

*Efficiency Improved:
The Genesis of the Web Press
in America*

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AS A CRAFTSMAN, the printer opts for quality; as a businessman, he opts for speed. In the early nineteenth century, he could not have both. Printers who desired speed were inhibited in achieving a very significant increase in efficiency until presses could be fed with 'endless' rolls of paper instead of single sheets. The papermakers had been attempting to produce such 'endless' rolls, but not with the printing industry in mind. Their initial purpose was to supply the wallpaper manufacturers with a sheet long enough to sell in rolls rather than in panels.¹ Nevertheless, once 'endless' paper became available, experiments in utilizing it for printing continued until William Bullock invented the first successful web press about 1860.²

Of the pre-Bullock web presses, historians of printing have noted two invented in Great Britain (Sir Rowland Hill, 1835; Thomas Nelson, 1850) and one in America (Josiah Warren, 1840).³ This implies that the printing industry made only sporadic attempts to develop a web press. A more intensive investigation discloses that this is not true. The web press in Amer-

¹*Report of the Commissioner of Patents for the Year 1843* (28th. Cong., 1st. Sess., House Doc. No. 177), p. 273; R. H. Clapperton, *The Paper-making Machine* (Oxford, 1967), pp. 15-16.

²*American Dictionary of Printing and Bookmaking* (New York, 1894), p. 395.

³R. S. Hutchings, 'Josiah Warren, Anarchist and Inventor,' *Black Art*, II (1963), 62.

ica evolved gradually if not systematically and entailed the work of men whose efforts deserve greater recognition.

American manufacture of 'endless' paper began in 1817 when Thomas Gilpin's papermaking machine went into operation at the Brandywine Paper Mills in Delaware. The proprietors, Joshua and Thomas Gilpin, lost no time in publicizing and marketing their machine-made paper. Articles about it appeared in periodicals; in 1818, the Gilpins printed a pamphlet of testimonials from Philadelphia printers.⁴ Then, in the following year, the Gilpins contrived to produce a printed work on their 'endless' paper. Quite appropriately, they informed the American Philosophical Society of this breakthrough. In March 1819, as noted in the Society's Minute Book, they 'exhibited printing on endless paper at the time of its manufacture by a cylindrical water press, and with a degree of rapidity never before equalled.'⁵ Another reference appears in the Society's Donation Book: 'A Specimen of their paper (Endless sheet) printed as it came wet from the Paper making rollers—54 Pages Stereotype placed on a Roller revolving in 10 Seconds of time 12mo. This Specimen the first that has been executed [in] Their Establishmt at Brandywine.'⁶ Unfortunately, this item cannot now be found in the Society's collection, nor is any additional information about the press available. Apparently the experience gained in using papermaking cylinders enabled the Gilpins to construct a makeshift printing press. If one interprets the phrase '54 Pages Stereotype placed on a Roller' literally, the stereotype plates were attached to a cylinder which, in itself, would be a remarkable achievement in printing technique at that time. On the other hand, the person who wrote the entry in the Donation Book may have misinterpreted the

⁴ Harold B. Hancock and Norman B. Wilkinson, 'The Gilpins and Their Endless Papermaking Machine,' *Pennsylvania Magazine of History and Biography*, LXXXI (1957), 401.

⁵ *Ibid.*, p. 402.

⁶ Letter, Jan. 23, 1969, from Mr. Willman Spawn who kindly searched the collection of the American Philosophical Society.

information given him for it would have been much easier to put the plates on a bed and use the cylinder for impression. At any rate, printing on 'endless' paper had been accomplished.

The Gilpins, in all probability, printed the paper on only one side. A more difficult task of printing was attempted by Henry Betts of Norwalk, Connecticut, who received a patent on September 14, 1833, for 'Printing paper on both sides.'⁷ Henry Betts (1794-1880) was, according to one historian of Norwalk, 'of inventive genius,' but his genius, if any, could not control his projects: a steamboat, constructed by him, blew up on its maiden trip, his printing press apparently was never perfected.⁸ Although specifications for his press were destroyed in the Patent Office fire of 1836, an expert contemporary evaluation of his patent appeared in the *Journal of the Franklin Institute*.⁹ Written by Dr. Thomas P. Jones, formerly Superintendent of Patents, it is worth reprinting in its entirety because of its allusion to work done previously as well as for the literary grace of the description of the Betts press:

We are informed by the patentee that the general principle of his invention, is the printing of paper in a continuous sheet, on both sides, either directly from the machine on which the paper is made, or from a reel, or roller, upon which it is wound.

We know that the printing press has been actually appended to the cylinder paper mill, by a gentleman in this country, so as to print the sheet as it is made; and we also know that it has been frequently proposed to do so by others; but we are unable to perceive any advantages from such a procedure which would not be more than counterbalanced by its unavoidable inconveniences. Paper has been printed from a sheet of many hundred yards in length, on one side, but we doubt whether this has been advantageously done, on both sides, although it has been attempted, on a cylinder machine. It would be no easy thing in this process to make good register for book work, although it might answer in

⁷*A List of Patents Granted by the United States from April 10, 1790, to December 31, 1836* (Washington, D. C., 1872), p. 623.

⁸Charles M. Selleck, *Norwalk* (Norwalk, Conn., 1896), pp. 250, 307.

⁹Letter from M. J. Lesch, United States Patent Office, Dec. 8, 1969.

the newspaper press. Should the present patentee have accomplished this, he will certainly have made another great step in the typographical art. It appears, however, that he has followed the usual, and almost unavoidable course of inventors, in patenting his machine before it has been essayed with that care which is necessary to the establishment of its character. The inventor says, that with the imperfect press by means of which he has experimented, he has seen a length of paper printed in ten seconds, sufficient to make eleven sheets of medium, with paper of only two feet in width, whilst he has it in contemplation to extend this width to ten, or even *twenty* feet. We have no reason to doubt the goodness of his judgment as a printer, but we cannot say so much of him as a practical mechanist. A cylinder paper machine, and a roller printing press, twenty feet wide, would, we think, appal the great mechanician of Syracuse, had his life been prolonged in vigour to the present day, and his mind imbued with a knowledge of all the wonders which have been effected in the mechanic arts. We like enthusiasm, however, as without it men will almost invariably fall short of what it is in their power to accomplish.

The description given of this apparatus, and the drawing which accompanies it, are both of them crude, being defective in those details which would enable any person to carry the plan into effect; this, we apprehend, has arisen from causes to which we have already made some allusion. Three different processes, and modifications of the machinery, are spoken of as being contemplated by the patentee; he has not, however, made claim to either of them, and the entire novelty of each, in all its parts, may certainly admit of doubt.

It is said that this machine differs from the Napier press in the employing of the whole surface of the cylinder, instead of allowing its intermitted action during the process of inking.

In the first method proposed, stereotype plates are alone to be employed; these are to be firmly attached to a set of blocks, not fewer than six, of the width of a page, and in length equal to that of the paper, 'which may be indefinite.' The blocks are to be hinged together on their edges, so as to form an endless chain. They are to be carried over a polygonal roller of wood, strong enough to sustain the pressure of the cylinder, by which the impression is made.

In the second process, either stereotype plates or movable types are to be employed upon similar blocks, united by strips of iron

in such a way as never to be inverted, so as to allow of the falling out of the types. In the first process, the inking is to be effected below, in the second above, the types, or blocks.

A third method noticed, is the employment of two or more movable forms, passing over a roller, and under a cylinder; the forms after receiving the impression are to descend under the roller, and thence be returned to the position in which they are to receive a new impression.

The modes of inking may be various, but that preferred is by the employment of an endless apron of leather, as wide as the form, and revolving round two rollers about nine inches apart. This is to receive the ink from one roller, and to communicate to another, whence it is to be transferred to the form.

We have thus given an extended account of this patent; and if it be not a clear one its deficiency in this respect does not rest with us, as we have carefully examined the specification and drawing, which ought, in conjunction, to make the plans fully known. We have not resorted to the model, which is referred to in the specification; the reason for omitting this, has been assigned on more than one previous occasion.¹⁰

No definite relationship between Betts and the papermaking industry can be established, but it must be noted that, by 1833, there were three papermaking machines in Connecticut.¹¹ Production of much continuous paper within his own state could have prompted him to think about inventing a web press. He saw the possibilities even though, as Dr. Jones stated, he did not resolve all of the problems.

Shortly after Betts patented his press, Thomas Trench, a papermaker in Ithaca, New York, built a web press on which he actually printed books. Regrettably, the brilliance of his role in advancing the technology of the press has had little attention. Trench's father, James Trench, was a native of Scotland who learned papermaking there before emigrating to the

¹⁰*The Story of the United States Patent Office*, 3rd ed. (Washington, D. C., 1961), p. 4; Thomas P. Jones, 'American Patents,' *Journal of the Franklin Institute*, New Ser., XIII (1834), 177-178.

¹¹Lyman H. Weeks, *A History of Paper-manufacturing in the United States* (New York, 1916), p. 180.

United States.¹² In the 1820s, he became manager and partner of the paper mill at Fall Creek, Ithaca, under the firm name of Mack & Morgan, later Mack & Andrus, succeeded by Mack, Andrus & Woodworth.¹³ Thomas Trench, born April 1, 1806, began his papermaking career in his father's mill.¹⁴ There he made at least one improvement in the process of papermaking: on November 6, 1832, he and Asahel H. Jervis received a patent for 'Paper, press, cylinder, hot and cold.'¹⁵ This patent, as described by Joel Munsell, was for 'a mode of pressing paper by passing it between two hollow metallic rollers, which was used at the Falls Creek mill at Ithaca, by which the quality of the paper was improved and much labor saved.'¹⁶ Thomas Trench later had a paper mill at Paterson, New Jersey, and afterward at Lightstreet, Pennsylvania. He died on June 23, 1897.¹⁷

While in Ithaca, Trench realized that the market for his paper would be vastly increased if the paper could be printed on both sides in one operation and he set out to demonstrate that this could be done. His knowledge of cylinder papermaking provided a good background; in fact, he saw no difficulty at all in the attainment of his objective. As he said a year or two before his death, 'I had the stereotype plates of "Robinson Crusoe" and "Cobb's Spelling Book" and simply fastened these plates around the cylinder, and started up the machinery.'¹⁸

On November 20, 1837, Thomas Trench was granted Letters Patent No. 468 for a 'Machine for Printing Both Sides of a Continuous Sheet of Paper.' The operation of the press is obvious in the accompanying diagram (Plate I). On the two lower cylinders are the 'stereotype plates, or pages, which are se-

¹²William W. Heacock, 'First Web Printing Press,' *Brooklyn Daily Eagle*, August 16, 1903, News Cable Section, p. 1.

¹³John H. Selkreg, *Landmarks of Tompkins County* (Syracuse, 1894), p. 172.

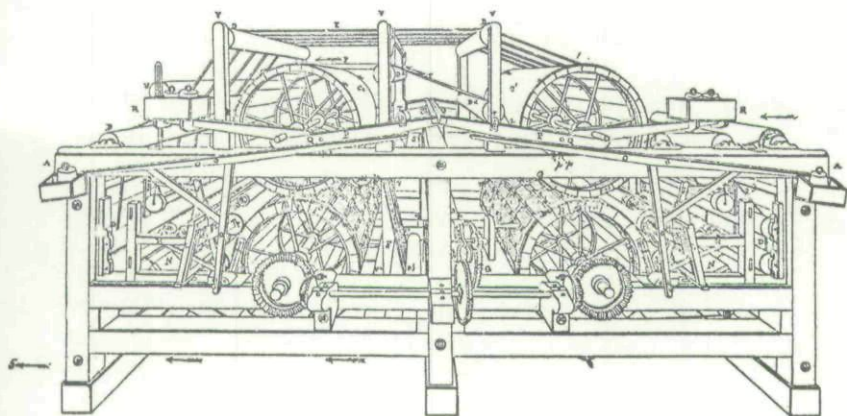
¹⁴Heacock, 'First Web Printing Press,' p. 1.

¹⁵*A List of Patents*, p. 532.

¹⁶J. Munsell, *A Chronology of Paper and Paper-making*, 3rd ed. (Albany, 1864), p. 74.

¹⁷Heacock, 'First Web Printing Press,' p. 1.

¹⁸*Ibid.*



J. Tenen
 Printing Press
 No. 468. Patent, Nov. 20, 1837.
 Sheet 1, 35 Sheets

PLATE I

cured thereon by clasps, screws, or other suitable fastenings.¹⁹ At each end of these cylinders, adjustable bearers could be raised or lowered 'so as to allow of a lighter or stronger impression.' The two upper cylinders are the impression cylinders 'covered with a soft elastic substance for pressing the paper against the types.' A combination of rollers delivers the ink to the type. The paper is placed between endless tapes 'so adapted in number and position as to fall between the pages of the printing, or on the margin.' It is carried between the first set of cylinders, then over rollers and around and between the second set of cylinders. From there it is 'conveyed to a common drying machine where it is dried, and from thence to a cutting machine where it is cut into sheets; or it may be wound in a roller.'

When the patent appeared, Dr. Jones again expressed his cynicism. He could not foresee the time when paper mill and press would be in separate places and he realized that the press

¹⁹Quotations in this paragraph are from the specifications for United States Letters Patent No. 468, Nov. 20, 1837.

was merely an adaptation of the cylinder press, and not basically new. He concluded his description with these paragraphs:

When an establishment is made, and carried into successful operation, we shall be most happy to collect and display all the details; should we live, however, we hope to accomplish much other work before being called to this, as we are apprehensive that the consummation will not be an early one. There is no novelty whatever in the idea of such an establishment; we have often conversed respecting it with an intelligent and enterprising paper maker, who made some attempts of the kind many years since, but relinquished the plan, not as impracticable, but as altogether ineligible. The paper mill and the printing office must be together; the works printed must be such only as are wanted in vast numbers, and the rapidity of the printing must be governed entirely by that of the forming the sheet of paper. These are some of the objections which present themselves, and many others might be brought forward were it necessary.

The claim made is to 'the combination and arrangement of the different parts of the before described machine for printing both sides of a continuous sheet of paper at one operation; whether effected in the manner set forth, or in any other substantially the same in principle.'

This claim confines the patentee to an arrangement substantially the same with that described, in all its parts, but the specification does not point distinctly to any thing possessing this character. The thing in itself, as we have before remarked, is not new, and if any one wishes to apply a double cylinder press, for printing upon both sides of a sheet of paper, as it comes from the mill, there is no power any where to prevent him. The right, however, is scarcely likely to be legally contested.²⁰

Evidently Dr. Jones did not know that at least one book had been printed before Trench received the patent. In the previous June, under the heading of '*One of the Wonders of the Age*,' the New York *Sun* had published an article about the press. Here are the first two paragraphs:

We have been shown a sheet of paper about a hundred feet in length and two feet wide, printed on both sides by a machine at

²⁰Thomas P. Jones, 'Mechanics' Register,' *Journal of the Franklin Institute*, New Ser., XXII (1838), 180-181.

one operation. This extraordinary invention enables a person to print off any length of paper required for any number of copies of a work or a public journal, without a single stop, and without the assistance of any person except one to put in the *rags* at the extremity of the machine. The work comes out entire and complete.

This wonderful operation is effected by the placing of the types on stereotype plates on the surface of two cylinders, which are connected with the papermaking machinery. The paper, as it issues from the mill, enters in a properly moistened state between the rollers, which are evenly inked by an ingenious apparatus, and emerges in a printed form. The number of copies can be measured off by the yard or mile, according to the demand, or according to the supply of the 'raw material.' The work which we have seen from this press is *Robinson Crusoe*, and consists of one hundred and sixty duodecimo pages.²¹

It is most probable that the *Robinson Crusoe* printed by Trench is the 1836 Ithaca edition published by Mack, Andrus & Woodruff. That firm, it will be recalled, owned the paper mill in which Trench was employed. The other book which Trench stated that he printed can be tentatively identified as the 1837 Ithaca edition of *Cobb's Spelling Book*, also published by Mack, Andrus & Woodruff. Copies of both books are in the Cornell University Library.²²

Trench, aided by his father, sought to make the New York publishers aware of the possibilities of the new press. Their efforts were rewarded, at least, with commendations. At the Tenth Annual Fair of the American Institute in 1837, James Trench received a diploma 'for a sheet of printed paper, about eighty feet in length, containing ten copies of the life of Robinson Crusoe.'²³ In the same year, the Mechanics' Institute awarded a silver medal to Thomas Trench 'for specimens of Printing from a Machine, by which endless Sheets are Printed

²¹*The Sun*, New York, June 1, 1837, p. 2.

²²Letter from Mr. Donald D. Eddy, Feb. 20, 1970.

²³'Premiums,' *Journal of the American Institute*, III (1838), 31.

on both sides at the same time.²⁴ Despite these tokens of appreciation, the New Yorkers made no rush to patronize the Trench press.

Within a few years Trench moved from Ithaca. In a manuscript note dated 1839, Joel Munsell preserved one more bit of information about Trench's activities:

A printing machine was in operation in Hanover, New Jersey, invented by Thomas Trench, which is thus described. The rags are taken into the mill and made into paper; that paper is run on a reel and taken to the printing machine, which prints six spelling books in one minute, and 300 books in an hour. The sheets are printed on both sides at one operation. The types are set in an iron cylinder and one revolution prints a book. The ink is applied by a roller mould by machinery. Mr. Trench is engaged in making a machine which will print two common Bibles in one minute.²⁵

At the same time, Josiah Warren constructed the web press on which *The South-western Sentinel*, February 28, 1840, was printed in Evansville, Indiana. The press, fully discussed by R. S. Hutchings, 'receives the paper from a roll, prints it by means of a roller, and winds it as it is printed.'²⁶ Because the press was located twenty-five miles from his home, Warren could not supervise its operation and it was soon dismantled.

Also at that time, a web press neared completion in Providence, Rhode Island. The story of this type-revolving press is almost as complicated as the press itself and can best be told by beginning in the middle. An American, Moses S. Beach, obtained a British patent for this press. Moses S. Beach (1822-1892), son of Moses Y. Beach who owned the New York *Sun*, was both journalist and inventor. At the age of fourteen, he entered the shop of the *Sun* and by 1852 had become sole owner.²⁷ Fascinated by the mechanical aspects of printing, he, at var-

²⁴Heacock, 'First Web Printing Press,' p. 1.

²⁵Joel Munsell, *Chronological Record of Printing* (Manuscript, American Antiquarian Society), II, 305.

²⁶Hutchings, 'Josiah Warren,' p. 62.

²⁷*DAB*, II, 81-82; *Nat. Cyc. Am. Biog.*, XIII, 329.

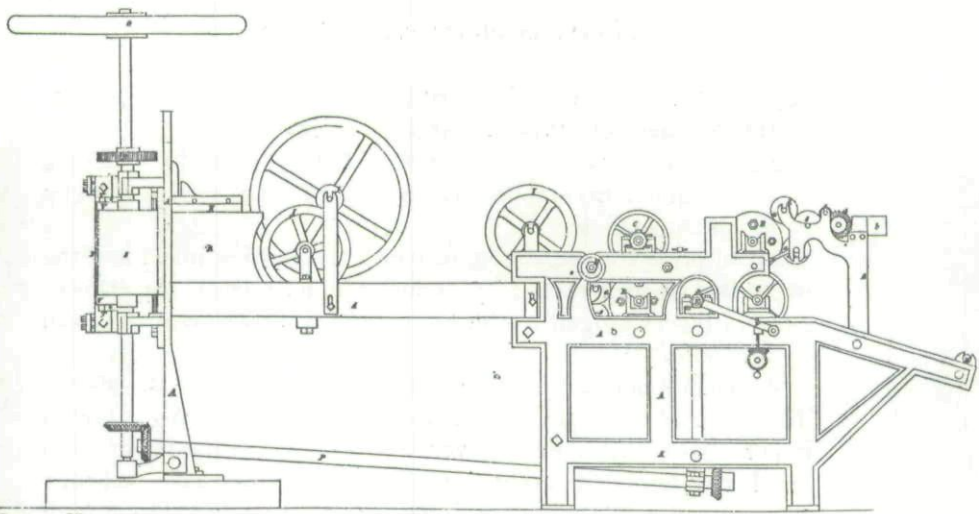


PLATE II

ious times, invented and patented feeding, cutting, and damping devices. During a visit to England in 1842, he received a patent to 'make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, the Invention of "Improvements in Machinery Used for Printing with Type and in the Construction of Type for Printing," communicated to me by a certain foreigner residing abroad.'²⁸

The press (Plate II) and its major appurtenances are described in an abridgment of the patent:

In the press in which the paper (damped and in roll) is conducted successively between two pairs of cylinders, the type cylinder being uppermost in the first, and the pressing cylinder in the second pair, from which the paper receives the reiteration. An ordinary inking apparatus is attached to each type cylinder. After the impression the paper is led over rollers and between converging plates which fold it. It then passes between vertical cylinders, and is cut into sheets by a revolving knife.

The types are tapering (the degree of taper varying with the size of the cylinder), and they, as well as the column rules, ring, cross rules, &c., have alternate indents and projections on their sides, the spaces between the lines having them on their ends. An

²⁸British Letters Patent No. 9308, Mar. 23, 1842, p. 1.

apparatus, called a 'grab,' is used for placing a column of type upon the cylinder. The types are secured by plates at the ends of the cylinder. Margins are made across the columns by tapering blocks, with indents and projections, and in the other direction by rings on the cylinder.

Proof press for the above, in which the form is inked and the paper laid on by hand. The pressing cylinder turns in the arms of parallel levers hinged to the frame, and is drawn over the form by a handle.

A machine for damping and packing the paper for the above. The roller on which the paper is to be wound for printing is placed in connexion with a first mover, and thus winds the paper from another roller. As it is thus wound, it is damped by a clothed roller in contact with a roller revolving in a water trough. The trough is upon wheels, and is kept in its position by a weight, which enables it to adjust itself as the roll of damped paper increases. Several intermediate rollers may be used between the trough roller and the roller in contact with the roll.²⁹

Curiously enough, in 1853, Jephth A. Wilkinson received a United States patent for a similar press (Plate III) as well as for all of the accessories except the damping machine.³⁰ Jephth A. Wilkinson (1791-1873) became an inventor in Rhode Island after serving in the War of 1812. An early invention, a machine for manufacturing weavers' reeds, yielded no profit in America and was opposed by the hand reed-makers in England. The patent rights, according to his biographer, were sold to the government of the Netherlands for approximately eighteen thousand dollars. It was also stated that his drawings for a repeating revolver were seen by Colt who secured the patent for himself.³¹ The similarity between the Beach press and the Wilkinson press suggests that Wilkinson was the 'certain foreigner residing abroad' mentioned in the Beach patent. This is now authenticated in a story of manipulation that has quite a few parallels in the history of invention.

²⁹*Printing Patents* (London, 1969), pp. 234-235.

³⁰United States Letters Patent No. 9,525, Jan. 4, 1853.

³¹*Biographical Cyclopaedia of Representative Men of Rhode Island* (Providence, 1881), p. 60.

Patented Jan. 4, 1853.

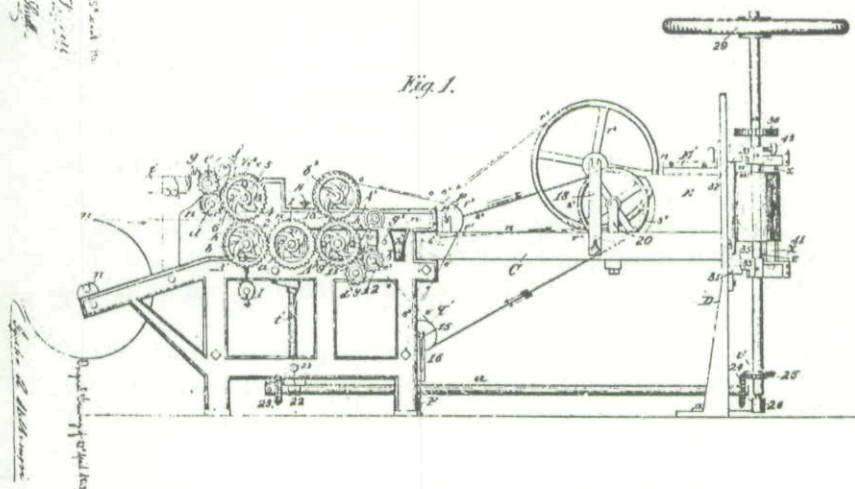


PLATE III

Pleading that he failed to obtain a reasonable remuneration from the sale of his invention, Wilkinson, in 1856, applied for a seven-year extension of his 1853 patent which took date from Beach's English patent of 1842. The documents relating to this application contain Wilkinson's own history of the press as well as supporting evidence of the piracy that took place.³² Wilkinson declared in a sworn statement that the history was 'collated from over thirty volumes of closely written manuscript forming a complete diary and history of every transaction in connection with said invention.' He then went on to say:

My invention was originally devised and drawn out so far as cylinders and type, in England in the year 1818, and I then made

³²All of the quotations from these documents are from a file, 'Petition of Wilkinson for Extension,' June 18, 1856, in Record Group No. 241, National Archives and Records Service. Mr. Richard S. Maxwell, Assistant Director of the Social and Economic Records Division, has been extremely helpful in supplying information about this file.

wooden models of radial type with the locking notches and projections.

In 1837 I entered a Caveat in the Patent office, and was then residing in Providence Rhode Island. — In 1837. 8 & 9, I constructed a model for the U. S. Patent office, obtained type and constructed model cylinders, made a complete model printing press, the cylinders of which were about $9\frac{1}{2}$ inches in diameter and printed a width of about 5 inches.

This press was put practically in work and one of the impressions, although imperfect, is hereunto annexed marked *A*. This press worked practically and was considered as eminently successful.

Although my invention was generally approved of, still a good opportunity for manufacturing large sized presses was not offered, on account of the want of necessary funds; and as Mr. Moses Y. Beach of New York held out good inducements, and his establishment being one wherein I could hope to prove my invention on a large-scale, I was induced to leave Providence in March 1841 and come on to New York.

The expenditures thus far were as follows

1837	March 9. Caveat fee	\$20.—
1839	Cost of moulds for type	45.—
	Incidental expenses, travelling &c.	50.—
1839.40	Wages of workmen, stock tools &c constructing first model press, and rent of shop.	283.09
	Amt. paid by Wilkinson, Jackson, & Brown & Ives	\$398.09
	Debts due for castings, balance of Wages &c. &c	242.49
	J. A. Wilkinsons personal time for nearly <i>three</i> years; cost of drawings and other incidental charges; together with the cost of alterations to model press after the above account, the same being done by Wilkinson <i>individually</i>	1959.42
	Experiments in Rhode Island	Total \$2,600.00
	J. A. Wilkinson received from Charles Jackson, Esq. various sums and also from Messrs Brown & Ives personally and through Charles Jackson sums amounting in total to about	700.00
	Total loss of Wilkinson to May 1841.	\$1,900.00

Arrangements were made with Moses Y. Beach to construct an entirely new press and adapt it to printing the Sun Newspaper, of which Beach was editor and proprietor; and after some delay the press was completed so as to print on both sides, fold, cut and deliver the sheets at the rate of over three hundred sheets per minute, see accompanying paper (exhibit B.). At this time Beach directed a suspension of work, cut off payments to myself and workman in direct violation of a written agreement, and shewed his object in so doing, for after thus impoverishing myself and family—and reducing us to straights, trials, sickness and distress, not now to be remembered without a shudder,—he made a *demand on me that I should allow him to take the patents in his own name*, and not only thus rob me of a stipulated subsistence money, but take away all merit and glory in the eyes of the world from the creation of my own mind and appropriate it to himself; And not only did he thus act in this country, *but sent his Son, Moses Sperry Beach to England and took a patent there in his own name for my invention*, and I have reason to believe did the same in France Holland & Belgium.³³ And the fact of the English Patent was not known by me until some years afterwards it was discovered that said patent was taken in March 1842, and the specification enrolled in Sep. 1842; *hence his robbery extended to depriving me of eleven years of the term of my patent*, when in 1852 “3 I discovered that my United States Patent when obtained must take date from this English patent, that was thus obtained by another without my knowledge, and in direct fraud of the intention and spirit of the agreement with Beach.—

Suffice now to say that at Beach's establishment the expenses were as follows.

Tools and shop fixtures for building press for 'Sun' with folding & cutting apparatus	\$2,000
Four moulds for casting type and a font of 1000 lbs. superior type.	1,200
J A Wilkinsons personal time during fourteen months	1,400
and sundry items paid by himself not included above of transport of machine tools &c.	111.20
Experiment at Beaches	Total
	\$4,711.20

³³ Beach received French patent no. 11,036, July 26, 1842.

Cash received of Moses Y Beach in various sums amounting to a total of about 3,200. machinery, \$120 personal \$3,320.

Net loss to Wilkinson in connection with this transaction \$1,391.20

From the years 1842 to 1846 I remained in New York and Vicinity endeavoring to make terms with Beach or to bring in other parties to set the press in work, and during this time was engaged in making drawings models, specifications and improvements on the machine,—devoting my time exclusively to the same—and in 1846 I removed my family onto a farm on Long Island but there my exertions were still given to endeavor to carry out my invention and devoted at least one half of my time to the said invention; and failing in other quarters memorialized Congress for aid.³⁴—in 1851

1842. to 1846. four years @ \$100 per month.	\$4,800
1846 to 1851 five " on half time \$50 per m.	3,000
Cash paid out for drawings, tools for making mod- els &c about	225
	\$8,025

After Memorializing Congress for aid, and not succeeding, I entered into an arrangement with Ambrose L. Jordan Esq of the City of New York and executed agreements with him April 19th 1851 in substance as follows—

Wilkinson assigns one half right to Jordan for nominal consideration of \$62,500

Jordan makes payment therefor in certain land in Taney County Missouri, which was claimed under an unsustained and doubtful title, and has no market value and cannot be sold.

Jordan & Wilkinson were to form a Company.

The invention was to be valued at \$300,000 and the same divided into 12000 shares @ \$25. each.

Wilkinson was to have 4000 shares

Jordan " " " 4000 "

and the remainder be used on which to raise the necessary funds for prosecuting the business

³⁴Wilkinson's petition 'praying that he may be allowed two years for the completion of a patent for letter-press printing by machinery' was presented to the House of Representatives, Jan. 12, 1846, and referred to the Committee on Patents. (*Journal of the*

Beaches claim was to be purchased (this was afterwards done for \$1000.)

The Rhode Island Press left in Beach's hands, as before set forth was to be repaired, refitted and set to work

After this the Stockholders were to decide whether they would proceed and have a large press built.

Some other minor details were arranged in the agreements and the business proceeded as follows.

The Rhode Island press and Beaches claim on the invention and patents were purchased for \$1000.

The said Rhode Island press was remodled and fitted with the last improvements and printed well, on both sides, folded and cut off the paper, and could also be applied to cut off the paper without folding it; Folded and flat sheets printed on said press accompany this affidavit marked C. and C.1.

The success of this model press was so conclusive that the Company determined to proceed and build a press for printing a paper of the size of the New York Daily Times. This was commenced about November 1852 and in the process of the construction it was deemed advisable to cut the sheets off when flat without being folded, and for this purpose a new style of shear had to be invented and applied, which occupied considerable time; It then became necessary to remove the press to a more eligible situation to put it in work, and it was then taken to Cor. Centre & Franklin Streets New York, and there put up and set running. The impressions were good, see accompanying exhibit *D*, but the trouble of getting paper in large rolls from the mills and in a damp condition caused delay and trouble; When the machine was set to work the papers were thrown off so fast that the cutting apparatus &c. was soon covered up with a heap and the machine had to be stopped.

It then became apparent that an apparatus for packing the papers was necessary in order that they might be taken away in the flat sheet and folded up for delivery.—

This packing apparatus was therefore devised and the machine after this delay pronounced finally ready for trial; Then came another delay for paper, partly on account of the humid condition of the mills and partly from the financial condition of the Com-

House of Representatives, Washington, 1845-46, p. 227). The journals of the House disclose no action and the minutes of the committee are missing. (Letter from Mr. Mark G. Eckhoff, National Archives and Records Service, Oct. 26, 1970.)

pany, and thus the matter rested until about 7 April 1855 when being unable to proceed further I had the machinery put into a place of safety on storage and once more turned my attention to the Farm on Long Island, which the liberality of my wifes relatives had provided as a refuge for my family; and forgetting as far as possible my machinery, devoted ten months to peaceful agricultural labor.—

Being renewed in body and mind I returned to New York in March 1856, and the Company still holding off from active measures in prosecuting the business, and the time for the extension application drawing nigh, I conferred with my friends Messrs John Thursbys Sons, Rope manufacturers, Williamsburgh, who volunteered to aid me in this straight. They assisted me with means to remount the press, provided paper and other expenses, and after some slight alterations to the packing apparatus found all to work well. They then aided me to make application for an extension of my Patent, and pending the decision on the same every thing now waits to take a new and I trust a permanent start when the extension shall be granted.

Wilkinson concluded with an appeal for an extension and a detailed account of expenditures. He appended four impressive affidavits attesting to the truth of his petition. In the first affidavit, George H. Hopkins, a printer, stated that he had composed type for the 'Cylindrical Rotary Printing Press' in 1839 or 1840, that he knew of the successful trial in 1840, and that he worked on Wilkinson's press in the *Sun* office as well as on the large press which printed the *Endless Register* in 1853. In the second affidavit, Sylvester S. Southworth, editor of the New York *Sunday Mercury*, declared that he had known Wilkinson in Providence where he saw 'the model press in operation, printing on both sides, folding and then cutting the sheet.' He also witnessed printing on the 1853 press. In the third, Francis Wayland testified that when he was President of Brown University in 1839 and 1840, he 'saw a model press of said invention in practical operation and had some of the sheets printed on the same.' In the fourth, Moses B. Ives, John Carter Brown, and Robert H. Ives, all of Providence, verified the fact

that, in 1839 and 1840, 'they advanced to the said Wilkinson certain sums of money in connection with a model press for printing on a continuous sheet by radial types on rollers.' All of these affidavits also contain affirmations of other statements made by Wilkinson.

The exhibits comprised five hitherto unrecorded specimens of early printing on a web press. Exhibit A, printed on the model press, is a newspaper sheet entitled *Endless Register*, dated at Providence, May 11, 1840. The type pages, 5 x 27 inches, contain journalistic fillers—notes, poems, short essays, as well as two references to the press on which it was printed. One can only agree with Wilkinson's admission, in his petition, that the impression was 'imperfect.' Nevertheless, he demonstrated the possibilities of a type-revolving web press. On Exhibit B, an issue of *The Sun*, New York, August 25, 1841, Wilkinson noted that it was printed at Moses Y. Beach's as a trial of his Rotary Cylindrical Printing Press. Each type page is 17½ x 23 inches. Exhibits C1 and C are copies of *The Endless Register*, New York, June 7, 1852, and November 15, 1852, printed on the improved model press. The type page is 5 x 27 inches and both issues are the same in text and composition. On the first page, Wilkinson printed a lengthy description of his press; fillers occupy the remainder of the text. Exhibit D, an eight-page newspaper with type pages 17½ x 23 inches, is *The Endless Register*, New York, November 7, 1853. It was printed on the large press which Wilkinson started to build in 1852 and which produced newspapers so rapidly that the cutting apparatus could not keep up with the output. Again Wilkinson printed his description of the press. The rather poor impression is similar to that of the other exhibits.

After studying all of this evidence, the Patent Office Examiner recommended that the petition be granted. Seven days later, on September 15, 1856, the Commissioner of Patents allowed the extension of Wilkinson's patent. Wilkinson, thus encouraged, continued work on the press, patenting some im-

provements in 1859.³⁵ Three years later, he went to Europe with the vain hope of marketing his press in France. He returned home and started to build another press, only to see his shop destroyed by fire. The remainder of his active life seems to have been devoted to serving as executor of the large English estate left by his father-in-law.³⁶

Ingenious as Wilkinson was, he could not compete with the apparatus and skilled help of the established press manufacturers. His type-revolving press appeared at least seven years before the type-revolving press of Richard M. Hoe. Whether or not Hoe knew about the Wilkinson press cannot be definitely determined even though it has been claimed that Hoe proposed to erect a plant for its manufacture.³⁷ But Hoe captured the publicity as well as the market for his own press by producing, as was his custom, a more efficient and satisfactory press.

Soon after Wilkinson and Hoe devised their presses for newspaper printing, a young man in Nashua, New Hampshire, invented a web press primarily intended for job printing. It printed only one side of the paper; two presses, one under the other, were required for printing on both sides. In his early years, Thomas H. Dodge (1823-1910), an employee of a Nashua cotton mill during the 1840s, had become fascinated by the operations of the press in the shop of the *Nashua Gazette*. After learning more about mechanics, he became convinced that the speed of printing could be greatly increased if a rotary motion was provided and a roll of paper substituted for sheets. One day, while looking at a railroad train, it occurred to him that the parallel rod connecting the driving wheels supplied the kind of motion he sought.³⁸ Utilizing that principle, he built a press (Plate IV) for which he received a patent in 1851.³⁹ It was a

³⁵United States Letters Patent No. 25,069, Aug. 9, 1859.

³⁶*Biographical Cyclopaedia*, p. 60.

³⁷*Ibid.*

³⁸Joseph T. Dodge, *Genealogy of the Dodge Family of Essex County, Mass.* (Madison, Wis., 1894), p. 304.

³⁹United States Letters Patent No. 8,521, Nov. 18, 1851.

bed-and-platen press, with bed and platen moving in the same direction longitudinally and an impression being made at every revolution of the cranks. Paper was fed at the same speed as the motion of the bed and platen. In Figure 1 of Plate IV, a part of the framing is broken away to show the inking apparatus.

Even before the press was patented, Dodge managed to secure publicity. *The Scientific American*, for example, printed a complete description and three illustrations on the front page.⁴⁰ This led to an ironic turn of events; the press, intended for paper, became a textile press:

One day, shortly after a description of the press had appeared in the public journals, a gentleman called at the counting-room and requested to see Mr. Dodge, who found him to be a Boston manufacturer and merchant by the name of John Bachelder. Mr. Bachelder frankly made known his business and the object of his visit. He was largely engaged in the manufacture and sale of cotton bags for salt, flour and similar materials. This was before the day of paper bags. He said he had seen the notice of the press and came to see it, since he thought it was just what he wanted to print his cotton bags with. Said he wanted to print the cloth direct from the bale, and should like to see it work, and went to Mr. Dodge's house, and was taken into the library where the small press stood, and which press was designed to print a form of 5 by 8 inches.

Mr. Dodge had some pieces of cotton cloth five or six feet long and of the proper width, and taking the end of one piece he passed it between the feed rolls, thence between the bed and the platen and delivery rolls. Mr. Bachelder took a position at the rear of the press to watch the cloth as it passed through and the operation of the mechanism, while Mr. Dodge stood at the front of the machine with his hand on the crank, and everything being ready, he gave a quick motion to the balance wheel and the cloth in a second was on the floor at the feet of Mr. Bachelder who stooped and picking it up was greatly surprised to find that all the impressions were clear and distinct, and at equal distances apart, while the cloth was clean and free from ink marks or stains on those parts outside of and between the prints. The work was per-

⁴⁰'Dodge's New Printing Press,' *Scientific American*, VI (1850-51), 329-330.

fect and he turned to Mr. Dodge and said: 'What can I have this press and the exclusive right to the invention and letters-patent, if one can be obtained, for?' Mr. Dodge thought a few minutes and then gave him the price, and he replied: 'I will give it, make out the papers,' and the business was disposed of and settled. The patent for this ingenious printing press was granted November 18th, 1851, and Mr. Bachelder had them running in his Boston manufactory as soon as they could be made; the product thereof was soon sold for use throughout the civilized world, with great benefit to himself and the public.⁴¹

Dodge, admitted to the bar in 1854, joined the staff of the Patent Office in Washington, D. C. In 1858, he resigned to practice law. Six years later, he settled in Worcester, Massachusetts, where, after thriving as a lawyer and manufacturer, he presented Dodge Park, a tract of thirteen acres, to the city.⁴²

Dodge acted most advantageously when he sold the patent rights because, in shifting his press to textile printing, he avoided competition with another web job press, the Fire Fly, soon to be successfully marketed. The Fire Fly was produced by George P. Gordon (1810-1878), one of America's most eminent press designers.⁴³ Gordon obtained a patent for it in August 1852, and, in October of the same year, received a gold medal when he exhibited it at the American Institute Fair.⁴⁴ The press bore an appropriate name. Small enough to be placed on the bench, it possessed a reputed speed of eight thousand to ten thousand impressions per hour.⁴⁵ As Gordon intended it to be a card press, the size, inside chase, was $3\frac{3}{4} \times 7\frac{1}{4}$ inches.⁴⁶ Bed and platen were vertical, with the bed moving backward and forward in a piston-like action. Inking rollers passed around a cylinder in which the bed was inserted. Two sets of rollers provided for slow inking without reducing the speed of the press.

⁴¹Dodge, *Genealogy of the Dodge Family*, pp. 304-305.

⁴²*Ibid.*, pp. 306-319.

⁴³*DAB*, VII, 422.

⁴⁴United States Letters Patent No. 9,234, August 31, 1852; *Scientific American*, VIII (1852-53), 59.

⁴⁵Ralph Green, *A History of the Platen Jobber* (Chicago, 1953), p. 15.

⁴⁶Henry L. Bullen, 'Collectanea Typographica,' *Inland Printer*, LXX (1922-23), 92.

The cardboard strip, fed from a roll at the top, received the impression and continued downward where shears cut it into cards and the cards fell into a box. A hand crank operated the Fire Fly. According to Bullen, cards 'were printed on it so rapidly that hundreds of card printers went into business, their sole equipment this little hand press and a dozen fonts of types.'⁴⁷

In 1857, Gordon patented a modified version in which two distributing tables replaced the cylinder, but he did not continue to sell the Fire Fly for many years.⁴⁸ Possibly printers were disappointed by the quality of work produced or possibly Gordon's interest centered upon his famous Franklin Press. He probably could have developed the Fire Fly as his own railroad ticket press, yet he let others pre-empt that specialty.

Records in the Patent Office confirm that other inventors also tackled the problem of printing on 'endless' paper. In 1853, Charles Montague (1820-1885), best-known for his Acme Cylinder Press used in country newspaper offices, patented a 'new and Improved Printing-Press for Printing on a Continuous Sheet.'⁴⁹ This press had a cylinder and horizontal bed. A driving-lever beneath the bed moved it under and from the cylinder and, with a set of inking rollers on each side, an impression was made at each stroke of the bed. Paper wound around a roller at one end of the press went under the cylinder and then to a roller at the other end of the press. Upon completion of printing on one side, the roll of paper could be printed on the other side. There is no evidence that this press was generally accepted by the printers. In 1858 Henry A. Bills and Stephen W. Wood, of Washington, D. C., secured a patent for a type-revolving web press intended for the newspaper trade.⁵⁰ Grooved or notched type was set flat on the rotating bed in alternate columns with spaces between for the remaining columns which

⁴⁷ *Ibid.*, p. 91.

⁴⁸ Green, *A History of the Platen Jobber*, pp. 15-17.

⁴⁹ George W. Montague, *History and Genealogy of the Montague Family of America*, Rev. ed. (Amherst, Mass., 1886), p. 549; 'The Montague Press,' *Inland Printer*, V(1887-88), 395-396; United States Letters Patent No. 9,993, Sept. 6, 1853.

⁵⁰ United States Letters Patent No. 19,672, Mar. 23, 1858.

were placed on another bed. Corresponding cylinders carried segments of impression cylinders so that, during impression, the type was perpendicular to the impressing surface. With cylindrical beds, the type could cover the peripheries. Moistened rollers dampened the paper before printing and a revolving knife cut the paper as it came from the press. In the specification, Bills and Wood mention 'our intention in constructing a press complete' thereby implying that no press had been built. It is doubtful that the press was ever constructed. Far west in Wisconsin, Joseph A. Smith and Lloyd M. Orvis, publishers of the Fond du Lac *Commonwealth*, contrived another web press.⁵¹ In 1860, they patented 'a printing-press for printing from a continuous roll of paper, and possessing automatic mechanism for feeding the paper to the forms, printing, during one passage through the press, on both sides of the paper, and cutting the same into sheets of the proper length, the paper being also moistened or sponged during the operation of printing.'⁵² On this press, there were two horizontal beds, one above the other. After the paper was printed on the upper bed, the paper moved underneath and was printed again with the bottom of the upper bed serving as the second platen. An endless blanket moisturized the paper before printing. The press may have seemed promising to Smith and Orvis, but any hopes certainly vanished when Bullock's press appeared a few years later.

By 1860, one type of web press, the railroad ticket press, was a practical, working machine. Richard M. Hoe's press, patented in 1859, appeared in the 1860 Hoe catalogue.⁵³ In his press, the strip of paper passed between the type-revolving cylinder and the impression cylinder, then between the impression cylinder and the numbering disks, after which the tickets were cut. Since the type or stereotype plate of a ticket occupied only

⁵¹*Annotated Catalogue of Newspaper Files in the Library of The State Historical Society of Wisconsin*, comp. Ada T. Griswold, 2nd ed. (Madison, Wis., 1911), pp. 326-327.

⁵²United States Letters Patent No. 28,948, June 26, 1860.

⁵³United States Letters Patent No. 23,172, Mar. 8, 1859; *R. Hoe & Co.'s Catalogue* (New York, 1860), p. 51.

one half of the cylinder, it could be duplicated on the other half so that two tickets would be printed at each revolution. Although the principle of numbering wheels had been previously patented in 1858 by George J. Hill, of Buffalo, New York, Hoe received his patent for the 'peculiar mechanism or its equivalent for moving the registering-disks on their axes at the proper times.'⁵⁴ Again in Buffalo, another advance occurred in 1860 when George Bailey patented a press for printing and numbering the 'through tickets' used on connecting railroads.⁵⁵ During those years, railroad ticket printing prospered in Buffalo. Sanford, Warren & Harroun, proprietors of the *Buffalo Courier* and employers of Hill, specialized in it, advertising themselves as railroad ticket manufacturers.⁵⁶ In 1862, James H. Sanford and Gilbert K. Harroun moved the ticket printing business to New York City where they thrived as printers as well as manufacturers of ticket presses.⁵⁷

All the web presses herein discussed were intended for book or newspaper or job printing. These, it must be emphasized, constitute only one class of a larger division of web presses. When other classes of that division are investigated, some interesting relationships may be revealed. Is there any relationship between the web newspaper press and the web wallpaper press? Or between the web paper press and the early web textile press? If a web press prints any continuous substance, the machine patented by John and Charles Bruce in 1832 cannot be neglected. It carried rolled dough under cylinders which formed crackers and printed 'a name, &c.' on each cracker.⁵⁸ Perhaps, after all, there is a connection between bibliography and baking bread.

⁵⁴United States Letters Patent No. 21,418, Sept. 7, 1858; United States Letters Patent No. 23,172, Mar. 8, 1859.

⁵⁵United States Letters Patent No. 27,510, Mar. 20, 1860.

⁵⁶*The Commercial Advertiser Directory for the City of Buffalo* (Buffalo, 1860), p. 182.

⁵⁷*American Dictionary of Printing and Bookmaking*, pp. 259, 484.

⁵⁸Thomas P. Jones, 'American Patents,' *Journal of the Franklin Institute*, New Ser., X(1832), 160.

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