IMPROVED SHOVEL PLOW.

We have tried many kinds of implements for cultivating corn, and we have never found anything superior to the shovel plow. Awkward and clumsy as it may appear, it kills the weeds more effectually, and thus makes the plants grow better, than any of the more elegant cultivators we have tried, although vast improvements have been made in the cultivator since we left the field. One of the principal difficulties with it has been the fastening of the shovel or share to the foot, an operation effected by the plan here illustrated in the simplest and most substantial manner.

The general construction of the plow is so clearly shown in the perspective as to require no description. The mode of fastening the share is illustrated in Fig. 2. In the lower or back side of the share, a series of circular recesses, *a a*, are formed, into any one of which the pin, *c*, enters; this pin being rigidly secured to the foot, D. A band, *e*, surrounds the foot and the shank of the share, and is tightened by the wedge, *i*. By fitting the pin to any recess in the share its depth in the ground may be adjusted at pleasure.

Another feature in this improvement is the shackle, which consists simply of a hook with a forked end which grasps the beam. A number of holes for fastening the shackle to the beam are made in a line along the beam, and the line of draft and consequent depth of plowing may be adjusted at pleasure by passing the shackle pin through any one of these holes.

Fig. 1

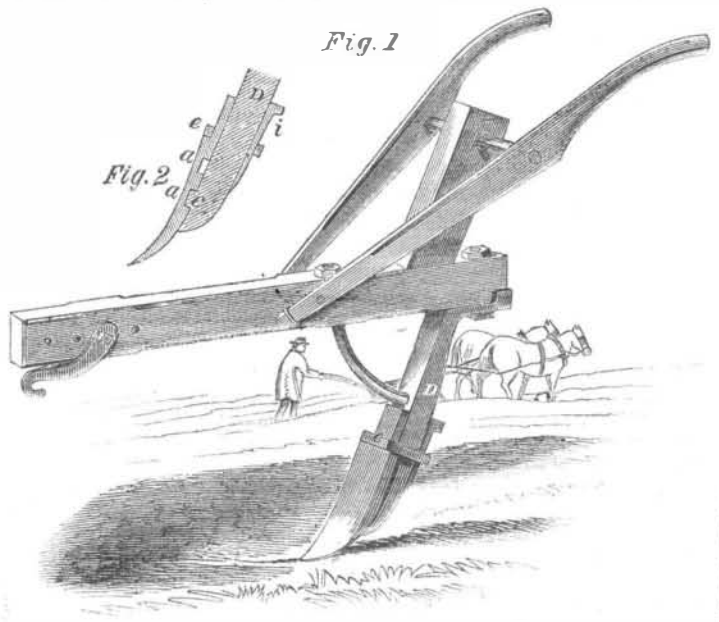

Fig. 2

LEE'S IMPROVED SHOVEL PLOW.

The patent for this invention was obtained through the Scientific American Patent Agency, Oct. 4, 1859, and persons desiring further information in relation to it will please address the inventors, E. D. & Z. W. Lee, at Blakely, Early county, Ga.

LAYING OUT ORCHARDS

We have found the setting of trees in orchards so that they would stand exactly in rows both ways, a more difficult problem than deflecting a regular curve for a railroad line between two tangents, or any of the ordinary operations of civil engineering. After trying various modes of *ranging* we have finally discovered that the simple method of measuring is not only by far the most rapid, but also the most accurate of any plan that we have ever tried. Since we adopted this method, we have set two and a half acres in small peach trees with such precision that no tree in the orchard stood out from the line to the extent of its semi-diameter, that is to say, to the extent of half an inch, and we do not believe that we expended one quarter the time in getting the trees in line that is ordinarily bestowed in the system of ranging. For such accuracy the measurements must of course be made with great exactness, and this can only be done by means of a rod and small pins.

The best thing for a rod is a cane fish pole, though a slender white pine sapling is nearly as good, cut green and seasoned under cover if there is time, if not selected from among the dead trees found standing in the woods. The essential points are to have the rod straight and stiff, with one end small in order that it may be light. Cut the rod of a length corresponding to the distance apart which it is desired to place the trees, and provide a basket full of straight pins about 10 inches long, cut from twigs about ¼ of an inch in diameter. Now draw a line of stout twine the whole length of the field along one side, at the proper distance from the fence for the first row of trees, and measure along the line, inserting a pin into the ground at each space. For this measuring two persons are required, one of whom holds the butt end of the rod exactly at the middle of the last pin inserted, and the other puts a new pin into the earth at the small end of the rod. Measure entirely around the field in this way, and if necessary move the last two lines until the measurement comes correctly at the place of beginning. Then draw the line and measure across the field successively for each row, putting in a pin for each tree. The person who inserts the pins should place himself first at right angles to the line to be sure to get the pin opposite the end of the rod, and he should then stand astride of the line and move the pin if necessary to get it perpendicular, with one side just in contact with the line.

The holes should be dug all one side, for instance the east side of the pins, in order to leave the pins in place for use in setting the trees. This is easily done by placing the first pin at the beginning along the line 21 inches farther from the edge of the field than it is desired to have the trees, which of course operates to place the pins in a corresponding position. Let the nearer edge of the hole be six inches from the pin and this will bring the middle of the hole, if it is 2½ feet square, 21 inches from the pin. Provide a small straight rod 21 inches in length, and in setting the trees measure with this rod from the pin, to find the place in the hole for the tree.

The opposite angles of the orchard must be equal, that is the orchard must be either rectangular or rhomboidal, in order to have the measurements meet at the place of beginning. If it is desired to have the rows at right angles to each other, and no compass or goniometer is at hand, a right angle may be laid off by measuring 8 feet on one line, and 6 feet on the cross line, and moving the latter till the hypothenuse measures 10 feet. Or better, still, by constructing an isosceles triangle. Stretch the base line both sides of the corner pin and measure along it each way 10 feet marking the points. Then from these points lay two poles of equal length, say 15 or 20 feet long, with their opposite ends together and set a pin at the angle; this pin will be at right angles to the base line starting from the corner.

In stretching the line, secure one end by driving the stake to which it is attached into the ground, and taking hold of the opposite end, pull it about as hard as the twine will bear, at the same time whipping the line up and down, and when it is brought straight secure the end which you hold by pressing its stake also into the earth. Stones or clods should be placed upon the line at intervals to hold it in place during the process of measuring. This method of laying out an orchard may seem to be troublesome, but in practice it will be found to save labor in comparison with the most careless plan, if any attempt whatever was made to have the trees in rows both ways; and it affords a constant source of satisfaction in observing the mathematical straightness of the rows, not only those at right angles, but also those that are formed in every possible diagonal direction.

COMPLETE DESCRIPTION OF THE AURORA BOREALIS AND AURORA AUSTRALIS.

The *American Almanac* for 1860 contains an article on the aurora, by Professor Joseph Lovering of Harvard University, which by its numerous references, displays laborious research and thorough investigation of the subject. Among the numerous facts stated, the most interesting one is that "the crown occurs around that point of the sky to which a perfectly free magnetized needle points." After a very elaborate discussion of the periodicity of the aurora, Professor Lovering comes to the following conclusions:—"There is a *secular* periodicity, consisting of 20 years or more of abundant exhibitions, separated by intervals, equally long or longer, when the phenomenon, if not wholly wanting, is unaccompanied by any of its more striking characteristics." It is observed quite as often in summer as in winter. "In regard to the *diurnal* periodicity, the general fact is observable, that, although grand auroras, as that for example of August 28, 1859, may last through the whole night, generally the aurora dies out before midnight; and even the best displays usually attain their maximum before 10 or 11 o'clock." It is seen most frequently in the neighborhood of the magnetic pole. "Scoresby says that in Iceland the aurora may be seen almostevery clear night in winter. Franklin had 142 examples of it in six months in the Arctic Sea." Careful and numerous experiments have been made to determine by the property of polarization whether the light eminates directly from the aurora or is reflected. The point is not absolutely settled, but it is highly probable that the light is not reflected. Professor Lovering's discussion of the question, whether this phenomenon is accompanied by any *sound*, affords a very striking proof of the uncertainty of human testimony resulting from the general carelessness of observation. The impression left upon the mind by the whole mass of conflicting testimony is, that it is not very probable that any noise does accompany the aurora. It is the opinion of Arago that the methods adopted to ascertain the hight of the aurora above the earth are not to be relied on, and that this point is still wholly undetermined. In regard to the character of the *light* the following quotation is made from Singer's Elements of Electricity:—"When electricity passes through rarefied air, it exhibits a diffused luminous stream, which has all the characteristic appearance of the northern lights. There is the same variety of color and intensity, the same undulating motion and occasional corruscations; the streamers exhibit the same diversity of character, at one moment divided in ramifications and at another beaming forth in one body of light, or passing in distinct broad flashes; and when the rarefaction is considerable, various parts of the stream assume that peculiar glowing color which occasionally appears in the atmosphere, and is regarded by the uninformed observer with astonishment and fear."

The article closes with a brief notice of some of the explantions that have been offered. Some may be passed over lightly; such as that of the ex-king of Sweden, who imagined the light was ground out by the friction of the earth on its great axle. Franklin modestly suggested the following:—"May not, then, the great quantity of electricity brought into the polar regions, by the clouds, which are condensed there, and fall in snow, which electricity would enter the earth, but could not penetrate the ice, may it not I say (as a bottle overcharged), break that low atmosphere, and run along in the vacuum over the air towards the equator, diverging as the degrees of longitude enlarge, strongly visible where densest, and becoming less visible as it more diverges; till it finds a passage to the earth in more temperate climates, or is mingled with the upper air? If such an operation of nature were really performed, would it not give all the appearance of an aurora borealis?" Marian and the late Professor D. Olmstead, of Yale College, both believed the origin of the aurora to be in space beyond the boundaries of our earth and its atmosphere, or some nebulous matter which the earth occasionally meets in its flight through space. It is certain, however, that it partakes not only of the motion of the earth about the sun, but also of the rotary motion about its axis.

The conclusion of the whole matter is, that the aurora borealis is so swift and changing in its motions, so distant in its position, and so subtile in its nature, that it baffles investigation, and remains, more than anything else which can be so plainly seen, largely enveloped in mystery. We respectfully suggest to the numerous gentlemen who are concocting theories in regard to this phenomenon, to procure Professor Lovering's article in order to avail themselves of the numerous facts which he has collected. The real masters of science almost always exhibit this labor in collecting facts, combined with a modesty in offering their own theories in explanation of them.