mud, and stones, to the distance of many feet, and with a furious rushing noise. This phenomenon has occurred quite a number of times during the summer, and once as late as a month ago.

PATENT CLAIMS.—Persons desiring the weekly official list of patent claims, are referred to a notice concerning the supplying of them in our advertising columns. The Commissioner of Patents would deem it a special favor if parties who intend to subscribe would order immediately, so that he may know how large an edition to publish.

A CORRESPONDENT of the *Mechanics' Magazine* states that the Moncrieff system of mounting artillery, which has lately attracted so much attention abroad, was anticipated 1811, by a French officer, who published a system of mounting guns not essentially different from that of Capt. Moncrieff.

BLACK PAINT FOR IRONWORK.—A varnish for ironwork can be made as follows: Obtain some good clean gas tar, and boil for four or five hours, until it runs as fine as water; then add one quart of turpentine to a gallon of tar, and boil another half hour. Apply hot.

THE following is a German recipe for coating wood with a substance as hard as stone: 40 parts of chalk, 50 of resin, and 4 of linseed oil, melted together; to this should be added one part of oxide of copper, and afterwards one part of sulphuric acid. This last ingredient must be added carefully. The mixture, while hot, is applied with a brush.

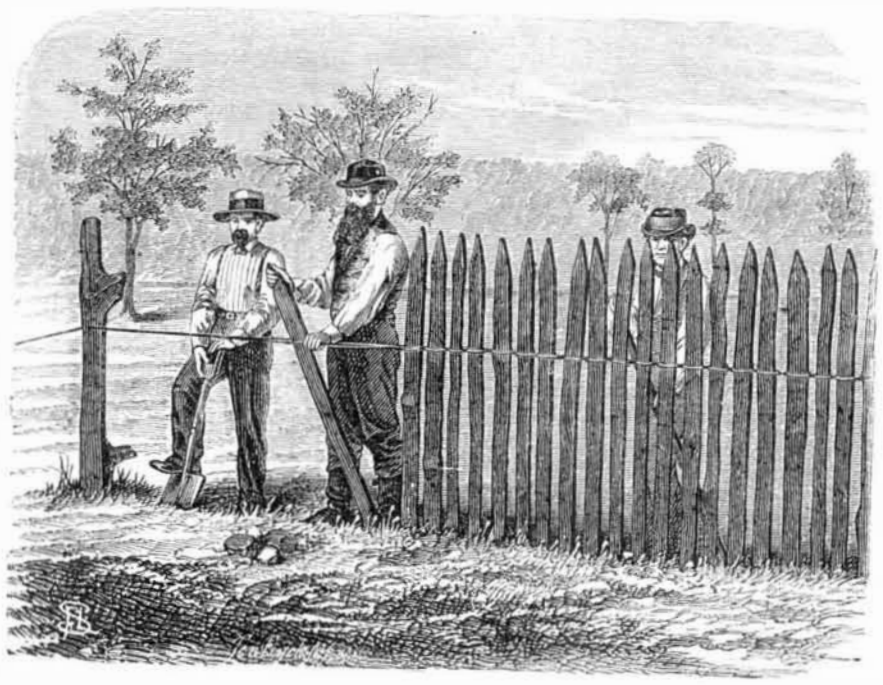
Wire and Picket Fence.

The use of wire as a substitute for bars between posts of fences, has gone the way of plank roads. It was "weighed in the balance and found wanting." The reasons for this termination to the experiment are too well known to need discussion here. The invention shown in the annexed engraving, employs wire only as a connector between upright pickets in lieu of the rails between posts, to which pickets are ordinarily nailed, and also reduces the number of posts required as will be seen in its description below.

It is intended to furnish a cheap, neat, and durable fence, that can be rapidly constructed, and dispenses with the use of nails.

The saving in posts is claimed to be sufficient to pay for the wire, as the posts are set from twenty to thirty feet apart.

Two wires are drawn through a hole in the first post set, and through similar holes in the other posts, to any convenient distance. The wires being fastened at the first or starting post, are left slack along the line for the insertion of the pickets, and wound around the last post of the section of fence under construction to keep them from being drawn back during the insertion of the pickets. The wires are then tightened by laying weights on the slack between posts, the palings distributed along the line answering perfectly for this purpose, one end being allowed to rest upon the ground and the other lying upon the slack wire, and as many being used in a bunch as may tighten the wire sufficiently.



P. DAVIS' IMPROVED PATENT FENCE.

The slack being thus taken up, the butts of the palings are successively set in a shallow trench dug between the posts on the fence line, and the tops being inclined laterally, until they will enter between the wires from the under side, they are brought to the vertical position, the wires being crossed between each picket, care being taken to keep the same wire always at the top.

The wires may be tightened if they should ever become slack by simply putting a twist in them, using a pair of palings for this purpose, turning them in opposite directions.

As fast as the palings are inserted, their butts are held by filling in and packing the earth in the trench.

This fence is impassable to all kinds of domestic animals, as nothing but a rat or similar burrowing animal can get under it, and a squirrel is about the only living thing which would attempt to climb over it. No domestic animal could crowd the pickets apart to get through it. The palings can not be pulled off, nor can the wind blow it down. The pickets take the strain off the posts, each one being, in fact, itself a post. The corner posts only require to be of greater strength than the other posts. Each post saves a paling, and may be made to look like it. The sides of the fence are uniform in appearance.

The fence represented in our engraving is a rude farm fence made with split palings; but with sawed palings of equal widths, it can be made very tasteful in appearance, and any form of either wood or metal palings may be used, to suit the taste of the builder. The inventor states that three hands can easily put up six hundred yards of this fence per day. He estimates the actual expense of a complete farm fence with top-sharpened split palings, with butts coated with tar or petroleum, as less than fifty cents per rod.

The palings need only be set from four to eight inches in the ground, according to the character of the soil. When stones are plenty they can take the place of a trench, in which case the butts of the palings do not need any protective coating.

Whether this invention was called forth by our article on cheap fences, published on page 9, current volume, or not, we are unable to say, but it meets a want therein set forth. At any rate, men of inventive genius will find in that and the numerous similar articles we publish, hints that will guide them to important and profitable inventions.

This fence was patented through the Scientific American Patent Agency, June 29, 1869, by P. Davis, of Newport News, Va., whom address for further information.

Paper Hangings.

When an amateur attempts this kind of domestic decoration it is desirable that he should attend to the following instructions, otherwise the work, when finished, will show blemishes and stains. First, pumice-stone the wall to remove all irregularities of surface, then wash over the size, about one ounce of glue to a gallon of water, and when dry, the wall is ready to ready to receive the paper. The paste should be well boiled and then passed through a hair sieve to extract the lumps, a fruitful source of stains. If the walls are inclined to show damp, add a little corrosive sublimate to the paste to prevent mildew forming on the surface of the paper The most important matter is to allow the paper to remain pasted for about ten minutes before hanging, in order that it may be well stretched before being placed on the wall. Stout paper hangings such as the "flocks," etc., require a longer time. If these directions are attended to the thinnest papers will hang without a crease or the objectionable water stains which characterize bad workmanship.

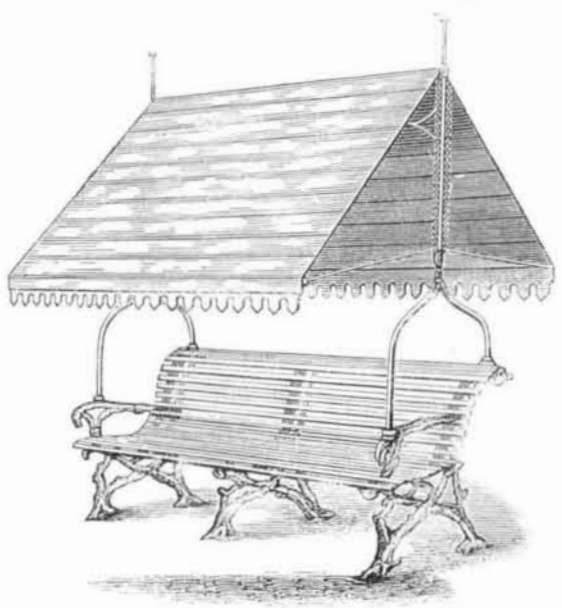
Gluing in Veneers.

I have advised the use of waterproof cements for fine inlaying, so that dampness will not affect them, but as this is not always convenient, it is well to make the glue so that it can be used and the work finished off in a short time. This is easily done by making the glue as thick as it will run, or so that it is like a jelly. If applied in this condition, it will set hard in thirty minutes, and the work may be cut down without fear or danger of its moving. I have done this frequently, in order to see what kind of work I was making. Always put a clamp on your work wherever you can, for although the glue will adhere of itself to the wood, it adheres much more strongly if pressed down by a clamp. Also, never put a veneer on a piece of work that is uneven, for although it map set square under the pressure of the clamp, when you come to scrape it, it will give way and yield to the inequalities, and when varnished and polished, will be full of depressions.

Don't be afraid to rub down with sand paper, under the impression that you are spoiling the work, but let the varnish get thoroughly dried, and be hard before you attempt it. Be sure, also, to remove every particle of varnish if you touch it at all, otherwise that which remains will take a coat while the bare wood will not take so much, and you will have a surface full of scars and ridges. It is not necessary to touch the wood in rubbing down, but go down to the wood, so that a waxy appearance is presented, and you will have a handsome finish that will add greatly to the beauty of the work. White holly is easily soiled when used in connection with ebony, by the dust from it, and it will be necessary to rub it, or scrape it delicately, before varnishing, without touching the ebony.—*Watson's Manual of the Hand Lathe.*

TENT ROOF GARDEN CHAIR.

It must be confessed our English cousins are men of taste in all that pertains to personal comfort. The dainty garden chair we illustrate herewith must indeed be a comfortable



thing in which to recline and enjoy a fragrant Havana, after dinner. The roof is composed of a roller and two canvas shades, which are wound up or extended at will by means of a brass endless chain. Our readers will agree with us that this chair is a very enticing piece of garden or farm furniture, and as it can be imitated easily we shall expect next summer to see many of our suburban gardens adopting the luxury. An article executed tastefully like the one illustrated, will sell, and we hope some of our manufacturers will get them up ready for the next season. A few such tent chairs in a garden would obviate the necessity for a summer-house.

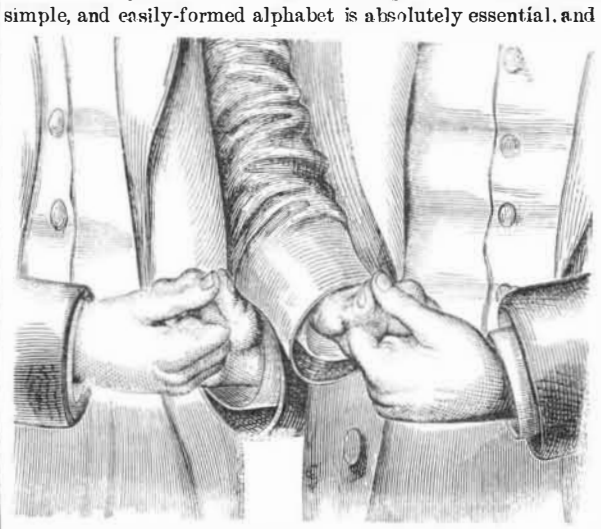
COMMUNICATION WITH AND BETWEEN DEAF MUTES

The sign language, used as a means of communication between deaf mutes, is of course unavailable in the dark, and is also unadapted to the use of blind mutes. It is, moreover unadapted for private communications, as the language spoken to one is spoken to all present who understand it. Spoken language can be whispered, or its volume can be so reduced as to be inaudible to other ears than those for which it is intended; but the force of the sign language cannot thus be modified, and when private conversations are held, written language is generally employed. Besides the tediousness of this process, it cannot always be resorted to, and therefore inventors have tried to devise means whereby conversations may be carried on under all circumstances except the fatal and insurmountable one of separation.

We have within a year or two read in some foreign journal, the name of which we cannot at present remember, of an instrument employed for effecting communication between deaf mutes, or between them and those not versed in the sign language.

We have before us a slip which describes this instrument, and which states that the invention was made by Mr. Bertram Mitford, of Cheltenham, England. "He uses a hollow case of any convenient form or size, made of wood or other suitable light material, and this case is provided with a handle by which it is to be held in the hand of the person using it. On the side of the case which faces the user there are contained the letters of the alphabet, numerals, or other signs useful to persons holding conversation with one another; and upon the opposite side, which faces the person communicated with, there is provided an opening protected by glass. In the interior of the hollow case are placed a number of slides worked by buttons which traverse along slots arranged each immediately above a different letter or sign. The upper end of each of these slides carries the corresponding letter or sign to that marked on the case opposite to the particular button; and when any slide or button is pushed along the slot, the corresponding letter or sign will be presented at the glazed aperture on the opposite side of the case. By successively raising and lowering or moving the slides it is obvious that words can be easily spelt and communication be established with the deaf and dumb without necessitating the knowledge of the signs known as the deaf and dumb alphabet."

While it is evident that this machine will answer the purpose designed; it does not, of course, supply the want we have stated. Sight is absolutely necessary to its employment. We have only noticed it as illustrating the fact that some simple, and easily-formed alphabet is absolutely essential, and



this alphabet must be capable of being read and communicated by the sense of touch.

Such an alphabet, which, so far as we know, is new, it is our present object to lay before our readers. It is the invention of a gentleman living in Brooklyn, and he permits us to make it public property.

In reading or communicating this alphabet the hands are placed, as shown in the accompanying engraving, to bring like fingers of the hands together. The hands are nearly closed as shown, and the balls of the five fingers are placed together, as indicated. The fingers of each hand may be numbered from the thumb, the thumb being called 1 and the little finger 5.

The letters are made by a quick strong pressure of the balls of the fingers of the individual communicating upon the balls of the fingers of the person addressed, the hands of the latter remaining passive; the letters being indicated according to the following system. The touches will be indicated by dots, the number of touches by the number of dots, the fingers with which the touches are made by its number; those on the right hand being further indicated by the letter R and those on the left being indicated by the letter L. Thus:

A - 1, L.	N - 5, R.
B - - 4, L.	O - 4, R.
C - - 1, R.	P - - 5, R.
D - - 2, R.	Q - 4, 5, L.
E - 1, R.	R - 2, L.
F - - 1, L.	S - 3, L.
G - - 3, L.	T - 2, R.
H - 4, L.	U - 5, L.
I - 3, R.	V - 4, 5, R.
J - - 5, L.	W - - 2, L,
K - 2, 3, R.	X - 2, 3, 4, R.
L - 3, R.	Y - 2, 3, L
M - - 4, R.	Z - 2, 3, 4, L.

The word "Brute" would be, spelled out, - - 4, L; - 2, L, 5, L, ; 2, R; - 1, R; only six motions, which can be made