THE speaker was a tall, homely man, towering above his Mil-
wauk ee audience that September day in 1859. The crowd was predominantly rural, for the occasion was the annual fair spon-
sored by the Wisconsin State Agricultural Society. People elbowed closer as they listened, interested, yet little dreaming that the man before them would be elected President of the United States in slightly more than a year.

As befitted the event, Abraham Lincoln devoted much of his address to the farmer's peculiar problems, emphasizing especially the need for technological improvements. Animal power was becom- ing obsolete, he pointed out. "The successful application of steam power to farm-work is a desideratum—especially a Steam Plow." He had not actually seen steam yoked to turn the soil, he admitted, but he had read of such inventions and believed that ef-fective machines for this purpose were highly important and not too far in the future. "Our thanks, and something more sub-
stantial than thanks," said Lincoln, "are due to every man engaged in the effort to produce a successful steam plow."

By this time—September, 1859—American agriculture was already well on the road to mechanization. Horse-drawn mowers and rakes were revolutionizing hay-making; grain drills were in wide use; the two-horse straddle-row cultivator was gaining gen-
eral popularity; and the reaper was making a fortune for the man shrewd enough to establish his manufacturing plant in the bustling town of Chicago. These were all machines that had under-
gone a period of transition and experimentation and had proved

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themselves reliable and serviceable. The reaper, for example, had been in existence for a good twenty years when Lincoln made his Milwaukee address. It had won international awards; its presence at agricultural fairs was taken for granted. In 1855, McCormick's plant on the shores of Lake Michigan employed two hundred men and boys and turned out 2,500 machines that year.

As Lincoln's comments indicated, cultivation by steam was yet in its infancy, if indeed it existed at all in the United States. Americans had experimented with steam plows of various types, but lagged far behind English inventors who had been working to harness the steam giant since the eighteenth century. American problems stemming from prairie turf, tough and stubborn as frontier life itself, were much more difficult to solve than those encountered in Britain where virgin soil was rare and farming was on a smaller scale. British steam plows did not adapt well; consequently many an American wrestled on his own with the knotty task of attempting to substitute steam for horse power in the furrow.

Imaginative machines were produced in the 1830's by Edmund Bellinger of South Carolina, Major Amos Tyrell of Genesee County, New York, and the distinguished naturalist, Professor Constantine Rafinesque of Philadelphia, but none proved successful. In the decade of the forties the ponderous contraptions of Larkin and Cowling caught the public eye but rumbled into obscurity as rapidly as they had appeared. Visitors at the Maryland State Fair of 1855 were captivated by the steam plow of Obed Hussey, better known for his pioneering work with the reaper.

\[\text{William T. Hutchinson, } \textit{Cyrus Hall McCormick} \ (\text{New York & London, 1935}), 64.\]
\[\text{See James Robb, } \textit{“Steam in the Field,” Good Words, IV} \ (1863), 399; J. Brainard, } \textit{“History of American Inventions for Cultivation by Steam,” Report of the Commissioner of Agriculture for the Year 1867, 253-254}; \text{John Fowler, } \textit{“On Cultivation by Steam: Its Past History and Probable Prospects,” The Journal of the Society of Arts and of the Institutions in Union, IV} \ (February 1, 1856), 166.\]
\[\text{It was reported in 1870 that there were over three thousand steam plows in operation in Great Britain, but only five in the United States. } \textit{Scientific American, XXII, new series} \ (January 22, 1870), 60.\]
\[\text{For descriptions of these early machines see } \textit{A List of Patents Granted by the United States from April, 1790, to Dec. 31, 1836} \ (\text{New York, 1872}), 584; \textit{Report of the Commissioner of Agriculture for the Year 1869, 305}; \textit{Genesee Farmer, IV} \ (August 23, 1834), 271.\]
\[\text{See } \textit{The Cultivator, IX} \ (October, 1842), 154; \textit{Farmer and Mechanic, III, new series} \ (November 22, 1849), 556.\]
But even Hussey's mechanical genius failed to bring forth a workable and efficient machine.\(^7\)

These men and numerous others of Lincoln's day had worked diligently trying to meet an obvious agricultural need. Not many succeeded, but few tackled the problem with more ability or vigor than did Joseph Walker Fawkes of Pennsylvania during the years immediately preceding the Civil War. The son of a Lancaster County farmer, Fawkes had received a limited education and had been apprenticed to learn the carpenter's trade. Within a few years he had become the proprietor of a small machine shop at Christiana, the town of his birth. A mechanic of considerable innate talent, he gradually became more and more aware of farm problems and requirements in a world on which the impact of the Industrial Revolution was becoming ever greater. His travels through the prairie-land of the Mid-West ultimately set him to work on the application of steam to tilling the soil.\(^8\)

By the autumn of 1855 he had fashioned a model of a steam-driven plowing apparatus which provided traction through a large driving drum, rather than through conventional wheels. To a friend, J. G. Dickinson, Fawkes took his model, carefully tied up in a handkerchief, and asked for financial aid. Dickinson and several associates contributed and the inventor turned to the construction of a full-scale working model.\(^9\) But obstacles were many: the first engine was an utter failure and never left the shop; the second lacked the power necessary for traction and could not be used; finally, in 1858, on the third attempt, the steam plow was ready for testing and a patent was granted to Fawkes for an "Improvement in machines for Ploughing."\(^10\)

As described by contemporaries, the engine and plowing gear attached to its rear were eighteen feet long and weighed nearly ten tons. Two horizontal pistons of nine-inch diameter and fifteen-

\(^7\) *country Gentleman*, VI (December 6, 1855), 364-365; *American Farmer*, XI (December, 1855), 162, 177.

\(^8\) Biographical material on Fawkes is meager. He was born September 25, 1815, the youngest son of Joseph and Eliza Walker Fawkes, and was apprenticed to Benjamin Simmons of Sadsbury. After building a house and a barn for his father, he erected his own machine shop and invented a rotary lime spreader, which he manufactured for local farmers. *Biographical Annals of Lancaster County, Pennsylvania* (n.p., 1903), 23-24; *Transactions of the American Institute of the City of New-York, for the Years 1859-1860*, 82.

\(^9\) *Chicago Press and Tribune*, September 23, 1858.

\(^10\) *Ibid.*; *Report of the Commissioner of Patents for the Year 1858* ("Arts and Manufactures"), I, 466.
inch stroke generated a maximum horsepower variously estimated by observers at from eleven to thirty. Power was imparted to a bulky driving drum, six feet long and five feet in diameter, while two forward guide-wheels were used for steering. Plows secured to the frame at the rear of the machine could be raised or lowered by a chain or cable arrangement.

The first public trials of the Fawkes rig seem to have been at the Lancaster County Fair in 1858, where it attracted considerable attention. Meanwhile, the Illinois State Agricultural Society, in conjunction with the Illinois Central Railroad, had offered premiums totaling $5,000 for the best steam engine adapted for plowing and other farm work. In hopes of winning development capital, Fawkes brought his machine to the Illinois State Fair at Centralia in mid-September where trials were to be held before a select committee of the Society. There the ten-ton behemoth was the darling of the show, as exhibits of horse-drawn equipment were forgotten or ignored. The inventor became the man of the hour and the Chicago Press and Tribune slyly suspected that he was a descendant of Guy Fawkes, “as he is determined to blow up and out of existence the whole system of horse, mule and ox-plowing, and substitute therefor his pet nag made of iron, whose breath is fire, and whose food is the product of diluvian and post diluvian forests.”

At the actual trials, the farmer upon whose field the running tests were to be made refused to allow the snorting iron monster on his land, and hard, baked, unbroken prairie was substituted. Fair-goers gathered at the site and only the noise of the engine drowned out the buzz of enthusiasm from onlookers as the ap-

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12 American Agriculturist, XVII (December, 1858), 376; XVIII (November, 1859), 329. [See illustration on the front cover.]
13 Lancaster Daily Evening Express, November 16, 1858.
14 Of this, $3,000 was for first prize; $2,000 for the second, Report of Executive Committee meeting (January 6, 1858), Transactions of the Department of Agriculture of the State of Illinois for the Year 1871, 1. new series, 226.
15 See Chicago Press and Tribune, September 20 and 21, 1858.
16 Ibid., September 23, 1858. Fawkes’ was the only plowing rig present, although it had previously been reported that three steam plows would be displayed at the fair. Ibid., September 16, 1858.
appropriately-named “Lancaster” moved forward, leaving behind it a row of six neatly-turned furrows. “The excitement of the crowd was beyond control, and their shouts and wild huzzas echoed far over the prairie,” said a Chicago editor, “as there, beneath the smiling Autumn sun, lay the first furrow turned by steam on the broad prairies of the mighty West.”

Others may have been less eloquent in their praise but hardly less optimistic, believing that “in less than three years . . . the steam-horse will be driven at will over the broad Western Prairies, doing the work of a dozen or twenty horses.” Within twenty years, steam plows would be common. But members of the Illinois State Agricultural Society were not so easily convinced and called for additional trials to be held at Decatur a month or so after the Centralia test. Fawkes’ machine was again the only entry and damp weather left the soil so soggy that it was unable to operate to the satisfaction of the judges.

The “Lancaster” performed again in the summer of 1859 at Oxford Park, near Philadelphia, before delegations representing Franklin Institute, the American Institute, the Pennsylvania State Agricultural Society, and the Philadelphia Society for Promoting Agriculture. After the trials, Fawkes hooked his engine to a hay wagon, draped the whole with Stars and Stripes, filled it with farmers and a four-piece band, then thundered three miles down the turnpike to the Chatham Street Station where the “Lancaster” was shipped home by rail.

At the field tests, Alfred L. Kennedy, President of Polytechnic College, was present and called the traction “perfect.” “I left the grounds,” he said, “with emotions of thankfulness to that great and good Being, who in our own day had enabled a fellow-countryman to make the giant steam tributary to the act of culti-

17 “The goal was won. Steam had conquered the face of nature, and the steam plow had become a fact. . . . The long lines of matchless furrows parted the crowd, and lay between the moving masses like a line of silver wove in the gray setting of the prairie.” Ibid., September 23, 1858.

18 American Agriculturist, XVII (November, 1858), 325.
19 Scientific American, XIV (October 23, 1858), 54. For other glowing comments and predictions, see Lancaster Daily Evening Express, December 2 and 11, 1858; Moore’s Rural New- Yorker, X (May 14, 1859), 158; The Cultivator, VI, 3d series (December, 1858), 380.
20 Report of the Trial of Steam Plows under the Auspices of the Illinois State Agricultural Society at Decatur, Wednesday, November 10, 1858, American Agriculturist, XVII (December, 1858), 376.
21 Country Gentleman, XIV (September 8, 1859), 163.
vation, and the means of untold blessings to millions.” Kennedy heralded the machine as “the only economical and practical application of steam to tillage.” and had nothing but praise for its inventor, whom he compared with Robert Fulton, also born in Lancaster County.

As he stood in the garb of a workman trying his gauges, or, in a sharp quick tone, which told of mingled confidence and anxiety, giving orders to the foreman, his rough attire, soiled in such a cause, appeared more honorable than imperial purple.

Other observers were enthusiastic but more subdued. The committee of the Franklin Institute recommended that Fawkes be awarded the Scott Legacy Medal for his pioneering invention. If the committee acknowledged that “the work was not as smooth as to satisfy a Pennsylvania ploughman,” it blamed that on the plowshares, which were designed primarily for breaking up prairie sod. The report of the Pennsylvania State Agricultural Society noted that the machine had successfully passed all tests, it had taken grades of seven per cent without difficulty, and with its eight plow bottoms had turned six-inch deep furrows at a speed of four miles an hour “in the most graceful manner, performing its work with ease, and to the admiration and perfect satisfaction of the most skeptical.”

The premium offered by the Illinois State Agricultural Society was the magnet that drew Fawkes and his equipment to the State Fair in Freeport, later the same year. Steam plows held the center of the stage. Several were scheduled for display, but the new, improved engine brought by Fawkes was the only one actually demonstrated. That of James Waters of Detroit did not appear.

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22 Ibid., XIV (July 28, 1859), 65.
23 Ibid., XIV (August 18, 1859), 106-107; The Cultivator, VII, 3d series (September, 1859), 274.
24 Committee on Sciences and Arts, “Report on J. W. Fawkes Steam Plough,” Journal of the Franklin Institute, LXVIII (September, 1859), 215.
25 Philadelphia Public Ledger, July 23, 1859. See also Moore's Rural New Yorker, X (August 6, 1859), 254.
27 Waters, originally from Pennsylvania, had built a four-cylinder, seven-and-a-half-ton traction-type machine specially designed for operation on prairie soil. His rig was one of Fawkes' most persistent competitors. See Country Gentleman, XIV (December 15, 1859), 379; XVI (September 27,
Field's rotary spader suffered an accident and could not be repaired in time; the "Rotary Plow, Reaper and Mower" of Van Doren and Glover—the so-called "Steam Farm Hand"—was exhibited and drew sighs of admiration from many of the fair's 20,000 daily visitors, but it did not compete in field trials.

Fawkes' engine was very much in evidence, however. It performed first in the show ring, where, without implements attached, it "ran about the track with celerity," before turning up "a little patch of plowing." The preliminaries were colorful but had no bearing on the utility of the machine. According to newspaper reports, the engine was

. . . beautifully decorated with flowers by the ladies, not forgetting the blue ribbon in abundance, showing that in the judgment of the ladies it was entitled to the highest premium. A company of ladies, the scientific committee, editors and others occupied seats upon the carriage; a large wagon occupied by the band was attached to the rear, and away sped the steam carriage around the ring amid the huzzas of the multitude and the waving of handkerchiefs by the ladies. It must have been an exciting and most gratifying occasion to the worthy inventor.

Unfortunately, the field tests were not so exciting and gratifying to the inventor. So great were the crowds on the first day of the scheduled trials that tests had to be postponed until September 10, when the steam colossus actually performed. It had plowed only about forty feet when the linkage between the engine and the gang of eight plows gave way, necessitating a halt of half an hour to repair the damage. In the meantime, rain fell and when the

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28 This was a ten-horsepower, six-ton leviathan, with eight-foot driving wheels and six rotating spades for turning the soil. Moore's Rural New Yorker, X (September 17, 1859), 302.
29 Although unpatented at this time, the Glover-Van Doren machine was considered highly promising. It was represented as being light and cheap, its five-horsepower engine propelling it at two miles an hour with its rotary plow attachment set at the rear of a triangular frame. According to the press, it broke down early due to a manufacturing fault, although another observer stated that at the time of the field trials the owners could not be found, hence it was not tested. Chicago Press and Tribune, September 8 and 13, 1859; French, "English Plows and Plowing," Report of the Commissioner of Patents for the Year 1859 ("Agriculture"), 259-260.
30 Ibid., September 8, 1859.
31 Ibid., September 12, 1859.
experiment was begun again, the engine bogged down in the wet terrain. Strips of wooden paling were then fastened to the face of the driving drum in an effort to improve traction, but all attempts failed, and Fawkes was forced to admit that he could do no more. Members of the Agricultural Society committee were sympathetic: they “regretted his failure,” were willing to grant a loan of $1,000, but were reluctant to award a premium.8

It was soon thereafter that the Seventh Annual Exhibition of the United States Agricultural Society opened on the outskirts of Chicago. The steam plows of Fawkes, Waters, and Van Doren and Glover were again displayed before a record number of visitors.32 But Van Doren and Glover’s “Steam Farm Hand” proved mechanically defective34 and Waters’ machine plowed only an eighth of an acre before being “utterly disabled” by an accident attributed to the inexperience of the operator. “Gentlemen,” said Fawkes politely, “I pity the steam plow man who meets with an accident; his fortune is hard enough at best. I do sincerely pity Mr. Waters.”35

Field trials were held without prior notice to prevent the collection of a crowd, which gathered anyway. On the first day (September 15), Fawkes plowed 78½ rods in 31 minutes, only 9 of which were considered actual plowing time.36 On the following day, the new “Lancaster” rumbled out again in the morning but soon exhausted its fuel supply, causing trials to be adjourned until afternoon, when, after additional delay due to minor breakage, the machine completed four rounds, plowing 164 rods in an actual plowing time of 16¾ minutes.37

Although the soil was light at the Chicago tests, local newsmen believed the results were significant. Under certain conditions, with large, improved fields, and with experienced operators,38

33 Chicago Press and Tribune, September 14 and 20, 1859.
34 Ibid., September 20, 1859.
35 Ibid., September 19, 1859.
36 Nineteen minutes were taken up in stops to adjust the machine and three minutes for turning at the ends of the field. Report of the Executive Committee of the State Agricultural Society on the Steam Plow Trials at Freeport and Chicago (February 21, 1860), Transactions of the Illinois State Agricultural Society, IV (1859-1860), 38.
37 With stops, these four rounds consumed forty minutes. Ibid.
38 Newspapers complained that management of the engine was unbelievably bad at Chicago. Chicago Press and Tribune, September 16, 1859.
steam was practicable in replacing animal power on the prairies, they insisted. Fawkes' estimates for operating the "Lancaster" seemed to indicate—on paper, at least—that steam could be more economical than brute force in plowing. Daily costs of running the machine totaled $16.12, according to the inventor, and included: one ton of coal, $5; one cord of wood, $3; the labor of three men, $4; oil and miscellaneous supplies, $1; wear and tear on machinery, $2; interest of 10 per cent on the initial cost of $4,000, $1.12. Twenty-five acres could be turned in a working day. At the current rate of $2.50 a day for breaking grassland by horse-drawn plow, the cost of doing the same amount of work by animal power would be $62.50.39

Officers of the Illinois State Agricultural Society were less impressed than Chicago's newsmen, although still sympathetic. Called upon to determine whether or not the "Lancaster" had earned either the $3,000 first award or the $2,000 second prize for workable steam plows, the Society's executive committee very carefully evaluated all phases of the machine's performance. It was admitted that the apparatus was capable of plowing an acre in twenty-four minutes, including stops, or from twenty-five to forty acres per day, but the committee believed the machine was too heavy and that it could not produce power sufficient for the weight and work required. Its traction was poor on damp terrain and its tank could not hold water for more than three hours of sustained running time.40 Believing that the machine was somewhat disappointing, but perfectible, the committee recommended that Fawkes be awarded the $2,000 second prize, less the $1,000 loaned him previously.41 But in the end this recommendation was not accepted; after considerable wrangling, the Society voted Fawkes a premium of $500 in cash, plus cancellation of the loan—in effect, an award of $1,500.42

From Chicago, Fawkes moved east to the Thirty-first Annual Fair of the American Institute of the City of New York, where

39 Ibid., September 17, 1859.
41 Report of Executive Committee meeting of September 15, 1859, Ibid., 27.
42 Ibid., 27, 29. It was erroneously stated in the agricultural press that Fawkes had been awarded the $3,000 first prize offered by the Society and the Illinois Central Railroad. Country Gentleman, XIV (September 22 and 29, 1859), 192, 203.
his machine was tested in a small, rocky plot at Hamilton Park and was forced to stop every few seconds because of stones. But the inventor appeared before the Polytechnic Association of the Institute, discussed the general problem of cultivation by steam, and was rewarded with a prize of $1,000.

Other honors were soon forthcoming also. In January, 1860, the United States Agricultural Society bestowed upon Fawkes a large gold medal, President Buchanan doing the presentation by mail. Buchanan wrote his Lancaster County compatriot:

Whilst those who have made improvements on deadly weapons for the destruction of the human race are receiving honors and rewards from governments, yours has been the far more important and useful task of improving the plow for the benefit of agriculture, and your recompense will consist in the approbation of your countrymen, and the consciousness that you have conferred an important benefit upon mankind.

Meanwhile, aware that his machine was too heavy and too complex, Fawkes acquired a third engine and plow apparatus, this one built for him by Miles Greenwood of Cincinnati, one of the top steam engine experts in the country, and showed up at the Illinois State Fair in the autumn of 1860 to compete for a new premium of $1,000 being offered by the Agriculture Society. On a forty-acre farm a mile from the Jacksonville fairgrounds, his new machine ran fourteen minutes before stopping, then encountered various difficulties which prompted observers to view the test as a complete failure. The committee of the Society decided that the rig could not be "practically substituted for animal

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15 Scientific American, I, new series (October 22, 1859), 265.
16 Transactions of the American Institute of the City of New-York, for the Years 1859-1860, 75, 471.
17 Scientific American, II, new series (March 31, 1860), 211.
18 Observers believed that the plow attachment especially was too intricate and susceptible to breakage. Country Gentleman, XV (January 19, 1860), 45. In December, 1859, Fawkes patented improvements in the mechanism for raising and lowering the plowshares. Report of the Commissioner of Patents for the Year 1859, I, 731; II, 695.
19 Scientific American, II, new series (March 31, 1860), 211: Moore's Rural New-Yorker, X (December 10, 1859), 398.
21 Chicago Press and Tribune, September 14, 1860; Country Gentleman, XVI (September 27, 1860), 202.
power in plowing and other farm work,” and refused to recommend a reward, monetary or otherwise.\(^5^6\) The press was even less charitable. “Mr. F. may have an idea,” said the Chicago Tribune, “but he has shown no ability toward the development and perfection of it.”\(^5^1\)

One of Fawkes’ engines—possibly the third one—was several years later moved from the farm where it had been standing since the fall of 1860 into Decatur to be used as a stationary source of power in a machine shop, a tacit admission of its failure in the field.\(^5^2\) This, or perhaps another of the engines, eventually exploded: so did the $1,200 that Horace Greeley had invested in support of Fawkes.\(^5^3\) Yet, as late as September, 1864, Fawkes had still not given up. At that time he demonstrated a locomotive-type steam plow at the Illinois State Fair at Decatur, but was again forced to admit defeat.\(^5^4\)

Several years earlier, Fawkes had experimented with another approach to power plowing. A patent granted to him in December, 1861, covered improvements on a method of plowing using an engine with windlass attachment. The engine would move along at intervals of about 1,000 feet, stopping to draw up a gang of plows by means of its cable drum, then pulling ahead to repeat the process.\(^5^5\) This was but a variation of a cable-drawn system successfully introduced by the Englishman, John Fowler. But on the large farms and unimproved prairie lands of America, Fawkes found it no more workable than the direct traction approach. After a decade of fruitless and expensive experimentation by trial and error, he discontinued his work with the steam plow and left to others its successful development.\(^5^6\)

Joseph Fawkes was neither a great man nor a great inventor.

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\(^5^0\) Report of committee at meeting of September 14, 1860, Transactions of the Illinois State Agricultural Society, IV (1859-1860), 55.
\(^5^1\) Chicago Press and Tribune, September 14, 1860.
\(^5^2\) Country Gentleman, XX (July 24, 1862), 64-65.
\(^5^3\) Transactions of the American Institute of the City of New York for the Years 1867-1868, 170.
\(^5^4\) New York Tribune, September 24, 1864.
\(^5^5\) Report of the Commissioner of Patents for the Year 1861 (“Arts and Manufacturers”), I, 599-600; II, 417.
\(^5^6\) For a time, Fawkes lived on a farm at Moline, then at Spring Lake, Iowa, before returning to Chicago to establish a company for the manufacture of electrical equipment, only to fail when his establishment burned. In 1887, he turned westward to California, where he was more successful at fruit cultivation until his death in 1892. Biographical Annals of Lancaster County, Pennsylvania, 24.
He was one of many ordinary Americans with mechanical ability who saw the need for greater mechanization on the farm and tried to fill that need. If he failed, it was for a variety of reasons—the same reasons that retarded numerous other amateur attempts in the same period. Some writers of the day believed that traditional rural reluctance to accept change was an inhibiting factor. The agricultural press, in attempting to combat this basic conservatism, often inadvertently contributed to it. Fawkes had to work under the definite disadvantage of laudatory and over-optimistic newspaper and periodical publicity, which predicted fabulous performances that the steam engine in his time was not competent to meet.

More important was the expense factor. As editors were careful to point out, the initial price of a Fawkes machine was estimated to be $4,000—literally as much as the cost of an improved farm in this pre-Appomattox era. If Fawkes himself lacked capital, so did the average farmer. Rising prices between 1854 and 1857 had helped expand the wheat-growing frontier out onto the grasslands of Iowa, Kansas, Minnesota, and Wisconsin. But the disastrous Panic of ’57, followed by economic prostration, seriously depressed the price of wheat. It was Fawkes’ misfortune to bring forth his steam plow in this period of low farm prices, when agricultural capital was difficult enough to accumulate for machinery which had been tested and accepted, let alone for expensive equipment still largely unproven. Moreover, despite the inventor’s claim to the contrary, reputable farm experts thoroughly acquainted with the “Lancaster’s” performance, insisted that power plowing cost at least twice as much per acre as tillage by horse.

One of the primary reasons for expense—both of purchase and of operation—was the size and complexity of Fawkes’ machines. Like many other mechanics, he was unable to devise a satisfactory power-weight ratio. In order to produce sufficient power, his engines were of “elephantine proportions and weight,” designed to

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60 Chicago Press and Tribune, September 8, 1859.
perform miracles, according to the Commissioner of Agriculture a few years later.61

Fawkes was admittedly an amateur. At least two of his engines he built with his own hands. Of necessity he served as his own blacksmith, his own machinist, and his own engineer. His machines were crude and subject to easy breakage as a consequence. Yet even the best steam engines available in the late fifties were little better for plowing. Most were designed for stationary belt work, not for traction. Only when the steam engine itself was immeasurably improved would steam plowing become practicable. Increased structural strength, replacement of cast iron gearing by steel, addition of more effective driving wheels and clutch arrangements, enlargement of fuel and water capacities—these were but a few of the changes which ultimately came in the power plant. But they did not come overnight. Although the use of the steam engine for thrashing spread rapidly, not until the end of the century did steam plowing rigs become common on the flat, broad wheatlands of western America.62 The dream of Joseph Fawkes was finally realized nearly forty years after his experiments. Even then, the “Age of Steam” was brief; quickly it gave way to the age of the lighter, cheaper, and more efficient internal combustion engine.

61 Report of the Commissioner of Agriculture for the Year 1869, 311.
62 For excellent general surveys of the coming of the “Age of Steam” so far as plowing was concerned, see Edward A. Rumeley, “The Passing of the Man with the Hoe,” World’s Work, XX (August 4, 1910), 13246-13258; Reynold M. Wik, Steam Power on the American Farm (Philadelphia, 1953), 93-96.