LECTURES ON ASTRONOMY.

BY PROF. ORSON PRATT.

LECTURE SEVENTH.

Is the sun in motion or at rest, is a question frequently asked by the inquisitive mind of man. We have already shown in our former lectures, that the apparent diurnal and annual motions of the sun are not real, but arise from the real motions of the earth upon its axis, and in its orbit. So far as we have been able to extend our observations, the planetary bodies of this system have a rotation upon an axis; this seems to be indispensably necessary, in order that different sides of those bodies may alternately be exposed to the heat and light of the sun. But the sun being the great source of heat and light, does not apparently stand in need of either heat or light from any external source; and therefore, it would seem altogether unnecessary for it to have a rotation upon an axis; if no beneficial object is perceived to result from a rotation of the sun, we might be led to conclude, in the absence of any direct evidence, that the sun was really quiescent in the centre of the system.

But when we examine the sun by the aid of a telescope, we discover upon its disc many large spots which appear dark, and when watched from day to day, they appear to move across the disc from east to west. When first discovered near the eastern limb, their velocity is very slow, but increases as they approach the middle of their paths, at which place, the velocity arrives at its maximum value, after which the velocity gradually decreases until near the western limb, when the spots disappear and remain invisible some 12 or 13 days, and then again re-appear near the eastern limb, describing the same paths as before.

Were these appearances produced by dark bodies intervening between the earth and sun, having a motion independent of that luminary, then the velocity would be uniform; but the variable velocity, observed in the description of their apparent paths, is precisely the same as it would be, if those spots were a part of the surface of the sun itself, rotating upon an axis from west to east. With such a rotation, it is evident, that the side of the sun, turned towards the earth, would have a movement apparently from east to west; while the most distant hemisphere which is turned from us, and consequently invisible, would have a motion from west to east.

If these spots appertain to the surface of the sun, they will each describe a circle, parallel to the sun's equator; and if this equator were coincident with the plane of the ecliptic, each of these circles would at all times appear like straight lines on the sun's disc; but if the plane of the sun's equator be inclined to the plane of the ecliptic, the circles, described by these spots, will, by the effect of perspective, appear elliptic. One half of the year these apparent semi ellipses will present their convex sides towards the upper limb of the sun, and the other half of the year their convexity will be presented towards the lower limb. These appearances are produced by the relative positions of the sun's axis to the earth in different points of its orbit. These ellipses will at certain seasons of the year appear much more elongated than at other seasons; this also depends upon the relative position of the axis of the sun to the earth in different portions of its orbit.

There are two days in a year when the axis of the sun is at right angles to the line of vision, namely, the 11th of June and the 12th of December.—At these two periods the spots on the sun appear to describe straight lines. After the 12th of December, the apparent paths of the spots begin to deviate from a straight line, the convexity being towards the north, or towards the upper limb of the sun. This deviation from a straight line will continue to increase more and more until the 10th of March when it will attain to its greatest value. From the 10th of March, the curvature of these ellipses will begin to decrease, and continue decreasing until the 11th of June, when the spots will again apparently describe a straight line; after which they will again deviate, but in a contrary direction, the convexity being towards the south, or in other words, towards the sun's lower limb; the curvature will increase more and more until the 13th of September, when it will become greatest, then again receding until the 12th of December, when their apparent paths will again be straight lines.

Thus it will be seen that on the 12th of December, the earth passes from the northern to the southern side of the plane of the sun's equator; while a spot on the sun's equator, at the same time, appears to ascend from the southern to the northern side of the plane of the ecliptic; this is called the Ascending Node of the sun's equator. The heliocentric longitude of the ascending node is 80 deg. 21 min. On the 11th of June, the earth passes from the southern to the northern side of the plane of the sun's equator, while a spot on that equator appears to descend from the northern to the southern side of the plane of the ecliptic; this is called the descending node of the sun's equator, and is situated directly opposite the other node, 180 deg. further east. The descending node, therefore, lies 260 deg. 21m heliocentric longitude.

If the shorter semi axis of these elliptic paths be accurately measured with a micrometer, say, for instance, when the earth is 90 deg. distant from either of the aforementioned nodes; or on the 10th of March, or 13th of September, it will be an easy matter to determine from these measurements the inclination of the plane of the sun's equator to the plane of the ecliptic; this is found to be about 7 deg. 20 min., and the period of rotation 25 days, 7 hours and 48 minutes. This period does not bring the same spots into the same relative position, in regard to the sun and earth, that they occupied at the commencement of such period; for the earth, during this period, advances in its orbit over a space equal to about 1-14 part of the whole circumference; consequently the sun has to perform more than one complete rotation before the same spots are brought round to the same relative position that they occupied at the commencement of the period; this period, which may be termed the apparent period, is about 2 days longer than the real period of the rotation.

The distance around the sun, being about 2,790,000 miles, a spot on the sun's equator must move with a velocity of about 4589 miles per hour; this is over 4 times swifter than the earth's equator moves by its rotation. The rotation of the sun generates a centrifugal force at its equator about 1-6 of the centrifugal force generated at the equator of the earth by its rotation. In a former lecture, we proved that the centrifugal force at the earth's equator is about 1-289 part of the earth's gravity; hence, the centrifugal force at the sun's equator is only about one-sixth of this fraction, or 1-1734 part of the earth's gravity; but in the sixth lecture we proved that the earth's gravity is 27.9 times less than the sun's gravity. Therefore, the centrifugal force at the sun's equator is 1-48379 part of the sun's gravity.—A body will fall at the sun's equator about 5375 4-9 inches in a second, and if the sun had no rotation, it would fall about 1-9 of an inch further. A clock pendulum which will vibrate seconds here on the earth would, if carried to the surface of the sun, vibrate over five times more rapidly; that is, a pendulum of the same length would make 5282 vibrations at the surface of the sun in the same time that it would make 1000 vibrations at the surface of the earth.

If the sun's rotatory velocity should become about 219 times more rapid than it is at the present, bodies would have no weight at the sun's equator, and a complete rotation would be accomplished in about 2 hours and 46 minutes.

It is probable that the sun is not a perfect sphere as it would be had it no rotation, but its deviation from the spherical form is very much less than that of the earth; for the centrifugal force of the sun's equator, compared with the force of gravity at his surface, is 167 times less than the centrifugal force of the earth's equator, compared with the force of gravity at its surface. Therefore, the force exerted to alter the spherical form of the sun is 167 times less than the force exerted upon the earth to alter its spherical form. Hence the spheroidal form of the earth is much more oblate than that of the sun's.

Although the sun is by far the largest body of our system, yet we are comparatively ignorant of the nature of this vast luminary. Some have supposed it to be a vast globe of fire. But when viewed through a telescope, as we have already observed, large dark spots are seen upon the sun's disc.—These spots are of different magnitudes; some are over 40,000 miles in diameter, while others are barely visible, being not over 500 miles in diameter. The spots appear to be perfectly dark, surrounded with a border or penumbra of a fainter shade.—This penumbra is often of the same shape as the central dark spot, and frequently embraces several thousand miles of area or space; the shade of the penumbra wears a uniform aspect throughout its whole extent. Sometimes several dark spots of different sizes are embraced within the limits of the same penumbra. The number of spots is continually varying; sometimes there are none to be seen; sometimes only two or three; and at other times several hundreds. During the last century and a half, more or less spots have been seen every year; but they are far more numerous some years than in others.

These spots are continually changing their aspects. This arises from two causes, one of which is real—the other only apparent. The real changes may be described as follows:

First, they are observed to expand or contract in their dimensions. When they first make their appearance, the dark nucleus and the penumbra surrounding it are so small, as to be barely visible; these gradually expand from day to day, some with much greater velocity than others until they attain to various degrees of magnitude, from a thousand to forty or fifty thousand miles in diameter. Again, they are observed to contract—the sides gradually approaching, until from their smallness, they are rendered invisible. That these changes are not the effects of perspective, occasioned by the relative positions of the spots on the surface of the rotating globe of the sun, is demonstrated from the fact that in the same regions some spots are seen in the act of enlarging while others are diminishing; this could not happen from a change of their relative positions, for in such cases the relative positions remain the same; therefore the changes must be real. The time occupied in the expansions and contractions of these spots, follows no regular law—some have been seen to arise and vanish in less than one day—others continue for six weeks, but it seldom happens that they continue longer than this; though in some rare instances they have been known to continue for several months.

Second, it is also observed, as a general thing, that when the expansions are gradual, the contractions are also gradual—and when they enlarge suddenly, they diminish suddenly. These spots sometimes break in pieces, and the fragments recede from each other with very great velocity. The movements exhibited by the expansions, contractions, and the receding of the fragments, in case the spots become broken, are carried on upon the grandest scale. A single second of angular measure upon the sun's disc as seen from the earth, would include an extent of 461 miles. A circular spot, therefore, of this diameter, would embrace an area of about 167,000 square miles, which is the least space that is distinctly visible on that distant orb. But spots have been observed, embracing an area of about 2,000,000,000 of miles, whose diameters were over 50,000 miles.

Now such spots have been observed to close up and disappear in the short space of 2 or 3 weeks; the borders, therefore, of such spots must approach each other with a velocity of between one and two thousand miles per day. Sometimes very large spots have closed up within the short period of one day; their velocity, therefore, must have been equal to 500 or a thousand miles per hour.

Third, besides the changes, observed in the dimensions of the spots themselves, it is also observed that they are not stationary on the sun's disc, but travel from one region to another with prodigious velocity, as we have already remarked in regard to the fragments of broken spots receding from each other in every variety of direction. But unbroken spots, instead of moving indiscriminately in all directions, seem to follow a more regular law in their movements; those on each side of the sun's equator, in most instances, gradually move towards the nearest pole with a velocity of four or five thousand miles per day.

Fourth, these spots are subject to numerous changes of form as well as of magnitude; these forms are constantly changing, sometimes being nearly circular; sometimes of an oval shape; at other times, presenting a variety of irregular figures. The exterior boundary of the penumbra always presents a curvilineal appearance, instead of sharp angles and straight lines, while the borders of the dark nucleus assume every variety of shape. When the penumbra is in the act of encroaching upon the nucleus, it sometimes divides the nucleus into two or more parts, and when the nucleus disappears, the penumbra remains visible for a short period, and then vanishes.

These spots do not appear on all parts of the globe of the sun, but are limited, generally speaking, to a zone extending from 30 deg. to 40 deg. each side of his equator; spots are rarely seen beyond these limits; in the polar regions they are never seen. The equatorial belt or zone is less frequently visited by these spots than the adjacent zones, situated a few degrees to the north and south of the equator. The zone in the northern hemisphere, comprized between the 10th and 20th degrees is the most fertile in the production of spots—their numbers and magnitudes being greater than in the southern hemisphere.

Another circumstance worthy of remark is the arrangement of these spots. It is observed, that when the spots are numerous, they frequently arrange themselves in belts or zones parallel to the sun's equator.

We will next explain the apparent changes which these spots exhibit, arising from the rotation of the sun. If a large, well defined spot be observed throughout its passage across the sun's disc, it will exhibit the following phases:

First, when it is in the centre of the disc or in the middle of its path, the whole encircling penumbra, and the central dark nucleus will be distinctly visible.

Second, as the spot approaches the western limb, the penumbra on the side nearest to the eye of the observer will gradually become more and more narrow in the direction of the line of vision, while the penumbra on the opposite side of the nucleus from the eye, will apparently grow broader and broader; at length, as the spot arrives near the western limb, the eastern part of the penumbra, as well as the dark spot entirely disappears, while the western or more distant portion of the penumbra still remains visible until near the time of its passing the edge of the limb.

Third, after the spot is carried round on the opposite and invisible hemisphere by the sun's rotation, it will re-appear near the edge of the eastern limb; in this position, the eastern portion of the penumbra will be seen first, then the dark nucleus, then the narrow portion of the western or nearest side of the penumbra which, as the spot approaches the middle of its path, will widen out, and at length, when it has gained about the same relative position it had at the commencement of the observation, it will again exhibit nearly the same appearance. These are not real changes, but apparent, arising wholly from the effects of perspective. Every spot which crosses the sun's disc is observed to present the same aspects, so that the law is ascertained to be universal.

These apparent changes can, perhaps, be more clearly perceived, if we picture to ourselves an artificial globe suspended over our heads with holes or pits in its surface, with shelving sides and black bottoms; as the globe is made to rotate, so that the upper surface shall move from west to east, it is evident that the under surface will move from east to west. When one of these pits is directly on the under side, the shelving sides, surrounding the pit will represent the penumbra, and the dark bottom of the hole will represent the black nucleus. As this artificial globe slowly rotates, the hole and shelving sides as they are brought near the western side, will exhibit the same aspects as the solar spots already described; the shelving side next the eye will be lost sight of first, then the bottom of the hole, and then the most distant shelving side. Similar, but opposite phenomena would happen as the spot re-appears on the eastern limb.

From a careful and attentive consideration of all the observed phenomena, relating to the sun's spots—to their forms, magnitudes, and motions both apparent and real, we are almost irresistibly led to the conclusion that the great body of the sun mainly consists of a dark mass of a similar nature to that of the earth and other planetary bodies—that this opaque mass is surrounded by two atmospheres several thousand miles in depth—that the lower one next to the opaque globe of the sun, is transparent—within the upper stratum of which floats innumerable clouds—the thickness of the cloudy stratum being greater or less in proportion to the various degrees of density, existing in the layers of which it is composed—that the loftier or exterior atmosphere consists of a self-luminous phosphorescent gas, radiating light and heat to the surrounding worlds.

On this theory the dark mass of the sun is protected from the destructive influence of the heating power of its upper atmosphere by the intervention of the cloudy stratum which serves as a kind of shield or veil. But what are these dark spots? And what is the encircling penumbra which surrounds them? According to this theory, the dark spots are portions of the surface of the dark globe beneath, seen through the openings occasionally formed in the luminous and cloudy strata. The penumbræ are the dark clouds which lay beneath the shining fluid or nearer the body of the sun; the luminous fluid being driven aside, the clouds below reflect a portion of the light which they receive from the shining fluid above. These openings are formed from some unknown force below. The depth of these atmospheric openings have been approximately ascertained by taking the angular measurements of the sides when near the eastern or western limb, at which time the most distant portions of the penumbra appear broader in consequence of their planes being nearly at right angles to the line of vision; this, therefore, is the most favorable position for taking their angular measurements. The depth is thus ascertained to be from 2000 to 4000 miles.

Besides these openings in the luminous and cloudy strata, there are other spots which have a brighter aspect than the surrounding medium; these apparently exist in the form of immense waves or ridges in the luminous regions of the exterior atmosphere. These ridges are more distinctly seen towards the eastern or western margin of the sun; when they are brought by the sun's rotation across the central portions of the disc, they uniformly disappear and remain invisible for 4 or 5 days. This is what would naturally take place, admitting that they are waves or ridges; for such elevations would, from their position relative to the line of vision, be seen when near the edges of the disc; but when near the middle of their path or in front, they would be foreshortened, and consequently disappear. These immense ridges are principally confined, like the dark spots, to a zone extending about 40 deg. each side of the sun's equator; they are seldom seen at a greater distance. Some of those immense waves extend over a space equal to 75,000 miles; others are smaller; they are frequently changing their form and also their position.

It has also been observed that those parts of the sun's disc where no spots exist, do not exhibit a uniform brightness; but present to the eye a surface finely dotted with minute black pores which are in a constant state of change, as if the luminous medium were intermixed or floating within the transparent non-luminous atmosphere in vast sheets or columns of flame, resembling the sheets or columns of our northern lights. It is evident that such columns streaming forth in lines perpendicular to the surface, would present the appearance of a finely mottled surface of darkness and brightness—the spaces intervening between the vast columns of light would evidently appear dark; and as these great sheets of flame are constantly darting up in new places and vacating their former positions, such a condition of things would exhibit a constant change in the position of the dark dots or pores.—If an observer could be placed a few thousand miles above the surface of the earth in our northern regions, and look down upon the northern lights, darting upwards from the earth's surface through the atmosphere, they would, probably, behold in miniature a faint resemblance of some of the grand phenomena displayed upon the sun's surface.

The spots—the immense ridges—the variegated or mottled appearance of the general surface—the vast changes to which they are all subject in form, in magnitude, and in position—the occasional breaking to pieces of large spots and the prodigious velocity of the fragments, as they recede from each other—the proper and more regular motions of the spots themselves, as they move upon the surface towards their respective nearest poles—all indicate the operation of sudden and tremendous forces either originated by the solid body of the sun itself, or generated within his atmospheres. How inconceivably powerful must be those forces which can burst asunder the great ocean of clouds and lights, surrounding that vast orb which can roll aside the billowy deep, and expose the immense foundations on which it rests, extending over an area of 2,000,000,000 of square miles! How tremendous must be the force which can roll up the surface of that luminous ocean to the height of several hundred miles above its mean level, forming an immense wave of light, extending seventy or eighty thousand miles in length. How grand and magnificent must be the scenery, to behold the dashing, surging, whirling movements of these immense elevations as they roll in awful majesty around the circumference of that shining globular ocean of light.

Whatever these forces may be, it is evident that they are connected in some way with the rotation of the sun upon its axis; this is indicated by the tendency which the spots have to arrange themselves in zones parallel to the equator.

But what are these forces? We are not aware that any philosopher has ever attempted to answer this question. We will venture to offer a few conjectures or speculations upon this subject, not, however, without diffidence, knowing how liable we are to be mistaken, when we venture beyond the limits of demonstration. It is known that heat, light and electricity are evolved, in a greater or less degree, by chemical operations. Now these agents doubtless, do exist in a latent state in greater or less quantities in connection with all the materials of which the great globe of the sun consists. Reasoning from analogy, we can, with propriety, suppose that there are great chemical operations taking place among the sun's materials, as well as among the materials of our globe. If so, heat, light and electricity would necessarily be set free. Now let us suppose that the materials in the sun's equatorial regions are more favorably situated for great chemical changes than elsewhere, it is evident, that those regions would be raised to a higher temperature, and the atmosphere immediately in contact with the surface would partake of this temperature, and becoming specifically lighter would arise; this upper or ascending current would have a velocity proportional to its relative temperature, and the rushing in of colder currents from the polar regions of the solar orb would have the same proportional velocity; the exterior atmosphere being much lighter than the interior would exhibit far greater changes and displacements. All these currents would be modified more or less by the sun's rotation, producing phenomena very similar to that of our trade winds. The upper currents of the dense transparent atmosphere would necessarily be inclined towards the solar poles; and in their progression thither they would be subject to many fluctuations which no doubt would frequently burst asunder the clouds and luminous atmosphere above, through which we could gaze upon the dark body of the sun beneath; as the immense wave rushes towards the poles successive portions of the luminous fluid above is flung aside, which will account for the progressive movement of the spots towards the nearest poles, and which will also account for the vast ridges or elevations and depressions observed. Moreover, the electric fluid, set free by chemical operations, would be conveyed or conducted to the higher regions, where it would stream forth in sheets of flame or columns with greater or less intensity, constantly varying their positions, producing all the phenomena already described, and accounting for the lack of uniform brightness on the sun's surface.

These conjectures are merely thrown out before this audience, though by no means matured. Hypotheses are frequently useful, when made stepping stones to truth, but never should be received as truth, only when supported by a vast collection of facts.

Some, perhaps, may be inclined to suppose the sun in a much higher state of progression than the earth. They may suppose it sanctified and glorified, and that it now occupies a place among the celestial order of worlds, and that the robe of light which it now wears is nothing more nor less than a cloud of celestial light and glory from the presence of the Lord. Be this as it may, it does not invalidate the theory of its being still governed by laws of heat, light and electricity. A glorified celestial body is still under the dominion of laws, though such laws, in some respects, may differ from the laws governing worlds of a lower order. If we were certain that the sun was a redeemed glorified world, this should not prevent us from endeavoring to search out, as far as possible, every law connected with his physical constitution, or with the various phenomena observed. Indeed, such knowledge, instead of being an obstacle in our way, should inspire us with a still more ardent desire to search out the more glorious works of that Almighty Being who governs and controls all of his creations, by laws of his own prescription.

The actual amount of heat radiated from the sun's surface, may be estimated approximately, by exposing given surfaces of material bodies to the vertical action of the sun's rays. The intensity of heat varies inversely as the square of the distance. And by making the calculations founded upon this law, we find that the heat at the sun's surface must be about 46,000 times greater than at the distance of the earth. Now by observing, with a thermometer, the sun's heating power in a given time, say for instance one second, on surfaces exposed vertically to his rays, and multiplying this by 46,000, the product will be the intensity of heat at the sun's surface. Again, by multiplying the superficial area of the sun's surface into its temperature, the product will be equal to the total amount of heat, radiated from that body in one second; this is found to be sufficient to melt 305,364,000 cubical miles of solid ice every second. In other words, if all the waters of our lakes and oceans were frozen into solid ice and thrown into the sun, it would be melted in one second; and if the same amount of ice should be thrown into the sun every second, the amount of heat which is radiated into the surrounding spaces would be sufficient to liquify these masses without in the least diminishing his temperature.

If the total amount of heat, radiated from the sun in one second, be multiplied by the number of seconds in 6000 years, the product will be the total amount of heat which has escaped from that luminous body since it first shone upon man. But how is this vast amount of heat supplied? This is a question not easily answered. If it existed in a latent state in the materials of the sun, there must have been very great chemical changes, to have set such an immense quantity free. It is evident, also, if heat consist of particles, radiated into the surrounding spaces, that the heat of the sun must be sensibly diminished, or in other words, that the sun must have cooled in proportion to the amount of heat escaped.

Remarks on Animalcules.

These creatures, the smallest with which we are acquainted, are called *animalcules of infusion*. They are thus named because they are produced in infusions and are such diminutive animals. For their production, nothing more is required than to pour water on any animal or vegetable substance, and let this infusion stand four or five days in a moderately warm room, when a species of fermentation will take place in the liquor; a slimy substance will grow over it, and an immense multitude of these animalcules, visible only by means of the magnifying glass, will be found in the fluid.

They may be obtained from different vegetable substances; but from some more, from others less.—Of the numerous infusions, however, with which experiments have been made, none have afforded such multitudes as thyme. If you put as much thyme as may be taken up between the ends of the thumb and two fingers into a wine glass, fill the glass with pure water, and let it stand for four days, you will be truly astonished when you look at a drop of it through the microscope; millions of animalcules swim about, and the celerity of their motion is so great that it makes the eye almost giddy.

The usual form of the animalcules, when at rest, appears to be spherical, or a little longish, or egg shaped. When they are in motion, their bodies are more or less elongated, accordingly as they swim about with more or less celerity. Some are seen darting along with great swiftness, the figure of which is nearly linear or resembling that of a small worm. Nothing can be conceived more lively; the bustle of a nest of ants, or swarm of gnats, is sluggishness to it. They dart in all directions, like an arrow from a bow, across the field of the microscope, in straight lines, when their bodies are drawn out greatly in length.

Sometimes they conceal themselves under the slime of the liquor, as if they were seeking their nutriment there; then they reappear, swimming in various directions, and dexterously passing each other when they meet. Sometimes they draw their bodies up together in a spherical form and then stretch them out again, in the same manner as a leech. Now they appear to dive down to the bottom of the drop, as only their hinder parts are visible; presently they spin round like a top, with incredible velocity. When one of these animalcules has entangled himself in a particle of slime, it is pleasing to see how he whirls himself round with it in order to extricate himself. It is equally pleasing to observe the motions which they make with the head or fore end; when they give themselves a spring to dart forward, they frequently turn the head quickly on one side, as if they were biting at something, and swim forward with the head in this oblique direction.

Curious readers will ask, how big the largest of these animalcules may be? An idea of their size may be given by observing, that upwards of 200 of the largest may be contained in the space occupied by one of the smallest grains of sand. A little mite is to one of these animalcules much the same as the turkey is to the sparrow.

The longevity of these animalcules cannot easily be ascertained. Those that we contemplate under the microscope do not die a natural death, but are destroyed by the evaporation of the fluid, which leaves thousands of their dead bodies on the glass side, in the shape of little, scarcely perceptible dust. It is observable, that in an infusion that has stood a week or more they become smaller, and at length seem to disappear; whether, however, these smaller animalcules are the same which have gradually diminished in size, or whether they are a more diminutive species which at last remains, cannot be ascertained.—[American Repertory.

[By Authority.]

AN ACT

IN relation to Marks and Brands:

SEC. 1. Be it enacted by the Governor and Legislative Assembly of the Territory of Utah, that the General Office for recording Marks and Brands shall be kept at the Seat of Government, and the Recorder therof shall be elected by the Legislative Assembly, and his term of office shall be four years and until his successor is elected and qualified.

SEC. 2. There shall also be an Auxilliary Recorder's Office in every other county in this Territory, the duties of which are hereby devolved upon the county Clerks of their respective counties.

SEC. 3. It shall be the duty of the Recorder at the Seat of Government to keep a fair and faithful record of all Marks and Brands in a Book suitable for the purpose, which shall be free for the inspection of all persons interested. Said Record shall show the name of each owner of the Mark or Brand so recorded, together with their place of residence; and it shall be his duty to define and designate the particular Mark or Brand to be used by each individual applying therefor.

SEC. 4. It shall be the duty of the Recorder to consult the convenience of each person applying for a Mark or Brand; Provided, the Mark or Brand so applied for has not previously been given or recorded to some other person, and to furnish to any person desiring it, a certificate of his or her Brand; Provided, also, if a character is wanted for a Brand for which there is no type, the person applying therefor shall pay the extra expense thereof.

SEC. 5. It shall be the duty of the General Recorder to furnish printed copies of all Marks or Brands to the Clerks of the different counties where such auxiliary office is established, to the amount that shall be applied and paid for at the rate of twenty-five cents for each printed sheet so printed, of common writing paper, printed on four sides.

SEC. 6. Whenever any person wishing to obtain a recorded Mark or Brand, application therefor shall be made to the General Recorder's Office at the Seat of Government; and if said applicant resides in any other county than the one in which the Seat of Government is located, said application shall be made to the Auxilliary Office in said county; and it shall be the duty of the Clerk of the county Court in such county, to report said application, if there shall be any on hand, once a month, to the General Recorder's Office, and when said Mark or Brand is received, to make an entry thereof in a book, suitable for the purpose, to be kept in his office, free to the inspection of all persons interested; and upon the reception of a certificate of a Brand, to deliver the same to the said applicant; he shall also keep, free to the inspection of all persons, a copy of all the Marks and Brands recorded in the Territory, which shall be furnished him by the General Recorder. Copies of all the recorded Marks and Brands shall be furnished said county Clerks, or upon the completion of every succeeding sheet.

SEC. 7. Any person finding cattle or any animals, having recorded Marks or Brands, in any enclosure or other place where they may be doing damage, shall immediately secure and take good care of the same, and search diligently for the owner thereof, and restore the animal or animals to said owner if the same can be found, and the owner shall be liable for all reasonable costs and damages. And if said owner cannot be found after diligent search, said animal or animals may be driven to the Stray Pounds.

SEC. 8. It shall be the duty of every person selling or disposing of any animal having a recorded Brand to reverse the same on said animal; but if any person shall alter or deface any recorded Brand on any animal, or place or cause to be placed his own or other Brand on any animal not belonging to said individuals, any person so offending shall be subject to any or all the penalties of this Act, together with further punishments, applicable to feloneous offences at the discretion of the Court having jurisdiction.

SEC. 9. Whenever any animal or animals having recorded Brands are put into the Stray Pound, it shall be the duty of the overseer or keeper of the Stray Pound, to use due diligence to ascertain the owner or owners of said stock, *both by reference to* the record of Brands and otherwise, and to notify the owner or owners of the same if known, or publish the same with the Marks or Brands in four public places in the county, or some newspaper having general circulation in said county within three days from the time said stock are put in the Pound.

SEC. 10. It shall be the duty of the Pound Keepers, and it is also required of all Public Officers of the Territory in their respective counties or precincts, to examine all trains and droves of cattle passing through their respective counties, and if they shall find any such animal or animals having recorded Brands, which said Brands do not belong to the individual purporting to own said animal or animals, and the same has not been reversed thereon; to take the said animal or animals into their custody as stolen property, and advertize the owner of said Band thereof, who shall be liable for all expense and damage so incurred, if it shall appear that he has disposed of said animal or animals without reversing his Brand.

SEC. 11. The Clerks of the Auxilliary Offices in their respective counties shall receive and forward a fee of fifty cents to the General Recorder for each Mark or Brand applied for, as also twenty five cents for each sheet of copies of printed Brands required; and he may receive the sum of twenty five cents for his own fee for every Brand applied for through his office, which shall be in full for his services.

SEC. 12. The Brands now recorded, and hereafter to be recorded, shall be arranged for distribution to the several counties, under the head of their several counties, so that all Marks and Brands owned in one county, shall be classed together, distinguishing at the head of each list the name of the county in which they belong.

SEC. 13. The Pound Keepers in their respective counties shall gather up all estrays therein, and after complying with the requirements of this Act in relation to seeking diligently for the owner, shall take a true description of, and value each estray remaining in his custody, and after advertising the same as herein required, devote all such estrays, or the proceeds arising from the sales thereof, to the benefit of the Emigrating Fund, the company of which shall pay over the appraised value of such estrays to the owner of said estrays, if found, after deducting all expenses and reasonable charges incurred.

SEC. 14. Any officer or individual violating any provision of this Act, shall be liable to a penalty of not less than one dollar, nor exceeding one thousand dollars, at the discretion of the Court having jurisdiction thereof.

SEC. 15. All acts and parts of acts heretofore passed in relation to Marks and Brands, are hereby repealed; provided, Marks and Brands heretofore recorded shall be and remain valid.

SEC. 16. Nothing herein shall be so construed as to interfere with peaceable animals running on their accustomed range, *unless they are known to be strays*, irrespective of any Mark or Brand.

W. RICHARDS,
President of the Council.
W. W. PHELPS,
Speaker of the House of Representatives.
BRIGHAM YOUNG,
Governor of Utah Territory.

Approved March 1, 1852.-9-4t

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