

The Project Gutenberg eBook of Jethro Wood, Inventor of the Modern Plow, by Frank Gilbert

This ebook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this ebook or online at www.gutenberg.org. If you are not located in the United States, you'll have to check the laws of the country where you are located before using this eBook.

Title: Jethro Wood, Inventor of the Modern Plow

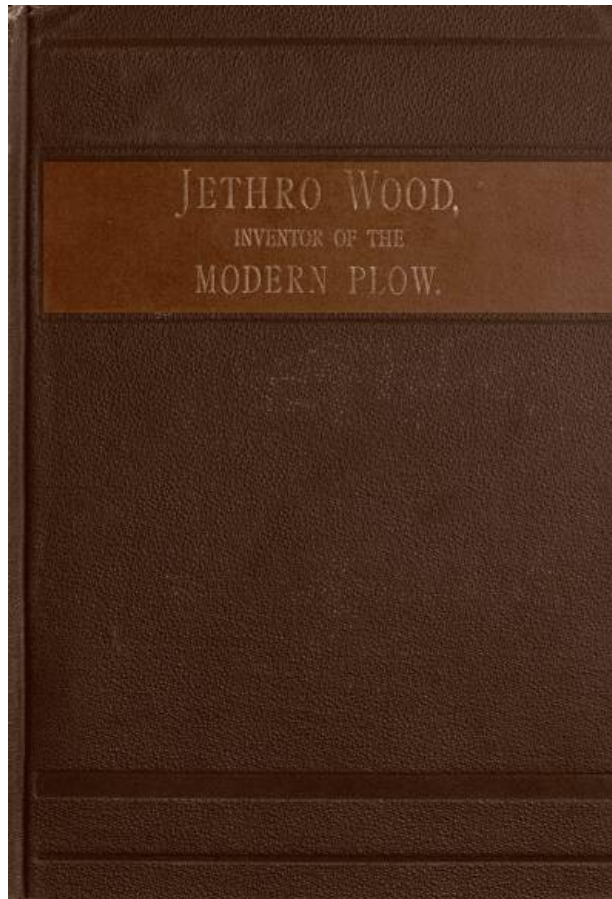
Author: Frank Gilbert

Release date: September 28, 2012 [EBook #40888]

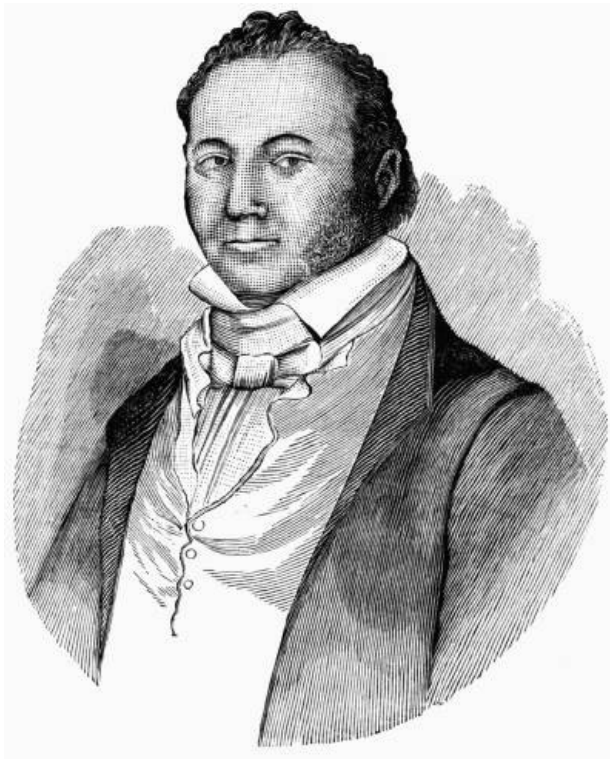
Language: English

Credits: Produced by Chris Curnow, Matthew Wheaton and the Online Distributed Proofreading Team at <http://www.pgdp.net> (This file was produced from images generously made available by The Internet Archive)

*** START OF THE PROJECT GUTENBERG EBOOK JETHRO WOOD, INVENTOR OF THE MODERN PLOW



**JETHRO WOOD,
INVENTOR OF THE
MODERN PLOW.**



JETHRO WOOD.

**JETHRO WOOD,
INVENTOR OF
THE MODERN PLOW.**

**A BRIEF ACCOUNT OF HIS LIFE, SERVICES, AND TRIALS;
TOGETHER WITH FACTS SUBSEQUENT TO
HIS DEATH, AND INCIDENT TO
HIS GREAT INVENTION.**

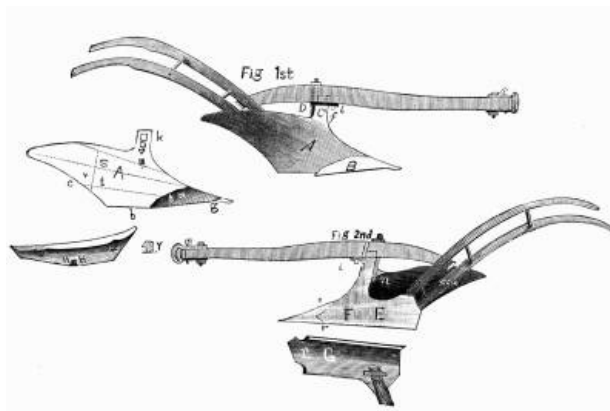
“No citizen of the United States has conferred greater economical benefits on his country than Jethro Wood—none of her benefactors have been more inadequately rewarded.”—*Wm. H. Seward.*

By FRANK GILBERT.

CHICAGO:

Entered according to Act of Congress, in the year 1882.
By I. U. KIRTLAND,
In the Office of the Librarian of Congress, at Washington.

STEREOTYPED AND PRINTED
BY
THE CHICAGO LEGAL NEWS CO.



FAC-SIMILE OF THE ORIGINAL WOOD PLOW.

EXPLANATION OF THE FOREGOING FAC-SIMILE.

SIDE VIEW of Plough. *A* Mould-board, the form of which is claimed as new. *B* Share claimed. *C* Standard claimed. *DD* Screw-bolt, and not confining the beam to the Standard. *a, b, c, d, e*, the 1st, 2d, 3d, 4th and 5th sides mentioned in the specification. *g, g*. Excavation at the fore part of the mould-board to receive the share which fills it up and forms an even surface. *h* Hole to receive the knob or head cast on the under side of the share, which, on being shoved up to its place, nooks under the mould-board at the upper side of the hole, and is held in its place by a wooden wedge driven between the knob and the lower side of the hole. *f* Notches in the Standard to receive the latch *i* in elevating or depressing the beam. *s, t, v*. Straight diagonal lines touching the mould-board the whole distance. *u* Vertical or plumb line touching the mould-board from top to bottom. *H* Reverse side of the share. *x* Knob to hold it fast to the mould-board. *y* Side view of knob. *zz* Shiplaps fitting under the point and edge of the mould-board. *k* Another form of standard keyed on top of beam. Fig. 2d, landside view: *E* The "landside". *F* part of landside cast with mould-board. *mm* Cast loops to hold the handles claimed. *n* Head of screw-bolt held by a shoulder made by a projection from the mould-board and standard, through which the bolt passes up to the beam. *o* Share claimed. *p* Shiplap claimed. *G* Inside view of landside. *r* Tennon at forward end to fit into a dovetailed mortice on the inside of that part which is cast with the mould-board.

PREFACE.

The immediate occasion of this little volume was a malignant misrepresentation from the pen of Ben: Perley Poore. With slight variation from the original text, the words of Thomas Jefferson about Benjamin Franklin and his maligners, quoted in the body of this monograph, apply to this case: I have seen with extreme

indignation the blasphemies lately vended against the memory of the father of the American plow. But his memory will be venerated as long as furrows are turned and soil tilled. The present object, however, is not so much to refute falsehood as to establish the truth, and make it a part of the permanent knowledge of the public. To the extent that this object shall be attained, will these labors be rewarded.

It is not the design of this publication to disparage any one; on the contrary, it is desired to give ample credit to all who contributed to the solution of the plow problem. If only brief mention is made of others, it is because they really deserved but little credit, or their merits are forever buried in obscurity. It is proposed to set forth without exaggeration, the claims of the supreme inventor in this line to the grateful remembrance of the public. And by the public is meant not only the American people, but all who are fed from the ample granaries of this country, or share the benefits of the improved tillage, whether on this continent or in Europe, made possible and actual by the inventive genius of Jethro Wood.

JETHRO WOOD; INVENTOR OF THE MODERN PLOW.

The last words ever penned by John Quincy Adams were these, written in the peculiarly tremulous hand of "the Old Man Eloquent:" "Mr. J. Q. Adams presents his compliments to the Misses Wood, and will be happy to see them at his house, at their convenience, any morning between 10 and 11 o'clock." This note was found upon his desk when he was stricken down with paralysis, February 21, 1848, in his seat in the House of Representatives. The Misses Wood here referred to were the daughters of Jethro Wood, then deceased. They were at that time engaged in a labor of love, and the venerable Ex-President was their friend therein. Prompted more by filial affection than by hope of gain, they were making a final effort to secure from Congress a proper recognition of their father's claim as an inventor. It is entirely safe to say that if Mr. Adams had been spared to the end of the Congress then in session, that claim would have been then duly recognized, and the name, services and genius of Jethro Wood become familiar to the American public.

Jethro Wood was born at Dartmouth, Massachusetts, on the sixteenth day of the third month of 1774. His parents were members of the Society of Friends. His mother, Dinah Hussey Wood, was a niece of Ann Starbuck, a woman of remarkable ability and high standing in colonial annals. Ann Starbuck was virtually governor of Nantucket. The niece was a woman of excellent intellect, and most winsome character. Her conversation sparkled with genial wit and good cheer. Her husband, John Wood, was a man of sterling worth, calm, self-poised, strong willed, and eminently influential. Jethro was their only son. On New Years Day, 1793, he was married to Sylvia Howland, at White Creek, Washington County, New York. The fruit of this marriage, every way a happy one, was a family of six children, namely: Benjamin; John; Maria, wife of Jeremiah Foote; Phœbe; Sarah, wife of Robert R. Underhill; Sylvia Ann, wife of Benjamin Gould. Of these children the only survivor is Mrs. Gould, who with her sister, Phœbe, were the Misses Wood of the Adams note. So much for the domestic setting of this diamond of inventive genius.

Even as a boy, Jethro Wood showed plainly the drift and trend of his mind. The child was indeed "father of the man," and almost from the cradle to the grave, he was an inventor. In his childish plays he seemed busied with the idea which he ultimately perfected. Many curious incidents and memories are treasured among the traditions of his neighbors and friends. "When only a few years old," writes a venerable man whose recollection spans two generations, "he moulded a little plow from metal, which he obtained by melting a pewter cup. Then, cutting the buckles from a set of braces, he made a miniature harness with which he fastened the family cat to his tiny plow, and endeavored to drive her about the flower-garden. The good old-fashioned whipping he received for this 'mischief,' was such as to drive all desire for repeating the experiment out of his juvenile head."

Such innate and ruling passion might be suppressed, but could not be subdued. As his mind matured, his thoughts took definite shape. His home was always upon a farm, but he was never a farmer, in the sense of Poor Richard's homely couplet:

"He who by the plow would thrive,
Himself must either hold or drive."

Born in comparative affluence, blessed with a good education, an ample library and a well equipped workshop, enjoying the correspondence of such men as Thomas Jefferson and David Thomas, he was unremitting in his endeavor to realize his ideal. "His chief desire," to quote further from our venerable correspondent, "was to invent a new mold-board, which, from its form, should meet the least resistance from the soil, and which could be made with share and standard, entirely of cast iron." To hit upon the exact shape for the mold-board he whittled away, day after day, until his neighbors, who thought him mad on the subject, gave him the soubriquet of the "whittling Yankee." His custom was to take a large oblong potato which was easy for the knife, and cut it till he obtained what he fancied was the exact curve.

The manhood home of Jethro Wood was at Scipio, Cayuga County, New York, a purely agricultural town, with nothing in its later history to distinguish it; but in its palmier early days of the present century, it must have

been a nursery of invention. Roswell Toulsoy, Horace Pease, and John Swan, of that town, each took out letters patent for improvements in plows, and that prior to the issuance of any patent to Mr. Wood. Their improvements were of no practical value, and played no part in the development of this branch of mechanism, but their efforts serve to show the state of the intellectual atmosphere breathed by the man who was destined to solve the knotty problem which underlies the very foundation of scientific agriculture.

Of the cotemporaries of Mr. Wood, who wrought at the solution of this problem, the most illustrious was Thomas Jefferson, statesman, philosopher and farmer.

In one of his letters to Jethro Wood, Mr. Jefferson spoke of his own labors in that direction, as the experiments of one whiling away a few idle hours, but herein he did himself injustice. His efforts, however, were far from exhaustive in their results, and it was with good reason that he urged Mr. Wood to go forward in his undertaking, and no doubt he was perfectly sincere in wishing him success. His correspondence, as published in nine large volumes, attests his long and deep interest in the problem, which it was reserved for Jethro Wood to solve. Having carefully examined those volumes, to glean all there is in them on this subject, I herewith append the observations found, for besides being in themselves interesting, in view of their authorship, they throw important light upon the general subject.

Under date of July 3, 1796, Mr. Jefferson wrote to Jonathan Williams: "You wish me to present to the Philosophical Society the result of my philosophical researches since my retirement. But, my good Sir, I have made researches into nothing but what is connected with agriculture. In this way I have a little matter to communicate, and will do it ere long. It is the form of a mould-board of *least resistance*. I had some years ago conceived the principle of it, and I explained it then to Mr. Rittenhouse. I have since reduced the thing to practice, and have reason to believe the theory fully confirmed. I only wish for one of those instruments used in England for measuring force exerted in the drafts of different ploughs, etc., that I might compare the resistance of my mould-board with that of others. But these instruments are not to be had here. In a letter of this date to Mr. Rittenhouse I mention a discovery in animal history, very signal indeed, of which I shall lay before the society the best account I can, as soon as I shall have received some other materials collecting for me.

"I have seen, with extreme indignation, the blasphemies lately vended against the memory of the father of American philosophy. But his memory will be venerated as long as the thunder of heaven shall be heard or feared."

March 27, 1798, Jefferson wrote to Mr. Patterson: "In the life time of Mr. Rittenhouse, I communicated to him the description of a mould-board of a plough, which I had constructed, and supposed to be what we might term the *mould-board of least resistance*. I asked not only his opinion, but that he would submit it to you also. After he had considered it he gave me his own opinion that it was demonstratively what I had supposed, and I think he said he had communicated it to you. Of that however, I am not sure, and therefore, now take the liberty of sending you a description of it, and a model which I have prepared for the Board of Agriculture of England, at their request. Mr. Strickland, one of their members, had seen the model, also the thing itself in use on my farm, and thinking favorably of it, had mentioned it to them. My purpose in troubling you with it is to ask you to examine the description rigorously, and suggest to me any corrections or alterations which you may think necessary. I would wish to have the idea go as correctly as possible out of my hands. I had sometimes thought of giving it into the Philosophical Society, but I doubted whether it was worthy of their notice, and supposed it not exactly in the line of their publications. I had therefore contemplated sending it to some of our agricultural societies, in whose way it was more particularly, when I received the request of the English board. The papers I enclose you are the latter part of a letter to Sir John Sinclair, their president. It is to go off by packet, wherefore I wish to ask the favor of you to return them with the model in the course of the present week, with any observations you will be so good as to favor me with."

Writing from Washington, July 15, 1808, to Mr. Sylvestre, in acknowledgment of a plow received from the Agricultural Society of the Seine (France), he adds: "I shall with great pleasure attend to the construction and transmission to the society of a plough with my mould-board. This is the only part of that useful instrument to which I have paid any particular attention. But knowing how much the perfection of the plough must depend, 1st, on the line of traction; 2d, on the direction of the share; 3d, on the angle of the wing; 4th, on the form of the mould-board; and persuaded that I shall find the three first advantages eminently exemplified in that which the society sends me, I am anxious to see combined with these a mould-board of my form, in the hope it will still advance the perfection of that machine. But for this I must ask time till I am relieved from the cares which have more right to all my time—that is to say, till next spring;" *i. e.* until after the expiration of his second term as President of the United States.

The importance of any step in civilization can be understood only in its relations, antecedent causes and actual results.

The *Scientific American*, which is certainly good authority in such matters, ranks Jethro Wood with Benjamin Franklin, Eli Whitney, Robert Fulton, Charles Goodyear, Samuel B. Morse, Elias Howe, and Cyrus H. McCormick, and these are certainly the great names and this a just classification. Each in his way laid the foundation on which all inventors in his respective line have built, and must continue to build, and none of them all came so near perfecting his grand idea as Mr. Wood. His now venerable daughter stated the exact truth when she remarked in a letter not designed for publication: "My father patented the shape and construction of the plow. He took the iron and shaped the plow that turns the furrow for every product of the soil in America. His plow has never been improved. It came from his hand simple and perfect, as it now is, and there is no other plow now in use." It was not the use of cast iron that he invented, although the use of "pot metal" by him occasioned a great deal of hostility to the original Wood plow.

Jethro Wood took out two plow patents, and those who wish to belittle his work, descant upon the first as if it were his only claim to credit. That first patent was issued in 1814. It fell far short of satisfying the patentee's

ambition. The plows made under it must have been a great improvement on any then in use, for although he abandoned it almost from the first, a great many of them were sold during the period between the first and the second patents. The second patent dates from 1819. The natal day of the modern plow may be fairly set down as September 1, 1819. The original specifications in this plow deserve to be given in full, and may well be inserted in this connection. The document was the handiwork of Mr. Wood himself, and runs thus:

"The Schedule referred to in these Letters Patent, and making part of the same, containing a description in the words of the said Jethro Wood himself of his improvement in the construction of Ploughs.

"Considering the manifold errors and defects in the construction of Ploughs, and the inconveniences experienced in the use of them, the petitioner and inventor hath applied the powers of his mind to the improvement of this noble utensil, and produced a Plough so far superior to those in common use, that he asks an exclusive privilege for the same from the government of his country.

"The principal matters for which he solicits Letters Patent, he now reduces to writing, and explains in words and sentences as appropriate and significant as he possibly can. But, being perfectly aware of the feebleness and insufficiency of language to convey precise and adequate ideas of complicated forms and proportions, the said Jethro Wood annexes to these presents, a delineation upon paper of his said new and improved Plough, with full and explanatory notes; urging with earnestness and respect that the delineation and notes may be considered as a part of this communication. The said petitioner and inventor also, being perfectly convinced, as a practical man, that a model of his inventions and improvements will convey and preserve the most exact and durable impressions of the matters to which he lays claim, he sends herewith a model of the due form and proportion of each, as a just exhibition of his principle and of its application to the construction and improvement of the Plough, requesting that the same may be kept in the Patent Office, as a perpetual memorial of the invention and its use.

"In the first place, the said Jethro Wood claims an exclusive privilege for constructing the part of the Plough, heretofore, and to this day, generally called the mould-board, *in the manner hereinafter mentioned*. This mould-board may be termed a plano-curvilinear figure, not defined nor described in any of the elementary books of geometry or mathematics. But an idea may be conceived of it thus:

"The land-side of the Plough, measuring from the point of the mould-board, is two feet and two inches long. It is a strait-lined surface, from four to five and one-half inches wide, and half an inch thick. Its more particular description will be hereinafterwards given. It is sufficient to observe here, that of the twenty-six inches of length on the land-side, eighteen inches belong to the part of the Plough strictly called the land-side, and eight inches to the mould-board. The part of the mould-board comprehended by this space of eight inches is very important, affording weight and strength and substance to the Plough; enabling it the better to sustain the cutting-edge for separating and elevating the soil or sward, and likewise the standard for connecting the mould-board with the beam, as will hereinafter be described more at large.

"The figure of the mould-board, as observed from the furrow-side, is a sort of irregular pentagon, or five-sided plane, though curved and inclined in a peculiar manner. Its two lower sides touch the ground, or are intended to do so, while the three other sides enter into the composition of the oblique, or slanting mould-board, over-hanging behind, vertical midway, and projecting forward. The angle of the mould-board, as it departs from the foremost point of, or at, the land-side, is about forty-two degrees, and the length of it, or, in other words, of the first side, is eleven inches. The line of the next, or the second side, is nearly, but not exactly parallel with the before-mentioned right-lined land-side, for it widens or diverges from the angle at which the first and second sides join towards its posterior or hindermost point, as much as one inch. Hence, the distance from the hindermost point of the mould-board, at the angle of the second and third sides, directly across to the land-side, is one inch more than it is from the angle of the first and second sides, directly across. The length of this, the second side, is eight inches. The next side, or what is here denominated the third side, leaves the ground or furrow in a slanting direction backward, and with an over-hanging curve, exceeding the perpendicular outwards from three to six inches, according to the size of the Plough. The length of this third side is fourteen inches and one-half. The fourth side of this mould-board is horizontal, or nearly so, extending from the uppermost point of the third side, to the fore part, or pitch, eighteen inches. The fifth, or last side, descends or slopes from the last mentioned mark, spot, or pitch, to the place of beginning at the low and fore point of the mould-board, where it joins the land-side. Its length is thirteen inches.

"Besides these properties and proportions of his mould-board, the said Jethro Wood now explains other properties which it possesses, and by which it may be and is distinguished from every other invented thing. The peculiar curve has been compared to that of the screw auger; and it has been likened to the prow of a ship. Neither of these similitudes conveys the fair and proper notion of the invention.

"The mould-board, which the said Jethro Wood claims as his own, and which is the result of profound reflection and of numberless experiments, is a sort of plano-curvilinear surface, as herein-before stated, having the following bearings and relations: A right line, drawn by a chalked string or cord, or by a straight rule, diagonally or obliquely upwards and backwards from a point two inches and a half inch above the tip or extremity of the mould-board to the angle where the third and fourth sides of the mould-board join, touches the surface the whole distance, in an even and uniform application, and leaves no sinking, depression, hole, cavity, rising, lump, or protuberance, in any part of the distance. So, at a distance half way between the diagonal line just described, and the angle between the first and second sides, a line drawn parallel to the diagonal line already mentioned will receive the chalked string or cord, or the straight rule, as on an uniform and even surface without the smallest bend, sinuosity, or bunch, whereby earth might adhere to the mould-board, and impede the motion and progress of the Plough, under, through and along the soil.

"In like manner, if a point be taken one inch behind the angle connecting the second and third sides, and a perpendicular be raised upon it, that perpendicular will coincide with the vertical portion of the mould-board

in that place; or, in other words, if a plumb line be let fall so as to reach a point one inch behind the last mentioned angle, then such a plumb line will hang parallel with the mould-board the whole way; the line of the mould-board there, neither projecting nor receding but being both a right line and a perpendicular line.

“Moreover, if a right line be drawn from a point on the just described perpendicular, an inch, or thereabouts, above the upper margin of the fourth side, and from the point to which the said perpendicular, if continued, would reach; if, the said Jethro Wood repeats, a right line be drawn downward and forward, not exactly parallel to the diagonal herein already described, but so diverging from the same that it is one inch more distant or further apart, at its termination on the fifth side of the mould-board, than at its origin or place of beginning; such line, so beginning, continued, and ended, is a right line parallel to the mould-board along its whole course and direction, and the space over which it passes has no inequality, hill, or hollow thereabout.

“Furthermore, an additional property of his mould-board is, that, if it be measured and proved various ways, vertically and obliquely, by the saw in fashioning it, by the rule in meeting it, and by the chalk-line in determining it, the capital and distinguishing character of right lines existing on, over and along the peculiar curve which his mould-board describes, is always and inseparably present. This grand and discriminating feature of his mould-board, he considers as of the utmost importance.

“He therefore craves the aid and elucidation of his drawing, and of his model, in their totality and in their several parts, to render plain and sure whatever there may be, from the abstruse and recondite nature of the subject, uncertain or dubious in the language of his specification.

“In the second place, the said Jethro Wood claims an exclusive right and privilege in the construction of a standard of cast iron, like the rest of the work already described, for connecting the mould-board with the beam. This standard is broad, stout, strong; and rises from the fore and upper part of the mould-board, being cast with it, and being a projection or continuation of the same from where the fourth and fifth sides meet. Its figure, strength, and arrangement are such as best to secure the connexion, and to enable the standard thus associated with the beam, to bear the pull, tug, and brunt of service. By a screw bolt and nut properly adjusted above the top of the standard and acting along its side, assisted, if need require, by a wedge for tightening and loosening, the beam may be raised and lowered; and the mould-board, with its cutting edge, enabled to make a furrow of greater or smaller depth, as the ploughman may desire, and a latch and key fixed to the beam, and capable of being turned into notches, grooves, or depressions on one edge or narrow side of the standard, serves to keep the beam from settling or descending. By means of these screw bolts, wedges, latches, and keys, with their appropriate notches, teeth, and joggles, the Plough may be deepened or shallowed most exactly.

“In the third place, the said Jethro Wood claims an exclusive privilege in the inventions and improvements made by him in the construction of the cutting edge of the mould-board, or what may be called, in plain language, the plough-share. The cutting edge consists of cast iron, as do the mould-board and land-side themselves. It is about twelve inches and one half of one inch long, four inches and one half of one inch broad, and in the thickest part three quarters of an inch thick. It is so fashioned and cast, that it fits snugly and nicely into a corresponding excavation or depression at the low and fore edge of the mould-board, along the side herein before termed the first side. When properly adapted, the cutting edge seems, by its uniformity of surface and evenness of connexion, to be an elongation of the mould-board, or, as it were, an extension or continuation of the same. To give the cutting edge firm coherence and connexion, it is secured to the mould-board by one or more knobs, pins or heads in the inner and higher side, which are received into one or more holes in the fore and lower part of the mould-board. By this mechanism, the edge is lapped on and kept fast and true, without the employment of screws. That the cutting edge may be the more securely and immovably kept in its place, it has a groove, or ship-lap of one inch in length, below, or at its under side, near the angle between the first and second sides, for the purpose of holding it, and for the further accomplishment of the same object, another groove or ship-lap, stouter and stronger than the preceding, is also cast in the iron, at or near the point of the mould-board, so as to cover, encase, and protect it effectually, on the upper and lower sides, but not on the land side.

“After the cutting edge is thus adapted and adjusted to the mould-board by means of the indentations, pins, holes, ship-laps, and fastenings, it is fixed to its place and prevented from slipping back, or working off, by wedges or pins of wood, or other material, driven into the holes from the inner and under side, and forced tight home by a hammer.

“In the fourth place, the said Jethro Wood claims the exclusive right of securing the handles of his plough to the mould-board and land-side of the plough by means of notches, ears, loops, or holders, cast with the mould-board and land-side respectively, and serving to receive and contain the handles, without the use of nuts and screws. For this purpose one or more ears or loops, or one or more pairs of notches or holders are cast on the inner side of the mould-board and land side, toward their hinder or back parts, or near their after margins, for the reception of the handles of the Plough. And these, when duly entered and fitted, are wedged in, instead of being fastened by screws.

“In the fifth place, the said Jethro Wood claims an exclusive right to his invention and improvement in the mode of fitting, adapting and adjusting the cast iron landside to the cast iron mould-board. Their junction is after the manner of tenon and mortice; the tenon being at the fore end of the land-side and the mortice being at the inside of the mould-board and near its point. The tenon and mortice are joggled, or dove-tailed together in the casting operation, so as to make them hold fast. The fore end of the tendon is additionally secured by a cast projection from the inside of the mould-board for its reception; and if any other tightening or bracing should be requisite, a wooden wedge, well driven in, will bind every part effectually, and all this is accomplished without the assistance or instrumentality of screws.

“The said inventor and petitioner wishes it to be understood, that the principal metallic material of his Plough is cast iron. He has very little use for wrought iron, and by adapting the former to the extent he has done, and

by discontinuing the latter, he is enabled to make the Plough stronger and better, as well as more lasting and cheap.

"He also claims, and hereby asserts the right, of varying the dimensions and proportions of his Plough, and of its several sections and parts, in the relations of somewhat more and somewhat less of length, breadth, thickness, and composition, according to his judgment or fancy, so that all the while he adheres to his principle and departs not from it.

"Regarding each and every of the matters submitted as very conducive to the reputation and emolument of the said Jethro Wood, he relies confidently upon a benign and favorable construction of his petition and specification, by the constituted authorities of his country.

"Given under his hand, at the city of New York, this fourteenth day of August, one thousand eight hundred and nineteen (1819), in the presence of two witnesses, to wit:

SAM'L L. MITCHELL }
J. G. BOGERT } JETHRO WOOD."

This patent expired by its own limitation in fourteen years, when it was renewed or continued for another term of fourteen years. In view of the comparative ease and speediness with which the inventors of the present day, or their assigns, utilize really valuable patents, it would be inferred, in the absence of specific knowledge to the contrary, that twenty-eight years constituted a sufficiently long period for the enjoyment by Mr. Wood, of "the full and exclusive right and liberty of making, constructing, using and vending to others to be used," the plow which he had invented. No doubt some members of Congress in refusing to continue the patent for a third term, acted from conscientious motives. But in point of fact, the period was occupied in a series of struggles calamitous to the inventor, to the history of which we must now turn. These struggles were unlike those in the lives of some other great inventors, notably, Goodyear and Howe. It was not a warfare for existence, the wolf of poverty staring him in the face. The broad fields which he had inherited from his father were adequate immunity from the sad fate too frequently allotted to inventors. But no benefactor of mankind in the domain of mechanism ever experienced more iniquitous treatment than Jethro Wood did.

Before the year 1819 closed, his mission as an inventor was an accomplished fact. The popular name given his implement, "The Cast Iron Plow," from its entire abandonment of wrought iron in its construction, needed no change to be the noblest gift ever made to agriculture. In the ideal, hope had ripened into full fruition. And now, at this day, looking at the matter in the light of the past, seeing the absolutely incalculable benefits of the invention, it seems almost incredible that the American people, then even more than now, a nation of farmers, should not have hailed the new plow as an unspeakable boon, especially the community in which he dwelt, for Cayuga county then, as now, under a high state of cultivation, was and is peopled by a population of much more than average intelligence. But an inventor, like "a prophet, is not without honor save in his own country." His neighbors gravely shook their heads at "Jethro's folly." With almost entire unanimity they agreed that the new contrivance would never work. His trials and difficulties at this stage of progress are told as follows, by one who wrote largely from personal recollection:

"He immediately began to manufacture his plows, and introduce them to the farmers in his neighborhood. The difficulties which he now encountered would have daunted any man without extraordinary perseverance and a firm belief in the inestimable benefit to agriculture sure to result from his invention. He was obliged to manufacture all the patterns, and to have the plow cast under the disadvantages usual with new machinery. The nearest furnace was thirty miles from his home, and, baffled by obstacles which unskillful and disobliging workmen threw in his way, he visited it, day after day, directing the making of his patterns, standing by the furnaces while the metal was melting, and often with his own hands aiding in the casting.

"When, at length, samples of his plow were ready for use, he met with another difficulty in the unwillingness of the farmers to accept them. 'What,' they cried, in contempt, 'a plow made of pot metal? You might as well attempt to turn up the earth with a glass plowshare. It would hardly be more brittle.'

"One day he induced one of the most skeptical neighbors to make a public trial of the plow. A large concourse gathered to see how it would work. The field selected for the test was thickly strewn with stones, many of them firmly imbedded in the soil, and jutting up from the surface. All predicted that the plow would break at the outset. To their astonishment and Wood's satisfaction, it went around the field, running easily and smoothly, and turning up the most perfect furrow which had ever been seen. The small stones against which the farmer maliciously guided it, to test the 'brittle' metal, moved out of the way as if they were grains of sand, and it slid around the immovable rocks as if they were icebergs. Incensed at the non-fulfillment of his prophecy, the farmer finally drove the plow with all force upon a large boulder, and found to his amazement that it was uninjured by the collision. It proved a day of triumph for Jethro Wood, and from that time he heard few taunts about the pot-metal.

"It was soon discovered that his plow turned up the soil with so much ease that two horses could do the work for which a yoke of oxen and a span of horses had sometimes been insufficient before; that it made a better furrow, and that it could be bought for seven or eight dollars; no more running to the blacksmith, either, to have it sharpened. It was proved a thorough and valuable success. Thomas Jefferson, from his retirement at Monticello, wrote Wood a letter of congratulation, and although his theory of the construction of mould-boards had differed entirely from the inventor's, gave his most hearty appreciation to the merits of the new plow."

In this connection may be told a curious episode, one in itself worthy of record, and strikingly illustrative of the perversities of fortune to Mr. Wood in those gloomy days. It is the story of a Czar and a Citizen.

All uncertainty as to the feasibility of the new plow having been removed, and actuated by that broad philanthropy which was one of the peculiar charms in the character of Mr. Wood, he desired to extend as

widely as possible the area of his usefulness, and concluded to make the Czar of Russia, so long the chief grain exporting country of the world, the present of one of his plows. During the Revolutionary war, then fresh in the American mind, that great sovereign, Catherine of Russia, had been the staunch friend of this country, and that, too, without being impelled by jealousy of Great Britain. It seems to be a peculiar trait in the Romanoff family to admire liberty in the abstract, however absolute in practice. Sharing the prevailing good will toward Russia, Mr. Wood conceived this happy thought of making a truly substantial contribution to Cossack civilization, a civilization ever ready, with all its crudeness, to adopt foreign improvements. That gift, in one point of view slight, proved of great benefit to Russian agriculture. It is impossible to state the extent of actual advantage derived by Russia from that truly imperial gift. It was in effect giving to that country, second only to the United States in area of tillage, in proportion to population, the free use of the perfected plow. In an old copy of the New York *Tribune*, in its palmy days of Horace Greeley and Solon Robinson, the tale of the Plow and the Ring is unfolded. It runs thus:

“During the year, 1820, Jethro Wood sent one of his plows to Alexander I, Emperor of Russia, and the peculiar circumstances attending the gift and its reception formed a large part of the newspaper gossip of the day. Wood, though a man of cultivation, intellectually as well as agriculturally, was not familiar with French, which was then as now the diplomatic language. So he requested his personal friend, Dr. Samuel Mitchill, President of the New York Society of Natural History and Sciences, to write a letter in French to accompany the gift.

“The autocrat of all the Russias received the plow and the letter, and sent back a diamond ring—which the newspapers declared to be worth from \$7,000 to \$15,000—in token of his appreciation. By some indirection, the ring was not delivered to the donor of the plow, but to the writer of the letter, and Dr. Mitchill instantly appropriated it to his own use. Wood appealed to the Russian Minister at Washington for redress. The Minister sent to His Emperor and asked to whom the ring belonged, and Alexander replied that it was intended for the inventor of the plow. Armed with this authority, Wood again demanded the ring of Mitchill. But there were no steamships or telegraphs in those days, and Mitchill declared that in the long interval in which they had been waiting to hear from Russia, he had given it to the cause of the Greeks, who were then rising to throw off the yoke of their Turkish oppressors. A newspaper of the time calls Mitchill’s course ‘an ingenious mode of quartering on the enemy,’ and the inventor’s friends seem to have believed that the ring had been privately sold for his benefit. At all events it never came to light again, and Wood, a peaceful man, a Quaker by profession, did not push the matter further.”

Perhaps another and quite as potent a reason why Friend Wood did not follow up this matter was that weightier affairs demanded his immediate and entire attention. One difficulty was overcome only to develop another. No sooner had he silenced the cavils of the farmers and demonstrated the value of his patent, than infringements upon his rights threatened to, and actually did, rob him of the fruits of his invention. “Uneasy rests the head that wears a crown” of genius.

The patent laws of that day were very imperfect, and there was a strong prejudice against their enforcement. The cry of “no monopoly” was raised. Mr. Wood had expended many thousands of dollars in perfecting his patterns and getting ready to supply the demand which he felt sure would arise for his plows, many of which, during the first few years, he gave away, that their value might be established to the satisfaction of the public. The stage of probation over, the plow makers of the country, defiant of patent law, engaged in their manufacture. His patent had fourteen years to run. In an incredibly short time their use by the farmers in all parts of the land became almost universal, and had he been allowed a royalty, however small, he would have realized a vast fortune. Instead of that he very nearly exhausted all his property in unavailing endeavors to establish through the courts his rights as inventor and patentee.

In 1833, when his patent expired, Congress granted a renewal for fourteen years. He was now bowed with the burden of years, and debts incurred in trying to protect himself against infringers. His remaining days were spent in vain efforts to maintain his rights. His broad and kindly nature had conceived noble plans for the use of the wealth which at one time seemed so nearly within his reach. He had always been deeply interested in education, and had fortune smiled upon him it is not too much to say that in spirit, however different in detail, Jethro Wood would have anticipated Stephen Girard, Ezra Cornell and John S. Hopkins, in nobly founding a great institution of learning.

In private life Jethro Wood was a model man. If he had faults it is impossible to ascertain them, for it would seem, from the concurrent testimony of all who were acquainted with him, that

“None knew him but to love him,
None name him but to praise.”

Although a consistent member of the Society of Friends, Mr. Wood was extremely liberal in his religious views, and did not conform to the peculiar dress of the sect. He had that truly Catholic spirit so admirably characteristic of the great Quaker-poet, John G. Whittier. Not even the cruel wrongs he sustained at the hands of dishonest infringers could turn the sweetness of his kindly temper. Nature had endowed him richly in every way, and no gift had been abused. Physically, his was the highest type of manly beauty. Six feet and two inches in height, perfect in proportion, courtly in manner, his presence was worthy his character.

We will not linger over the closing scene of his eventful life. That belongs to the sacred secrecy of private grief. His death occurred at the very threshold of a new conflict, and upon it his son and executor, Benjamin Wood, entered with intelligent zeal. The closing of it being reserved for two of his daughters.

The story of these new labors was well told several years ago by a journalist familiar with the facts, and we cannot do better than to unearth the record from its musty file, and by transcribing it to these pages, give it a kind of resurrection worthy its importance.

"After the death of Jethro Wood, his son Benjamin, who received the invention as a legacy, continued his efforts to wrest justice from the unwilling hand of the law. Nearly all his father's failures had proceeded from the inadequacy of the patent laws, which were almost worthless to protect the rights of the inventor. Even now a patent is worth little until it has been fought through the Supreme Court of the United States. In those days so many obstacles were thrown in the way of inventors, and the combinations against them were so formidable, that Eli Whitney, in trying to establish his right to the cotton-gin in a Georgia court, while his machine was doubling and trebling the value of lands through the State, had this experience, which is given in his own words: I had great difficulty in proving that the machine had been used in Georgia, *although at the same moment there were three separate sets of this machinery in motion within fifty yards of the building in which the court sat, and all so near that the rattling of the wheels was distinctly heard on the steps of the Court House.*

"Similar difficulties had met Jethro Wood in *his* suits; so his son resolved to strike at the root of the evil by securing a reform in the laws. He accordingly went to Washington, where he remained through several sessions, always working to this end. Clay, Webster, and John Quincy Adams, all of whom had known Jethro Wood and his invention, aided his son powerfully with their votes and counsel, and he succeeded in securing several important changes in the patent laws.

"Then he returned to New York, and commenced suit to resist encroachments on his right, and the wholesale manufacture of his plow by those who refused to pay the premium to the inventor. The 'Cast-Iron Plow' was now used all over the country, and formidable combinations of its manufacturers united their capital and influence against Benjamin Wood. William H. Seward, then practicing law, was retained as Wood's counsel, and the plow-makers engaged all the talent they could muster to oppose him.

"Heretofore it had never been contradicted that Jethro Wood was the originator of the plow in use, but now his right to the invention was denied, and it was alleged that his improvements had been forestalled by other makers. Again and again the case was adjourned, and Europe and America were ransacked for specimens of the different plows which were declared to include his patent.

"Mr. Wood also obtained from England samples of the plows of James Small and Robert Ransom. He searched New-Jersey to find the Peacock plow which was said to have a cast-iron mould-board of exactly similar shape to his father's. Everywhere in that State he found 'Wood's plow' in use, but he could hear nothing of the one he sought. At length riding near a farm-house he discovered one of the old 'Newbold-Peacock plows' lying under a fence, dilapidated and rust-eaten. 'We don't use it any more,' the farmer replied to his inquiries, 'we've got one a good deal better.' 'Will you sell this?' asked Wood. 'Well, yes.' And Wood, glad to get it at almost any price, paid the keen farmer, who took advantage of his evident anxiety, two or three times the price of a new plow, and added the old one to his specimens.

"This motley collection of implements was brought into court and exhibited to the judges. At last, after the case had dragged its slow length along, through many terms, and the plaintiff was nearly worn out with the law's delay, the time for final trial and decision arrived. The combination of plow-makers feared that the case would go in Wood's favor, and made every effort to keep him out of court, that he might lose it by default. During his long entanglement in the law, he had contracted many debts, and one of his opponents had managed to purchase several of these accounts. Just before the case was to be heard for the last time, this worthy plow manufacturer, attended by a sheriff, and armed with a warrant to arrest Wood for debt, appeared at the front door of his house. Fortunately Wood had had a few minutes warning, and slipping out at the back door, he made his way under cover of approaching darkness to a house of a friendly neighbor. There he procured a horse and started for Albany, 150 miles distant, hearing every moment in fancy the clattering of hoofs at his heels.

"As if fortune could not be sufficiently ill-natured, his horse proved vicious and unmanageable, and thrice in the tedious journey threw the rider from his saddle upon the frozen earth, so injuring him, that he was barely able to go on.

"On arriving at Albany he found himself not a moment too soon. The case had an immediate hearing, and after three days' trial the Circuit Court decided unequivocally that the plow now in general use over the country was unlike any other which had been produced; that the improvements which rendered it so effective were due to Jethro Wood, and that all manufacturers must pay his heirs for the privilege of making it.

"This was a great triumph; but it was now the late autumn of 1845, and the last grant of the patent had little more than a year to run. Wood again repaired to Washington to apply for a new extension, but the excitements of so long a contest had been too much for him. Just as he had recommenced his efforts they were forever ended. While talking with one of his friends, he suddenly fell dead from heart disease, and the patent expired without renewal.

"The last male heir to the invention was no more. On settling the estate, it was found that while not a vestige remained of the large fortune owned by Jethro Wood when he began his career, *less than five hundred and fifty dollars had ever been received from his invention.*

"The after history of the case is a brief one. Four daughters of Jethro Wood alone remained to represent the family. In the winter of 1848 the two younger sisters went to Washington to petition Congress that a bill might be passed for their relief, in view of the inestimable services of their father to the agricultural interests of the country. Webster declared that he regarded their father as a 'public benefactor,' and gave them his most efficient aid; Clay warmly espoused their cause, and the venerable John Quincy Adams, with his trembling hand—then so enfeebled by age that he rarely used the pen—wrote them kind notes, heartily sympathizing with them. On one memorable day, while they were in the House gallery, Mr. Adams, at his desk on the floor, wrote them briefly in relation to their case. A few minutes later he was struck with the fatal attack under which he exclaimed, 'This is the last of earth; I am content,' and was borne dying to the

Speaker's room. The tremulous lines, the last his hand ever traced, were found on his desk and delivered to Miss Wood.

"A bill providing that in these four heirs should rest for seven years the exclusive right of making and vending the improvements in the construction of the cast-iron plow; and that twenty-five cents on each plow might be exacted from all who manufactured it, passed the Senate unanimously. But Washington already swarmed with plow manufacturers. The city of Pittsburgh alone sent five to look after their interests. Money was freely used, and the members of the House Committee who were to report on the bill were assured that during the 28 years of the patent, Wood's family had reaped immense wealth, and wished to keep up a monopoly. The two quiet ladies, fresh from the retirement of a Quaker home, where they had learned little of the world, were even accused of attempting to secure its extension through bribery. It was the wolf charging the lamb with roiling the water. So ignorant were they of such means, that, though the Chairman of the Committee plainly told the younger lady in a few words of private conversation that a very few thousand dollars would give her a favorable verdict, she did not understand the suggestion till after an unfavorable report was presented, and the bill killed in the House.

"When they were about to leave Washington, some friendly members of Congress advised them to deposit the valuable documents which had been used in their suit, including the letter from Thomas Jefferson to Jethro Wood, in the archives of the House, where they could only be withdrawn on the motion of some member. They did so, and left them for some years uncalled for. When at last they applied for them they could not be found. Nor from that time to the present has any trace of them been discovered by any of the family. Thus perished the last vestige of proof relating to this ill-fated invention."

This is a fair and candid statement, one fully sustained by unimpeachable documentary evidence. Especially by the somewhat voluminous pamphlet entitled "Documents relating to the improvements of Jethro Wood in the Construction of the Plough." A careful examination of the testimony therein embodied, and of the Congressional Reports on the subject, warrant the foregoing statements.

It is not strange that in an early annual report of the United States Commissioner of Agriculture, that official should have remarked with some bitterness that "Although Wood was one of the greatest benefactors to mankind by this admirable invention, he never received, for all his thought, anxiety and expense, a sum of money sufficient to defray the expenses of his decent burial." The time long since passed forever to seek pecuniary indemnity; but a debt of gratitude never outlaws, and it is due to the great inventor that his countrymen should gratefully cherish his memory. Every year adds to the debt we all owe him. As the area of cultivation widens, the obligation deepens. Already America is the foremost nation of all the earth in the production of wheat and provisions, the latter being in reality corn in meat form. In exchange for our food supplies, the United States is draining Europe of its gold at an enormous rate, and the fundamental element in the production of American wealth, is our great implement of tillage. American prosperity is the monumental glory of Jethro Wood and his plow.

"The Balance Sheet of the World" shows that the United States can boast more acres of tillage, in proportion to population, than any other country on the globe; and in grain production, outstrips all competitors. Of such a record every American citizen may well be proud, and it should be remembered that without the genius of Wood such a record could not have been made, even approximately. But in order to a just appreciation of the importance of the modern plow and the usefulness of the inventor of it, one should take a retrospective glance, tracing, as best we may without tedious details, the steps which led from the use of a forked stick to the present implement for following the ground. The *Scientific American*, which ought to be good authority on such a subject, in speaking of the Wood patent, says: "Previously the plow was a stick of wood plated with iron." If this does sound like an exaggeration, but is really a plain statement of fact, consider for a moment what the plow really is in its relation to civilization.

The savage lives by the chase and upon the bounty of untilled nature. The first steps toward civilization are to domesticate animals, and cultivate the soil with a rude kind of hoe. Both are alike primitive. The next step is to press the beast into service by supplementing the hoe with a plow. In that implement we see what might be called the original strand in the mighty cord which binds in co-operation man, brute and earth. By means of this agency of agriculture the beast of the field is made to toil, and purchases the benefits of human kindness at the expense of idleness and industry. It is not too much, then, to say that the plow is at once "the tie that binds," and the tap-root which nourishes the world. If by some miraculous calamity this one implement were forever swept away, universal and unappeasable famine would be inevitable. And that occasional famines of a local character are disappearing from the civilized world, is very largely, if not chiefly, due to the improved tillage resulting from improved plows.

We might well say, in paraphrase of a familiar saying attributed to Napoleon: Let me make the plows of a nation, and I care not who makes their laws.

The primitive plow was and is (for the barbarian of to-day is substantially the same in his agricultural methods as the barbarian of antiquity) simply a forked stick, to which is attached by a strip of rawhide or a wisp of grass, a beast, often the patient cow. As the prong passes over the ground, held down by the bowed form of the poor tiller, it barely scratches the face of the earth.

The first improvement was to reverse the stick and notch the forward end. By that means the animal could be more securely fastened to the plow, the thong being tied around the crotch of the stick. The shorter limb ran along the surface of the ground, the notch in front being the only reliance for stirring the soil. In the absence of a compact turf, such plowing would do a little good in rendering the ground fallow, and would at least have the merit of not being so difficult to operate as its predecessor.

The third plow had three parts. It consisted of a beam, a handle and a share, all constructed by simply trimming the natural wood selected for that purpose. In the first plow the prong which served as a share was

slanting, while in the third it rested flatly upon the ground, projecting forward, instead of backward, as in the second plow. It could have required no very difficult search to have found small trees and broken limbs, needing no mechanical skill in fashioning, to render them serviceable for such crude uses. They may be termed nature's contribution to the art of plow-making.

Without going further into details, it may be stated that a standard authority on the history of mechanism asserts that "the ancient Egyptian, Etruscan, Syrian, and Greek plows, were equal to the modern plows of the south of France, part of Austria, Poland, Sweden, Spain, Turkey, Persia, Arabia, India, Ceylon and China; at least such was the case until the middle of the present century." The Roman and Gallic plows were better than those of the modern countries named. The Gauls had mould-board plows. Pliny is our authority for this statement. That eminent Latin author of eighteen centuries ago, in speaking on the general subject, says:

"Plows are of various kinds. The colter is the iron part which cuts the thick sod before it is broken into pieces and traces beforehand by its incision the future furrows, which the share, reversed, is to open with its teeth. Another kind, the common plowshare, is nothing more than a lever furnished with a pointed beak; while another variety, which is used in light, easy soils, does not present an edge projecting from the share-beam throughout, but only a small point at the extremity. In a fourth kind, again, this point is larger and formed with a cutting edge by the agency of which it cleaves the ground, and by the sharp edges at the side cuts up the weeds by the roots."

Pliny adds that the broader the plowshare the better it is for turning up the soil. These excerpts from the great Roman may serve to show the utmost reach of invention in that line, until a new impulse, begun in the Netherlands in the eighteenth century, was brought to perfect development in the next century by an American citizen who died the poorer for his invention.

The highest of all authorities upon this and cognate subjects is "Knight's American Mechanical Dictionary," and Knight says of Jethro Wood, "He made the best plows up to date." He adds, "He met with great opposition, and then with much injustice, losing a competency in introducing his plow and fighting infringers." The same writer defines the peculiarities of the Wood plow with remarkable clearness and brevity: "It consisted in the mode of securing the cast-iron portions together by lugs and locking pieces, doing away with screw-bolts, and much weight, complexity and expense. It was the first plow in which the parts most exposed to wear could be renewed in the field by the substitution of cast pieces." Considering the source of this passage, it may be said that literature could hardly pay a nobler tribute to the memory of Jethro Wood than this. It is doubly significant, from the fact that Knight's publishers, Houghton, Osgood & Co., are also the publishers of the *Atlantic Monthly*, in the May number of which magazine a *habitude* of the National Capital tried to belittle the invention of Jethro Wood, and malign as iniquitous the attempt of his daughters, championed by John Quincy Adams, to secure for that invention proper recognition. It would be quite superfluous to follow this maligner in the details of this, and a subsequent attack in an agricultural journal. He disclaims any design to defame the claimants, but insists that other and earlier inventors deserve the credit for the modern plow. The opinion of Knight's Dictionary upon the Wood patent has just been given, and the following extract from the same great work sets forth in their proper relations to the modern plow the inventions of those for whom this *habitude* makes preposterous claims:

"The modern plow," says Knight, "originated in the low countries, so-called. Flanders and Holland gave to England much of her husbandry and gardening knowledge, field, kitchen and ornamental. Blythe's 'Improver Improved,' published in 1652, has allusions to the subject. Lummis, in 1720, imported plows from Holland. James Small, of Berwickshire, Scotland, made plows and wrote treatises on the subject, 1784. He made cast-iron mold-boards and wrought-iron shares, and introduced the draft-chain. He made shares of cast-iron in 1785. The importation of what was known as the 'Rotherham' plow was the immediate cause of the improvement in plows which dates from the middle of the last century. Whether the name is derived from Rotterdam cannot be determined.

"The American plow, during the colonial period, was of wood, the mold-board being covered with sheet-iron, or plates made by hammering out old horseshoes. Jefferson studied and wrote on the subject, to determine the proper shape of the mold-board. He treated it as consisting of a lifting and an upsetting wedge, with an easy connecting curve. Newbold, of New Jersey, in 1797, patented a plow with a mold-board, share and land side all cast together. Peacock, in his patent of 1807, cast his plow in three pieces, the point of the colter entering a notch in the breast of the share."

It will be observed that the credit given these improvers of the plow is very considerable, without at all trenching upon the exceptional credit due to Jethro Wood. With such an authoritative refutation, the slander may well be dismissed as beneath further notice.

In no way more appropriately can final leave be taken of the subject in hand than by presenting the apostrophe to Jethro Wood from the pen of Edward Webster, formerly associated editor of the *Rural New Yorker*:

No jeweled diadem or crown
E'er glittered on thy manly brow—
No slave would tremble at thy frown,
Nor at thy footstool bow;
For thou wert pure in heart and mind,
And strove to *raise*—not crush mankind!

As famed Prometheus of yore,
In aid of our lost, wretched sires,

Stole from the flaming-sun, and bore
Down to the earth those fires
That fill with light and life all space,
And mark the Day God's glorious race—

So thy inventive genius found
For man the bright and polished share,
That bids the willing fields abound
With fruits beyond compare;
And from the seed that falls like rain
Crowds full our barns with bearded grain!

Eternal may the honors shine,
We yield with grateful hearts to thee;
May children's children round thy shrine—
Sons of the brave and free—
With reverent lips pronounce thy name,
And build for thee a deathless fame!



*** END OF THE PROJECT GUTENBERG EBOOK JETHRO WOOD, INVENTOR OF THE MODERN PLOW ***

Updated editions will replace the previous one—the old editions will be renamed.

Creating the works from print editions not protected by U.S. copyright law means that no one owns a United States copyright in these works, so the Foundation (and you!) can copy and distribute it in the United States without permission and without paying copyright royalties. Special rules, set forth in the General Terms of Use part of this license, apply to copying and distributing Project Gutenberg™ electronic works to protect the PROJECT GUTENBERG™ concept and trademark. Project Gutenberg is a registered trademark, and may not be used if you charge for an eBook, except by following the terms of the trademark license, including paying royalties for use of the Project Gutenberg trademark. If you do not charge anything for copies of this eBook, complying with the trademark license is very easy. You may use this eBook for nearly any purpose such as creation of derivative works, reports, performances and research. Project Gutenberg eBooks may be modified and printed and given away—you may do practically ANYTHING in the United States with eBooks not protected by U.S. copyright law. Redistribution is subject to the trademark license, especially commercial redistribution.

START: FULL LICENSE
THE FULL PROJECT GUTENBERG LICENSE
PLEASE READ THIS BEFORE YOU DISTRIBUTE OR USE THIS WORK

To protect the Project Gutenberg™ mission of promoting the free distribution of electronic works, by using or distributing this work (or any other work associated in any way with the phrase “Project Gutenberg”), you agree to comply with all the terms of the Full Project Gutenberg™ License available with this file or online at www.gutenberg.org/license.

Section 1. General Terms of Use and Redistributing Project Gutenberg™ electronic works

1.A. By reading or using any part of this Project Gutenberg™ electronic work, you indicate that you have read, understand, agree to and accept all the terms of this license and intellectual property (trademark/copyright) agreement. If you do not agree to abide by all the terms of this agreement, you must cease using and return or destroy all copies of Project Gutenberg™ electronic works in your possession. If you paid a fee for obtaining a copy of or access to a Project Gutenberg™ electronic work

and you do not agree to be bound by the terms of this agreement, you may obtain a refund from the person or entity to whom you paid the fee as set forth in paragraph 1.E.8.

1.B. “Project Gutenberg” is a registered trademark. It may only be used on or associated in any way with an electronic work by people who agree to be bound by the terms of this agreement. There are a few things that you can do with most Project Gutenberg™ electronic works even without complying with the full terms of this agreement. See paragraph 1.C below. There are a lot of things you can do with Project Gutenberg™ electronic works if you follow the terms of this agreement and help preserve free future access to Project Gutenberg™ electronic works. See paragraph 1.E below.

1.C. The Project Gutenberg Literary Archive Foundation (“the Foundation” or PGLAF), owns a compilation copyright in the collection of Project Gutenberg™ electronic works. Nearly all the individual works in the collection are in the public domain in the United States. If an individual work is unprotected by copyright law in the United States and you are located in the United States, we do not claim a right to prevent you from copying, distributing, performing, displaying or creating derivative works based on the work as long as all references to Project Gutenberg are removed. Of course, we hope that you will support the Project Gutenberg™ mission of promoting free access to electronic works by freely sharing Project Gutenberg™ works in compliance with the terms of this agreement for keeping the Project Gutenberg™ name associated with the work. You can easily comply with the terms of this agreement by keeping this work in the same format with its attached full Project Gutenberg™ License when you share it without charge with others.

1.D. The copyright laws of the place where you are located also govern what you can do with this work. Copyright laws in most countries are in a constant state of change. If you are outside the United States, check the laws of your country in addition to the terms of this agreement before downloading, copying, displaying, performing, distributing or creating derivative works based on this work or any other Project Gutenberg™ work. The Foundation makes no representations concerning the copyright status of any work in any country other than the United States.

1.E. Unless you have removed all references to Project Gutenberg:

1.E.1. The following sentence, with active links to, or other immediate access to, the full Project Gutenberg™ License must appear prominently whenever any copy of a Project Gutenberg™ work (any work on which the phrase “Project Gutenberg” appears, or with which the phrase “Project Gutenberg” is associated) is accessed, displayed, performed, viewed, copied or distributed:

This eBook is for the use of anyone anywhere in the United States and most other parts of the world at no cost and with almost no restrictions whatsoever. You may copy it, give it away or re-use it under the terms of the Project Gutenberg License included with this eBook or online at www.gutenberg.org. If you are not located in the United States, you will have to check the laws of the country where you are located before using this eBook.

1.E.2. If an individual Project Gutenberg™ electronic work is derived from texts not protected by U.S. copyright law (does not contain a notice indicating that it is posted with permission of the copyright holder), the work can be copied and distributed to anyone in the United States without paying any fees or charges. If you are redistributing or providing access to a work with the phrase “Project Gutenberg” associated with or appearing on the work, you must comply either with the requirements of paragraphs 1.E.1 through 1.E.7 or obtain permission for the use of the work and the Project Gutenberg™ trademark as set forth in paragraphs 1.E.8 or 1.E.9.

1.E.3. If an individual Project Gutenberg™ electronic work is posted with the permission of the copyright holder, your use and distribution must comply with both paragraphs 1.E.1 through 1.E.7 and any additional terms imposed by the copyright holder. Additional terms will be linked to the Project Gutenberg™ License for all works posted with the permission of the copyright holder found at the beginning of this work.

1.E.4. Do not unlink or detach or remove the full Project Gutenberg™ License terms from this work, or any files containing a part of this work or any other work associated with Project Gutenberg™.

1.E.5. Do not copy, display, perform, distribute or redistribute this electronic work, or any part of this electronic work, without prominently displaying the sentence set forth in paragraph 1.E.1 with active links or immediate access to the full terms of the Project Gutenberg™ License.

1.E.6. You may convert to and distribute this work in any binary, compressed, marked up, nonproprietary or proprietary form, including any word processing or hypertext form. However, if you provide access to or distribute copies of a Project Gutenberg™ work in a format other than “Plain Vanilla ASCII” or other format used in the official version posted on the official Project Gutenberg™ website (www.gutenberg.org), you must, at no additional cost, fee or expense to the user, provide a copy, a means of exporting a copy, or a means of obtaining a copy upon request, of the work in its original “Plain Vanilla ASCII” or other form. Any alternate format must include the full Project Gutenberg™ License as specified in paragraph 1.E.1.

1.E.7. Do not charge a fee for access to, viewing, displaying, performing, copying or distributing any Project Gutenberg™ works unless you comply with paragraph 1.E.8 or 1.E.9.

1.E.8. You may charge a reasonable fee for copies of or providing access to or distributing Project Gutenberg™ electronic works provided that:

- You pay a royalty fee of 20% of the gross profits you derive from the use of Project Gutenberg™ works calculated using the method you already use to calculate your applicable taxes. The fee is owed to the owner of the Project Gutenberg™ trademark, but he has agreed to donate royalties under this paragraph to the Project Gutenberg Literary Archive Foundation. Royalty payments must be paid within 60 days following each date on which you prepare (or are legally required to prepare) your periodic tax returns. Royalty payments should be clearly marked as such and sent to the Project Gutenberg Literary Archive Foundation at the address specified in Section 4, “Information about donations to the Project Gutenberg Literary Archive Foundation.”
- You provide a full refund of any money paid by a user who notifies you in writing (or by e-mail) within 30 days of receipt that s/he does not agree to the terms of the full Project Gutenberg™ License. You must require such a user to return or destroy all copies of the works possessed in a physical medium and discontinue all use of and all access to other copies of Project Gutenberg™ works.
- You provide, in accordance with paragraph 1.F.3, a full refund of any money paid for a work or a replacement copy, if a defect in the electronic work is discovered and reported to you within 90 days of receipt of the work.
- You comply with all other terms of this agreement for free distribution of Project Gutenberg™ works.

1.E.9. If you wish to charge a fee or distribute a Project Gutenberg™ electronic work or group of works on different terms than are set forth in this agreement, you must obtain permission in writing from the Project Gutenberg Literary Archive Foundation, the manager of the Project Gutenberg™ trademark. Contact the Foundation as set forth in Section 3 below.

1.F.

1.F.1. Project Gutenberg volunteers and employees expend considerable effort to identify, do copyright research on, transcribe and proofread works not protected by U.S. copyright law in creating the Project Gutenberg™ collection. Despite these efforts, Project Gutenberg™ electronic works, and the medium on which they may be stored, may contain “Defects,” such as, but not limited to, incomplete, inaccurate or corrupt data, transcription errors, a copyright or other intellectual property infringement, a defective or damaged disk or other medium, a computer virus, or computer codes that damage or cannot be read by your equipment.

1.F.2. LIMITED WARRANTY, DISCLAIMER OF DAMAGES - Except for the “Right of Replacement or Refund” described in paragraph 1.F.3, the Project Gutenberg Literary Archive Foundation, the owner of the Project Gutenberg™ trademark, and any other party distributing a Project Gutenberg™ electronic work under this agreement, disclaim all liability to you for damages, costs and expenses, including legal fees. YOU AGREE THAT YOU HAVE NO REMEDIES FOR NEGLIGENCE, STRICT LIABILITY, BREACH OF WARRANTY OR BREACH OF CONTRACT EXCEPT THOSE PROVIDED IN PARAGRAPH 1.F.3. YOU AGREE THAT THE FOUNDATION, THE TRADEMARK OWNER, AND ANY DISTRIBUTOR UNDER THIS AGREEMENT WILL NOT BE LIABLE TO YOU FOR ACTUAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES EVEN IF YOU GIVE NOTICE OF THE POSSIBILITY OF SUCH DAMAGE.

1.F.3. LIMITED RIGHT OF REPLACEMENT OR REFUND - If you discover a defect in this electronic work within 90 days of receiving it, you can receive a refund of the money (if any) you paid for it by sending a written explanation to the person you received the work from. If you received the work on a physical medium, you must return the medium with your written explanation. The person or entity that provided you with the defective work may elect to provide a replacement copy in lieu of a refund. If you received the work electronically, the person or entity providing it to you may choose to give you a second opportunity to receive the work electronically in lieu of a refund. If the second copy is also defective, you may demand a refund in writing without further opportunities to fix the problem.

1.F.4. Except for the limited right of replacement or refund set forth in paragraph 1.F.3, this work is provided to you ‘AS-IS’, WITH NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.

1.F.5. Some states do not allow disclaimers of certain implied warranties or the exclusion or limitation of certain types of damages. If any disclaimer or limitation set forth in this agreement violates the law of the state applicable to this agreement, the agreement shall be interpreted to make the maximum disclaimer or limitation permitted by the applicable state law. The invalidity or unenforceability of any provision of this agreement shall not void the remaining provisions.

1.F.6. INDEMNITY - You agree to indemnify and hold the Foundation, the trademark owner, any agent or employee of the Foundation, anyone providing copies of Project Gutenberg™ electronic works in accordance with this agreement, and any volunteers associated with the production, promotion and distribution of Project Gutenberg™ electronic works, harmless from all liability, costs and expenses, including legal fees, that arise directly or indirectly from any of the following which you do or cause to occur: (a) distribution of this or any Project Gutenberg™ work, (b) alteration, modification, or additions or deletions to any Project Gutenberg™ work, and (c) any Defect you cause.

Section 2. Information about the Mission of Project Gutenberg™

Project Gutenberg™ is synonymous with the free distribution of electronic works in formats readable by the widest variety of computers including obsolete, old, middle-aged and new computers. It exists because of the efforts of hundreds of volunteers and donations from people in all walks of life.

Volunteers and financial support to provide volunteers with the assistance they need are critical to reaching Project Gutenberg™'s goals and ensuring that the Project Gutenberg™ collection will remain freely available for generations to come. In 2001, the Project Gutenberg Literary Archive Foundation was created to provide a secure and permanent future for Project Gutenberg™ and future generations. To learn more about the Project Gutenberg Literary Archive Foundation and how your efforts and donations can help, see Sections 3 and 4 and the Foundation information page at www.gutenberg.org.

Section 3. Information about the Project Gutenberg Literary Archive Foundation

The Project Gutenberg Literary Archive Foundation is a non-profit 501(c)(3) educational corporation organized under the laws of the state of Mississippi and granted tax exempt status by the Internal Revenue Service. The Foundation's EIN or federal tax identification number is 64-6221541. Contributions to the Project Gutenberg Literary Archive Foundation are tax deductible to the full extent permitted by U.S. federal laws and your state's laws.

The Foundation's business office is located at 809 North 1500 West, Salt Lake City, UT 84116, (801) 596-1887. Email contact links and up to date contact information can be found at the Foundation's website and official page at www.gutenberg.org/contact

Section 4. Information about Donations to the Project Gutenberg Literary Archive Foundation

Project Gutenberg™ depends upon and cannot survive without widespread public support and donations to carry out its mission of increasing the number of public domain and licensed works that can be freely distributed in machine-readable form accessible by the widest array of equipment including outdated equipment. Many small donations (\$1 to \$5,000) are particularly important to maintaining tax exempt status with the IRS.

The Foundation is committed to complying with the laws regulating charities and charitable donations in all 50 states of the United States. Compliance requirements are not uniform and it takes a considerable effort, much paperwork and many fees to meet and keep up with these requirements. We do not solicit donations in locations where we have not received written confirmation of compliance. To SEND DONATIONS or determine the status of compliance for any particular state visit www.gutenberg.org/donate.

While we cannot and do not solicit contributions from states where we have not met the solicitation requirements, we know of no prohibition against accepting unsolicited donations from donors in such states who approach us with offers to donate.

International donations are gratefully accepted, but we cannot make any statements concerning tax treatment of donations received from outside the United States. U.S. laws alone swamp our small staff.

Please check the Project Gutenberg web pages for current donation methods and addresses. Donations are accepted in a number of other ways including checks, online payments and credit card donations. To donate, please visit: www.gutenberg.org/donate

Section 5. General Information About Project Gutenberg™ electronic works

Professor Michael S. Hart was the originator of the Project Gutenberg™ concept of a library of electronic works that could be freely shared with anyone. For forty years, he produced and distributed Project Gutenberg™ eBooks with only a loose network of volunteer support.

Project Gutenberg™ eBooks are often created from several printed editions, all of which are confirmed as not protected by copyright in the U.S. unless a copyright notice is included. Thus, we do not necessarily keep eBooks in compliance with any particular paper edition.

Most people start at our website which has the main PG search facility: www.gutenberg.org.

This website includes information about Project Gutenberg™, including how to make donations to the Project Gutenberg Literary Archive Foundation, how to help produce our new eBooks, and how to subscribe to our email newsletter to hear about new eBooks.