Correspondence.

A Few more Words About Locusts.

To the Editor of the Scientific American:

In late numbers of your journal I notice several short articles on the Rocky Mountain locust, especially a note from J. F. Dunwoody, of Louisiana, Mo., taking exceptions to some of the statements and opinions of Professor Riley on the subject, and a brief reply from Professor Riley to Mr. Dunwoody. Frequently two men will take different sides of a question; and, to sustain their opinions, each will quote facts which appear to conflict, and yet the statements of both may be correct. I am convinced, from my own experience, that such is the case here. I have known one instance, very similar to the one mentioned by Mr. Dunwoody, where the locusts were hatched after the eggs had been covered for weeks with water. In the spring of 1868, vast quantities of locusts were hatched in the counties along the Missouri river, between Nebraska City and St. Joseph, Mo. In the following June or July, I saw myriads of locusts that had not been hatched a week, on an island in the Missouri river, just above Brownville, Neb., where the ground had been submerged by the river during the greater part of the spring. This was several weeks after the grasshoppers on the main land on both sides of the river had arrived at full growth and had flown away.

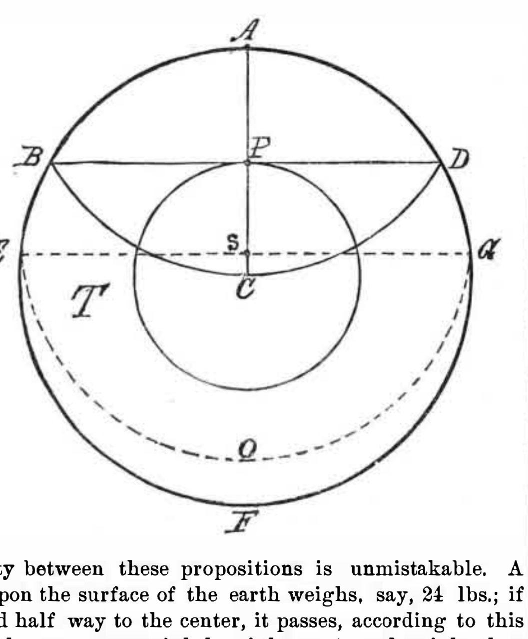
It is a prevalent opinion, among farmers who have tried the experiment, that plowing the ground where the eggs are deposited does not destroy them. But in some instances it does. I noticed, in the spring of 1868, one field that was plowed early, and that contained tuns of grasshopper eggs, many of which were exposed to the surface. They did not get hatched, but gradually changed color and putrified, till the field smelt like a dried-up pond. Why they perished, whether from repeated freezing and thawing or from the heavy rains that washed the cement from the eggs in their new and exposed position, or from the bright sun shining on them, I cannot say. But I did not see any young grasshoppers during the entire season on that field.

Lawrence, Kan. J. R. FISHER.

Weight on and in the Earth.

To the Editor of the Scientific American:

I supposed the "body in a hollow sphere doctrine" had been repudiated, but I find it endorsed by Professor Young in a recent lecture. There can be no doubt as to the falsity of this theorem. Olmstead embodied it in a proposition in his philosophy; and singularly enough, further on he said: "A body lowered toward the center of the earth would lose in weight in proportion to its distance downward." The



hostility between these propositions is unmistakable. A body upon the surface of the earth weighs, say, 24 lbs.; if lowered half way to the center, it passes, according to this queer theorem, seven eighths of the mass, and weighs then but 3 lbs.; but, according to the second proposition, it weighs 12 lbs., having lost 12 lbs. If this latter proposition be true, and there can be much evidence produced in its support, the former at once falls to the ground. In truth, a body would as eagerly fall to the center from any point within a hollow sphere as if the sphere were solid.

A body on the surface, at A, would be attracted by the whole mass toward C; but if lowered to P, the mass above the plane, B D, would attract it toward A, and neutralize the downward attraction of a corresponding inverted volume of matter, B D C. Then it is the lenticular mass, A B C D, that has been rendered neutral in its effect upon the body, at P, instead of the shell, T, as erroneously set forth by this absurd theorem; and the weight of a body, or vibrations of a pendulum, at P, would be due to the amount of matter in, and distance of, the cup shape fragment of earth from which the neutralized mass may be supposed to have been taken. Were the body lowered to *s*, it would be attracted toward C only by the thin and distant shell, E F G O, the rest of the mass being neutral: which shell would disappear as the body reached C. There is much to disprove this theorem, it being little less than a philosophical monstrosity. Theoretically, every solid body would balance in any position if suspended from its center point of gravity. Guided by the theorem in question, we should expect a hollow sphere to so balance, if suspended from any possible point within the void. E. B. WHITMORE.

Rochester, N. Y

Production of Silkworms' Eggs in Italy.

Great attention is being paid in Italy, as stated by Consul Colnaghi in his report upon the yield of cocoons in 1874, to the restoration of the native breeds of silkworms, and apparently with every hope of success. Government stations for microscopic examination are established in various provinces, and private individuals are not behindhand in experimental studies, which, in some cases, have assumed an important industrial aspect. At Albiate, in the province of Milan, there exists the important Cascina Pasteur for the production of silkworms' eggs, founded about 1868-69, and conducted by M. Guido Susani. The Cascina Pasteur has been continually increasing its production of grain under cellular selection, and in 1874 furnished 18,000 ounces (of 25 grammes each) of eggs, a quantity that could be greatly increased on the receipt of early commissions.

Microscopic examination of the moths, and not of the eggs, is the foundation of the system of selection. While, however, this examination is a certain safeguard against the corpuscular disease, or, as it is usually termed in Italy, *la pebrina*, it is of no avail against other sicknesses. Here the remedy is found in a series of physiological selections, costing both time and money, and requiring more than two years to be certain of effect. M. Susani has obtained equally good results with regenerated Italian breeds as with the green and white Japanese, which he has reproduced for the last seven years without requiring to renew the stock from Japan. In Lombardy these Japanese reproductions are preferred, and are the only ones generally used. They have given of late better results than the Japanese cards, which are found every year to be more and more infected with disease. In Central Italy the yellow Italian breeds are more usually cultivated. These, when ill attended and if the season is unfavorable, sufferfrom *flaccidezza*, and this is why the Lombard peasants prefer the cellular selections of the more hardy green Japanese race. Among the Italian breeds M. Susani prefers the old *brianzola* and the *biona*, which he has regenerated, for hill cultivation, or at least for dry localities, and where sufficient care is taken; for the lowlands he prefers a commoner quality.

On a smaller scale than M. Susani's, but very complete in its arrangements, is an establishment in the immediate neighborhood of the small town of Arezzo (Tuscany) overlooking the Val Tiberina, and founded by Count Polidori and Co., three years ago, also for the special purpose of producing silkworms' eggs for sale. M. Colnaghi mentions that he recently had an opportunity of visiting this establishment. A convenient two-storied building has been erected in a garden in which a plantation of young mulberry trees is growing. The rooms in which the silkworms are reared are light, airy, and well ventilated; the open fireplaces are of brick; and by a simple system of tubes communicating with the outer air, a constant supply of fresh air, warmed in its passage through the stoves, is brought into the rooms, the foul air being carried away by means of ventilators. Light wooden frames are raised in each room, leaving sufficient space for the attendants to walk round them. On the frames trays are laid in rows, each tray measuring 30 inches; the hight between the rows of trays is 18 inches. To rear 1 oz. of eggs 72 trays are required—a superficial area of 600 square feet—and they may be placed in a small space if it is well aired. The bottoms of the trays are of string, over which a piece of white gauze is laid to support the worms. Twenty-six microscopes are in use to examine the moths. A power of 560 diameters is considered the most suitable. Sixty women are in constant employment, varying according to the season, in examining the moths and rearing the worms.

The system of microscopic selection used in Italy is that of Pasteur, modified slightly by the experiments of Cornalia and Cantoni. The moths (male and female), themselves carefully selected, are placed in a small gauze bag, where they couple—the female depositing her eggs—and die. After death they are taken out of the bag, the wings carefully stripped off, the bodies pounded, with a little water, in a small porcelain or glass mortar. If on examination under a microscope no sign of corpuscules are found, the eggs are considered healthy. The examination of the eggs themselves is not required, being superfluous if the moths are healthy, and useless when they are not, as the germs of the disease may be contained undeveloped in an apparently sound egg. The healthy eggs are suspended in the little bags in a cool and airy place. For the due hatching of the worms in the following spring, it appears to be absolutely necessary for the eggs during the winter to be exposed to the influence of frost, or at the least to a certain degree of cold.

Count Polidori and Co. rear worms enough to produce 3,000 ozs. (of 28 grammes each) of grain, for which about 270,000 couple of moths have to be examined under the microscope. The breed of the worms at present obtaining the preference at the Anghiari establishment is the French Roussillon, which produces a small but compact and well made cocoon, contracted in the middle, yellow in color, with a slight roseate hue. The silk is elastic and lucid. The cocoon resembles that of the well known brianza breed, of which it is probably a descendant. The yellow Tuscan breed, although it has been preserved in the province throughout the the silkworm disease, is said to be weakly; the cocoons do not spin well. The Novi breed (white cocoon) yields a beautiful silk. A race of worms from Sardinia, with a roseate cocoon, was of good promise, as also a French breed from the Var, of striped worms, and producing a nankin-colored cocoon.

With reference to the product of the various breeds, on an average 1 oz. Japanese grain yields from 35 to 45 lbs. of green cocoons; 1 oz. of Japanese grain, reproduced in Italy, yields from 85 to 95 lbs. green cocoons; 1 oz. of Italian green yields about 130 lbs. yellow cocoons; 1 oz. French striped breed (Var) yields about 78 lbs. nankin cocoons; and 1 oz. of Roussillon yielded last year 175 to 190 lbs. yellow (roseate tinted) cocoons; but this was a maximum, and cannot be taken as the average.

Electric Conductivity of Carbon.

"The following simple method of exhibiting the conducting power of carbon was brought to my notice by my friend Mr. W. J. Ward, of the metallurgical laboratory of the Royal School of Mines, as having been shown to him several years since by Dr. von Kobell, of Munich. As I have not found any account of it published, I have ventured to bring it before this society.

"A fragment of the substance to be tested, whether charcoal, coke, anthracite, or other form of carbon, is held between the jaws of a pair of tongs formed by bending a strip of zinc into a horseshoe form, and immersed in a solution of cupric sulphate. If the carbon is a non-conductor, the copper salt is decomposed, and deposit of copper only takes place on the immersed surface of the zinc; but when it possesses a high degree of conductivity, a zinc carbon couple is formed, and deposit of copper takes place on the surface of the carbon as in ordinary electrotyping.

"Of the different forms of carbon experimented upon, the most rapid results have been obtained with some American anthracites, and coals that have been subjected to the action of intruded igneous rocks. The most remarkable of these is an anthracite from Peru, which contains a large amount of sulphur in organic combination, and is found in a nearly vertical position, interstratified in quartzite, in the high plateau of the Andes, about 13,000 feet above the sea level, near Truxillo. It is probably of secondary age, the metamorphism having taken place at the time of the great trachylic outbursts which form the gold and silver bearing rocks of the adjacent mining district. This is coppered by immersion almost as readily as graphite. The anthracite of Pennsylvania possesses the same property, but not in quite such high degree. The heathen coal of South Staffordshire, when altered by the intrusion of the white rock trap, is more slowly coppered; but this is probably due to the resistance interposed by the numerous laminæ of calcite filling the fractures in the mass of the coal, which renders the conductivity less perfect. A specimen of coal from Bengal, altered in the same manner by intrusion of igneous rocks, behaves much in the same way as coke, being coppered directly. This is rather remarkable, as this coal is a very impure one, and contains such a large quantity of water, very intimately combined, probably as a hydrated silicate interspersed through the mass, as to decrepitate explosively when suddenly heated.

"The ordinary Welsh anthracite does not appear to be a conductor by this method; but after having been heated to a full red heat, it conducts electricity freely. The lowest temperature at which this change takes place appears to be somewhere between the melting points of zinc (806° Fah.) and silver (1832° Fah.), as fragments of anthracite packed in a thin clay crucible and plunged into molten zinc were not found to be altered, but were changed when heated in a bath of melted silver. These limits, although considerably wide apart, are interesting as giving a possible clue to the temperature at which anthracite metamorphism of coals has been effected in different districts. Mr. W. C. Roberts has recently shown that the alloys of silver and copper have very definite melting points; it will be possible, therefore, to determine more nearly the lowest temperature necessary to produce the change.

"In the South Wales anthracite district, it is well known that no great amount of disturbance has taken place in the position of the coal seams, while in North America and Peru the change has been accompanied with much more violent action, as evidenced by the greater disturbance of the rocks; and probably a correspondingly higher degree of heat was developed in the mass. The evidence afforded by the coals that have been actually altered by intruded rocks, and must have been highly heated, appears to bear out this view. On the other hand, long continued exposure to a lower temperature might possibly produce the same effect, and further experiments upon this point would be desirable."—*H. Bauerman, F. G. S.*

Paper Car Wheels.

The American Paper Car Wheel Company, of Hudson, N. Y., has specimens of 30, 33, and 42 inches wheels of its manufacture. These wheels have steel tires made with an inside flange and a cast iron hub. On each side of the hub and tire, wrought iron or steel plates 3-16 inch thick are bolted, and the space between the plates is filled with compressed, or rather condensed, paper. This paper is made of straw boards $\frac{1}{8}$ inch thick, pasted together with paste made of rye flour., and first made into sections about $\frac{1}{2}$ inch thick. These are subject to a pressure of about 400 tuns for about five hours, and are then dried with hot air. These sections are then pasted together in the same way, so as to get the requisite thickness, about $3\frac{1}{2}$ inches, and are again pressed and dried. They thus form a disk, which is turned off and the tire forced on with a pressure of about 150 tuns. The plates are then bolted to the inside and outside of the wheel with $\frac{3}{4}$ inch bolts. An old wheel is exhibited, "one of the first paper car wheels ever made. It has run under a Pullman car 312,900 miles without the tire being turned." One of the wheels is shown with a portion of the plates and paper disk cut away, so as to show the inside structure. One of the paper disks is also exhibited; and if a separate tire and hub were shown, the exhibit would be complete. The wheels are painted brilliantly red, which might be described as mono-chrome-engineering.

Guanine.

The perfectly white solution of the scales of the bleak (*leuciscus alburnus*), a fish indigenous to the rivers of France, is now used largely for the manufacture of artificial pearls. The solution or guanine is a mucus which lubricates the scales of the fish. It coagulates by heat to a thick, white deposit, and is obtained by carefully scraping the fish over a shallow tub containing fresh water. Care is taken not to scale the back or dorsal part, as these scales are yellow, while the white scales possess the value. The material is received on a horsehair sieve. The first water, mixed with a little blood, is thrown away. The scales are then washed and pressed, when the mucus or essence (guanine) sinks to the bottom of the tub and appears as a very brilliant blue-white oily mass. It takes 40,000 fish to furnish two pounds of the material. The fishermen seal it in tin boxes with ammonia, and in this condition send it to Paris. If a drop of the essence be taken up by a straw and let fall upon water, it floats, giving forth the most brilliant colors. Mere glass bulbs, in shape of pearls, lined with this substance, imitate the real gems with remarkable closeness.

PRACTICAL MECHANISM.

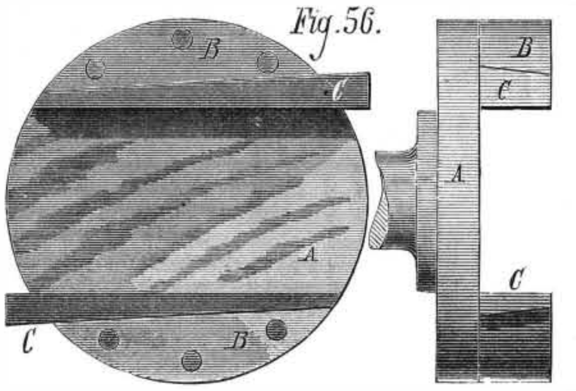
BY JOSHUA ROSE.

SECOND SERIES—Number VIII.

PATTERN MAKING.

Fig. 56 represents a side and face view of a very useful chuck, suitable for holding core boxes while boring them. It is shown attached to one of the metal plates that fit the mandrel of the lathe, and is usually made of hard wood; but for a large sized one, say 15 or more inches in diameter,

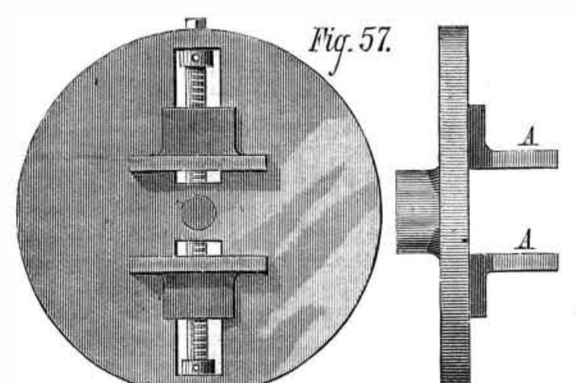
Fig. 56.



the disk portion, A, may be made of pine wood. The two sides, B B, are firmly fixed to the disk, their inner edges being planed at an acute angle to it. The work is held by driving the wedges, C C, and may be truly chucked by them in a comparatively short space of time.

Another very useful chuck is shown in Fig. 57, and it will

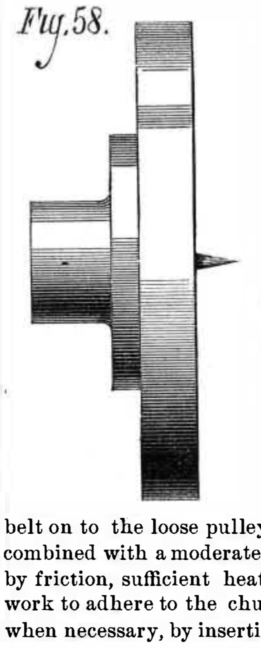
Fig. 57.



answer the same purposes as that shown in Fig. 56. It is, however, made entirely of metal somewhat similar to a machinist's dog chuck, but much lighter. Pieces of wood may be screwed on the jaws at A A, and bored to the curvature of any round piece of wood, an advantage which the chuck shown in Fig. 56 does not possess. Or the jaws may be turned round in their places, so that the faces, A A, will stand outwards, and the wooden pieces screwed thereon may be made to fit a hole. This chuck will be found to save much time over the plan of screwing work to the common face plate. V pieces of wood may be fixed to the jaws, and a piece of work in the rough held by them during the process of facing, boring, and turning the projecting part. The work can then be reversed in the chuck, and similar operations performed on the opposite end; and the work can be taken from the lathe and tried as to either fit or conformation, and, if necessary, restored in a moment to its original position in the chuck, so as to run quite true; but at the same time, for first class work, it is better not to use the Vs on finished surfaces. For holding bits and small work, neat little chucks may be purchased at the hardware stores, and they act similarly to the nipping arrangements applied to boring braces. These chucks can be supplied to either screw on the lathe mandrel; and they will, with a taper shank, fit into the taper hole provided to fit the holes which receive the lathe centers. It is well to have one of each, so as to be able to use one of them in place of the still lathe center, to operate upon work already chucked on the face plate of the lathe.

A simple and very useful chuck still remains to be described, being what is known as the cement chuck, which is made as follows: A disk of hard wood is screwed to a metal plate, where it should remain permanently; but if the face plate cannot be spared, bore a slightly taper hole through the disk, a little smaller than the diameter of the screw of the lathe mandrel, and partly through the disk. Then screw the disk on the mandrel, working the disk backwards and forwards to form a thread in the bore of the disk, and then turn and face it perfectly true. Then bore a small hole in its center, and drive in a piece of soft steel wire, leaving a short length projecting from the face and turn it to a point, as shown in Fig. 58.

Fig. 58.

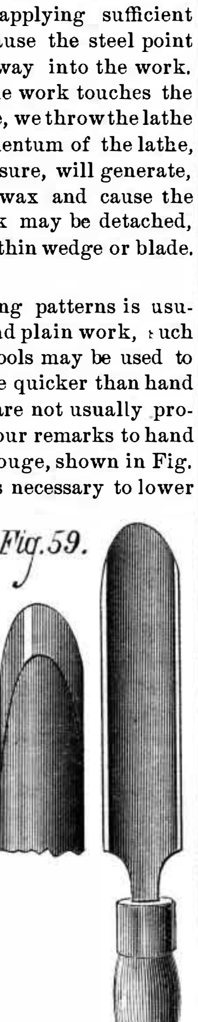


The object of this chuck is to drive thin delicate work, which it would be difficult to screw or clamp by adhesion, and this is accomplished as follows: We first prepare a wax composed of 8 parts of resin to 1 of the best beeswax, melted together, and we stir them well together, and run the mixture into tubes of paper or other suitable molds. To chuck the work, we take a stick of the wax, and press its end against the face of the chuck while the lathe is running, and then place the center of the piece of work on the steel point, applying sufficient pressure to cause the steel point to force its way into the work. Just before the work touches the waxed surface, we throw the lathe belt on to the loose pulley; and the momentum of the lathe, combined with a moderately heavy pressure, will generate, by friction, sufficient heat to melt the wax and cause the work to adhere to the chuck. The work may be detached, when necessary, by inserting behind it a thin wedge or blade.

TURNING TOOLS.

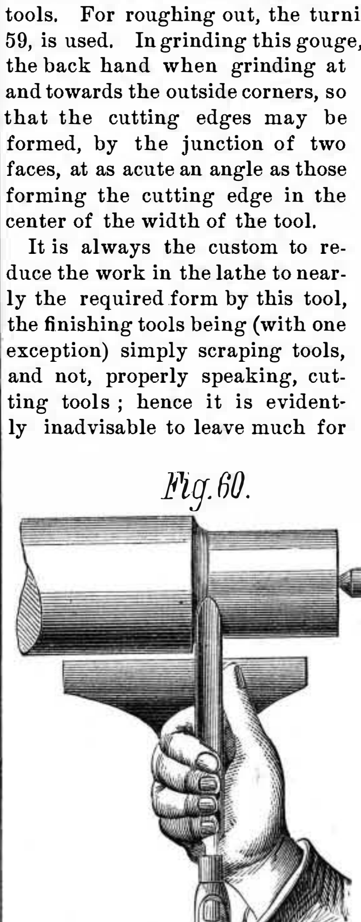
The turning work necessary in making patterns is usually done by hand; although on small and plain work, such as simple boring and facing, slide rest tools may be used to advantage, inasmuch as they will operate quicker than hand tools. Since, however, pattern lathes are not usually provided with slide rests, we shall confine our remarks to hand tools. For roughing out, the turning gouge, shown in Fig. 59, is used. In grinding this gouge, it is necessary to lower the back hand when grinding at and towards the outside corners, so that the cutting edges may be formed, by the junction of two faces, at as acute an angle as those forming the cutting edge in the center of the width of the tool.

Fig. 59.



It is always the custom to reduce the work in the lathe to nearly the required form by this tool, the finishing tools being (with one exception) simply scraping tools, and not, properly speaking, cutting tools; hence it is evidently inadvisable to leave much for

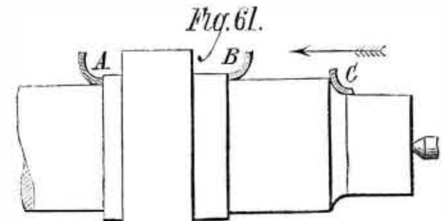
Fig. 60.



them to take off. The manner of holding the gouge is shown in Fig. 60. One hand grasps the handle near the end, while the other grasps the gouge near the cutting point, that is to say, as near as the hand rest will permit. It is sometimes, however, necessary to slightly vary the manner of holding by passing the forefinger of one hand around the hand rest while the gouge is confined between the thumb and forefinger, thus gripping the gouge end to the rest. This is advisable when turning a piece of work that is not completely round, as, for instance, tipping off the teeth of a gear wheel, in which case gripping the gouge to the hand rest will steady it and prevent it from digging into the work. The gouge is shown, in Fig. 60, to be cutting from left to right; it will, however, cut equally well if used from right to left, in which case the position of the hands must be reversed, the left hand gripping the gouge near the cutting edge. In either case, however, the gouge is not held horizontally level, but is tilted to one side, the lower side being the cutting one, otherwise the tool would rip into the work.

Fig. 61 shows the section of the tool and the tilt of the tool when cutting from right to left; while that of the tool, A, shows tilt when cutting from left to right. The reasons for this are as follows: The face of the gouge, on its hollow side and near the cutting edge, receives the strain which is necessary to curl the shaving, that is to say, which is necessary to force it out of the straight line. But if we were to place the gouge in the position shown in Fig. 61, at C, the whole of this strain would be placed upon the gouge, tend-

Fig. 61.



ing to force it forward and into the cut, as denoted by the direction of the arrow; and as a consequence, the gouge would run forward and dig into the work, in spite of all endeavors to prevent it. When, however, the gouge is held in the positions relative to its line of travel to its cut, shown in Fig. 61, at A and B, there is but little tendency for it to run forward, and it can be fed easily to its cut. In addition to its use as a roughing tool, the gouge makes a very efficient finishing tool for hollows, though it is not often employed as such by patternmakers. In this case, however, great care must be taken in controlling its position to the work, as shown in Fig. 61.

Trial of a Weeding Machine.

A trial of a weed eradicator, manufactured by Messrs. Ord and Madison, Darlington, Eng., lately took place under the auspices of the Highland Agricultural Society. The object of the machine is to remove the weeds which grow among corn crops. A drum, about 24 inches in diameter, is placed between two carrying wheels. Three sets of projecting teeth or iron combs run horizontally along the drum. This, when the machine is in operation, revolves by the action of the gearing, the combs at the same time working in and out of the slits, and over and along the top of the crop. Supposing the ground to be soft, the teeth catch the weeds and pull them fairly out of the soil; but should the soil be hard, as was the case at the trial, and thus have a firm grip of the roots of the weeds, the combs tear off the heads, so that they are prevented from seeding, leaving the stem in the soil. As the drum revolves and the teeth are drawn in towards the center, the weeds or their heads come in contact with the circumference of the drum, and, not being pulled in at the slits, are allowed to drop to the ground. The teeth exert little or no action upon the crops, passing between the teeth.

Remedy for Obesity.

According to Dr. Philbert, the waters of Brides in Savoy, which are very similar to those of Carlsbad, are very useful in the treatment of obesity. The purgative salts contained in these waters are sulphate of soda, chloride of sodium, chloride of magnesium, sulphate of magnesia, and sulphate of lime. To increase the effect, from 15 to 80 grains of sulphate of soda are added to each glass of mineral water. The quantity taken daily is $\frac{1}{5}$ quart, divided into three doses, and the purgative effect is produced in two or three days. The course may last from four to six weeks. As an adjuvant to the waters, a vapor bath may be taken every day or every second day. Farinaceous and saccharine articles of food are not allowed, and brandy, liqueurs, and coffee are interdicted; but the quantity of food is not limited, and a moderate amount of wine may be taken without harm. Muscular exercise is considered indispensable, and the mountains in the vicinity of Brides afford every facility for walking, where, in addition, this treatment may be followed by the grape cure.

A College of Cookery.

At last a practical step has been taken towards emancipating the people from the evils of bad cookery. We know of no department in domestic economy which is so sadly in need of reform, especially in the United States. Mr. William Emerson Baker, of the sewing machine firm of Grover & Baker, has given to the Governor of Massachusetts and to four other trustees a farm of 50 acres and $50,000, to form a college of cookery. Cookery is to be taught as an art—which it certainly is—and the pupils are to be instructed in the scientific principles which underlie wholesome cookery. The horrible pies, fried meats, hot bread, and other dyspepsia-generating compounds, together with the inexplicable concoctions produced by the verdant Milesian handmaid, let us hope, are doomed to disappear; and instead, our kitchens are to be tenanted in future by culinary artists able to prepare, palatably and healthfully, the vast variety of food this country affords.

Farming in California.

Some idea to what vast extent farming is carried on in California, and some other Western States, may be formed from the following item in one of our exchanges: "Plowing in unbroken furrows six miles long can be seen in Fargo, California. The teams start in the morning and make one trip across an entire township and back before dinner, and the same in the afternoon, making 24 miles' travel every day." It would seem that the steam plow ought to find a place in such a region.