

MODERN PRINTING METHODS.

THE ECONOMIC SIDE OF THE INDUSTRY.



THE development of the "art preservative of all arts" has been very rapid during the last decade, and many of the changes have been revolutionary, resulting in enormously increased product, manufactured in quicker time and at a much lower cost. The quality of the work has also improved. The far more general dissemination of intelligence, the rapid and efficient means

of intercommunication between all parts of the world, with the cheapening and broadening of educational facilities, constitute one of the most notable features in the progress of the world during the past fifty years; and the one most vitally contributing to all our great industries is the printing press. Some idea of the volume of business may be gained when it is stated that in 1900, the census year, the value of the finished product was \$347,055,050. This sum was almost equally divided between newspapers on the one hand and book and job printing on the other. In the United States there are 22,312 establishments, 15,305 of which publish or print newspapers. The total capital invested is \$292,517,072. A large clerical force is necessary to transact this amount of business; 37,799 salaried officials, clerks, etc. draw \$36,090,719 in salaries, while the actual work is done by 162,992 persons, drawing \$84,249,954 in wages. Miscellaneous expenses of these establishments were \$55,897,529, and the cost of materials used was \$86,856,990.

Of the total value of products, advertising forms 43 per cent, subscriptions and sales 35.3 per cent, and book and job printing, including miscellaneous products, 21.2 per cent. The total circulation of daily papers is enough to supply one for every five inhabitants, and the total circulation per issue of weeklies and monthlies is one to each two inhabitants. Ninety-four per cent of all the publications are printed in the English language. One and a quarter billion pounds of paper were used in the census year. Of this amount 77.6 per cent was consumed for newspapers and 16.4 per cent for books and periodicals, and only 6 per cent for job printing. On analyzing the total circulation of each State it is found that the ten leading States supply four-fifths of the circulation per issue of all publications, thus indicating the concentration of circulation in certain populous States. Weekly publications are more numerous in proportion to the inhabitants in the West and Northwest. New England ranks high in dailies but low in circulation, suggesting that in that densely settled region the daily has to some extent supplanted the weekly.

There were 18,226 publications reported to the census authorities, while 3,046 publications failed to report. This would give a remarkable total of 21,272 periodicals, and the aggregate circulation of those reporting was 114,229,334 per issue, while the aggregate number of copies issued during the census year was 8,168,148,749.

The average capital of those engaged in the printing business is \$12,574; the average value of their products is \$14,569. These figures compared with those of a previous decade show that in a period of ten years an increased capital is required to produce the same or even a smaller value of products; this is largely caused by an increase in wages and a decrease in working hours. In 1850 a compositor in New York received \$9 per week; ordinary job compositors now receive \$19.50 per week, and operators on machines from \$24 to \$27, depending on the time of day or night they take their shift. In the opinion of many large operators, the number of wage earners has actually increased rather than diminished. The introduction of machine composition has been of decided benefit to the employe, offering a new field for endeavor. There are few unemployed men in the printing trade, as is shown by the fact that when in 1900 the Typographical Union was called upon to supply 150 men for a special job of city printing, only 100 could be obtained, and these with difficulty.

A classified list of periodicals is given below, showing how the list is divided:

Period of issue:	
Daily	2,226
Triweekly	62
Semiweekly	637
Weekly	12,979
Monthly	1,817
Quarterly	237
All other classes	268
Total	18,226

Character of publication:	
News, politics, and family reading	14,867
Religion	952

Agriculture, horticulture, dairying, and stock raising	307
Commerce, finance, insurance, railroads, and trade	710
General literature, including magazines	239
Medicine and surgery	111
Law	62
Science and mechanics	66
Fraternal organizations	200
Education and history	259
Society, art, music, and fashion	88
Miscellaneous	365

The average number of inhabitants to each publication is 4,170. News, politics, and family reading form the bulk of all publications, 81.6 per cent being taken up by them; religious periodicals come next with 5.2 per cent; finance, railroad, insurance, and kindred topics follow with 3.9 per cent; agriculture and allied subjects follow with 1.7 per cent; and the other subjects while most important, follow with very small percentages, which can practically be neglected, as none of them exceeds 2 per cent, and most of them come nearer 1 per cent or below. The publications devoted to specialties have been steadily superseded by the large dailies, which have invaded every field of journalism. The Sunday edition has become a most important factor in journalism, which when aided by the linotype or other composing machines have done the work of four to nine men. The line cut and the tint cut, called "half-tone," have made the rapid production of a counterfeit presentation of a photograph possible.

Mechanical composition put an entirely new aspect on affairs. The New York Herald, for example, has no less than fifty-six linotype machines, doing the work of hundreds of compositors in far less time and with a new dress of type each time. The daily press has seized with avidity on these improvements, and has thus worked a revolution in the printing trade, causing a vast increase in the number of printed pages, and instead of 24 pages in 1890, we have occasionally 120 pages of a Sunday in 1903, the departments and supplements being well segregated. The reading matter now presented in even one metropolitan newspaper is not only satisfying to the reader, but in amount is often far beyond his capacity to assimilate. We get all this for five cents, which reflects credit on the management and the "city" and "Sunday" editors of our great dailies. Such excellent news-gathering and presentation is not, however, limited to New York; even Seattle, in far-away Washington, does practically the same thing on a reduced scale.

Out of the 18,226 publications, 2,226 are dailies, with a circulation of 15,102,156; 62 are tri-weekly, with a circulation of 228,610; 637 are semi-weekly, with a circulation of 2,832,868; 12,979 papers are issued weekly, with a circulation of 39,852,052; there are 1,817 monthly publications, whose circulation is 39,519,897. The quarterly publications are mostly devoted to special subjects, and only number 237, but their circulation is very respectable, as they issue 11,217,422 per issue. Semi-monthly, semi-annual and yearly publications number 268, and have a circulation of 5,541,329. Out of 18,226 publications, 17,194 were printed in English.

The production of monthlies is centralized in a few States, ten producing 92.5 per cent of the aggregate circulation. The circulation of periodicals is not governed by local consumption, but is distributed regardless of State lines. The whole question of newspapers is admirably discussed in the Census Bulletin No. 216, by Mr. W. S. Rossiter, and we are largely indebted to it.

In 1900, cities of 201,000 inhabitants and over contained 79 per cent of the separate job-printing establishments of the country, and 97.7 per cent of the total job product emanated from them.

QUANTITY AND COST OF PAPER USED.

Our figures show the quantity and cost of paper used and the average cost per pound, in 1900.

Kinds.	Pounds.	Cost.	Average cost per pound, Cent.
News	956,335,921	\$22,197,060	2.3
Book and periodical	202,296,263	9,356,490	4.6
Job printing	74,510,064	6,270,306	8.4
Total	1,233,142,248	\$37,823,856	3.1

In this table is presented a division of the paper used in 1900, according to the several classes of products which, combined, produced the total value of products of newspaper and periodical establishments. About one and a quarter billions of pounds were used during the census year. This large quantity was utilized in the following proportions:

	Per cent.
News	77.6
Book and periodical	16.4
Job printing	6.0

It is important, however, to observe that these proportions in weight do not by any means hold good in cost. The latter shows the following proportions:

	Per cent.
News	58.7
Book and periodical	24.7
Job printing	16.6

It is clear that while the quantity of paper used for newspapers far exceeds that consumed in the other branches of the industry, it is proportionately much less expensive.

The average cost per pound shown adds confirmation to deductions drawn that the cost of materials for book and job work was over 40 per cent greater than that for newspapers and periodicals. If the item of paper alone were considered, this per cent would be increased. The average cost per pound of paper consumed by newspapers and periodicals combined was 2.3 cents. The average cost per pound of paper for books and periodicals and job printing combined was 5.6 cents.

The invention of printing is usually ascribed to Gutenberg, although there are strong claims for others. But the consensus of opinion of close students of typography is almost unanimous in giving him credit for the improvement over block printing by the introduction of movable types. The subject has been discussed *pro* and *con*, scores of books have been written on the subject, but still Gutenberg remains as the sole figure around which the typographic art centralizes and is crystallized into concrete and usable form. We may depart from his idea, we may assemble matrices instead of individual types, but the principles involved are the same. His press was of the crudest description, yet almost perfect work was produced on it—work which makes even the millionaire-collector sigh to possess.

HOW A NEWSPAPER IS PRODUCED.*

Nowhere in the world is the value of time so thoroughly appreciated as in the modern newspaper office. There every minute counts, and if everything isn't done on the scheduled minute there are a hundred thousand or more readers asking why, and there is a managing editor and a publisher ready to make things interesting for those who are to blame.

There is no harum-scarum rush and bustle. Behind the noise and scurrying and the apparent confusion there is a system and a mass of rules and schedules as inviolable as the laws of the Medes and Persians.

The city editor has an assistant who reads all of the newspapers, and in a diary, called an assignment book, makes a memorandum, and when the time comes the reporter is given the story to get. So suggestions as to what may happen are noted, and as the time comes the event is covered. Each reporter who leaves the office has something definite to do. Everything is foreseen.

The day's work began, as was the case with the Pope's death, perhaps years before. But the real work of the twenty-four hours begins at 3:15 A. M., when the city edition of the paper is placed on the managing editor's desk, followed a few minutes later by the other papers. Everybody else has gone home in the editorial end except a reporter and a telegraph editor. In the composing-room and the stereotyping-room are a few men in reserve for extras. In the basement the huge presses are grinding out the paper and a score of delivery wagons and a hundred men are distributing the paper after a night spent in preparation for this final hour.

Then the managing editor is reading the morning papers. He dictates to a stenographer suggestions for covering the news of the dawning day, incidentally criticising the work of the past day as shown in the newspaper before him by comparison with its rivals. He really makes news, for he suggests stories that otherwise might not be gotten. Telegrams are sent to correspondents telling them what to do with impending news. Orders are given for pictures. But all of this is tentative. The managing editor is working as if nothing unforeseen would happen. Twenty hours later something may happen that may spoil all his plans. His instructions given, the managing editor goes home at 4:30 A. M., or later, while the presses are still running off the city edition.

At 9 A. M. the work of the local department begins. An assistant to the city editor comes on duty and begins his day's work of reading the city papers. His duty is chiefly to get tips for assignments for the reporters. The day city editor arrives at 11 A. M. He maps out the day's work of the reporters and the photographers in accordance with the news in sight and instructions from the managing editor and city editor the night before.

Each newspaper must have its own story of anything of any consequence. Each has a certain individuality of its own and a style of treatment which gives each newspaper a following just as each breakfast food has its devotees. The assistant city editor goes ahead as if there were no city editor, deciding things as they happen. This style is followed throughout the office, and every man thus has his share of responsibility. A certain number of pictures are need-

* Abstract of article by William M. Handy, Sunday editor of the Chicago Tribune, in *Mahin's Magazine*.

ed to illustrate the paper. The assistant city editor and the managing editor's secretary go ahead and arrange for these as if nothing else were to happen, and when the artists arrive at 2 P. M. they set about making them, though most of them may be crowded out at 10 P. M., when better pictures may be in sight. Each day sees probably twice as much matter prepared as is needed.

The city editor arrives at 4 P. M. and the managing editor a little later. These men read the morning papers before they went to bed. When they got up the 3 o'clock editions of the evening papers were on their breakfast tables, and even before breakfast they had telephoned the office to learn the news of the day and consult with the assistants, thus actually beginning work as soon as they are out of bed.

On the managing editor's arrival at the office he finds on his desk a summary of the day's news prepared by his secretary, while the day report of the Associated Press is at hand for reference, and as a pile of wheat from which grains missed by the afternoon papers may be winnowed and ideas may be gleaned for stories of importance. The city editor having the local news of the day at his fingers' ends comes in to consult with the managing editor. In the meantime the editorial writers and other department men have turned in their copy.

At 6 P. M. the advertising manager tells the managing editor how many columns of advertisements he has for the next day. The night editor arrives a few moments later and then the probable size of the paper is determined—whether twelve, fourteen or sixteen pages, in accordance with the aggregate number of columns of advertising and reading matter.

At 6:30 the telegraph editor and his assistants have arrived. The city editor and the telegraph editor then prepare separate schedules of their news, the amount of space in each being expressed in decimals. These first schedules are tentative, to be succeeded by revised figures a few hours later which must be adhered to except for important reasons.

The routine copy has, in the meantime, been given to the night foreman of the composing-room, who cuts it into "takes" for the linotype operators, who begin work at 7 P. M. The separate takes into which each story is divided are numbered, and they are also given letter or class numbers, that all matter of a general character may be assembled together on the galleys. As the matter is set, proofs are taken and sent to the proofreaders for correction of typographical and other obvious errors. After correction they go to the make-up table ready to be put in the forms.

Meantime, upon a large sheet of paper, the night editor has copied the schedules of the city editor and telegraph editor and, having added the totals, he summarizes these in another column.

The copy readers in the telegraph and local room are working in accordance with the schedules. Each piece of news is made to fit the space assigned to it. Any new story means the omission of another or the trimming of several, for only 112 columns can get in sixteen pages—no more, no less.

When the managing editor arrives from his dinner at 9:30 o'clock, the city and night editors come into his office. He goes over the schedules and asks about each piece of news. His judgment is that nothing in particular has happened; fourteen pages are enough. "We are printing too many long-winded stories, anyhow," he says; "kill some of this 'cheese' and have a bright, snappy paper."

The night editor makes out a schedule for each page after the managing editor has determined what stories shall go on the first page.

The last form for the first edition goes to press at 12:30. By 1:10 A. M. it has been stereotyped, the plates are on the press and the mailing-room is getting the first papers.

The mailing-room has been preparing for this moment. Twenty wagons are waiting to carry the papers to the early morning mail trains. The papers are wrapped in bundles for dealers and routed so as to simplify the work of the mail clerks. The wagons dash to the stations, and soon papers are on their way to the country.

Then comes the work of getting out the city edition. The mail edition is made for country readers. It contains all the general news covered in much better shape than the dailies in the small cities could, but it also has agricultural news and accounts of events happening in the Northwest of no importance to the people of the city. Politics has been given a more prominent consideration than is necessary in the city edition. When the night editor gets copies of the first edition he goes over the paper and "kills" news of no interest to city readers and trims other items that are worth a smaller mention in the second edition. The whole paper is revised with the city reader in view. The telegraph and city editors report their new stories and news in the paper is cut or trimmed accordingly. Stories of purely local interest are given more prominence and some crowded out of the mail edition are restored.

The city edition goes to press at 2:30 A. M. and is being printed by 3:15. The wagons that carried the papers to the railway stations now receive bundles for delivery to newsdealers and carriers and the morning paper is ready for the reader.

Practically two separate newspapers have been issued—one for country and one for city readers, each prepared with regard to the varying tastes of rural and urban readers. In the process enough matter to make two or three newspapers has been sifted and winnowed, and everything has been done on a clock-work schedule as regular as that of the railroad which bears the mail edition to thousands of readers in the smaller towns of the Northwest.

A MORNING WITH THEODORE L. DE VINNE.

Mr. Theodore L. De Vinne spends the greater part of the day in his library, surrounded by his noted collection of books on the printing art. Certainly there are few printers in the world to-day who are better qualified to talk both of the history of their craft and its practical side as well, for he has seen the birth and growth of modern printing, and is still its best chronicler. The question which first occurred to the interlocutor was, "Who invented printing?" We receive a conservative answer, which should make us all cautious on snap judgments on the origin of inventions.

"Movable types were known before Gutenberg made type, but they were cut singly. I think he was the inventor of the adjustable mold. To make a mold, on which you can clamp any matrix of any letter, was the key to the invention. There is no proof that Gutenberg made the first movable type. Koster, a Hollander, of Haarlem, is credited with making wood type. There is no certainty that he did; there is certainty that he never printed a book. The vitality of typography depends upon types cheaply made and easily combined.

"The Psalter of 1457, made by Füst and Schoeffer at Mentz, was recently sold for \$27,000, although it is a thin single volume. Of the Mazarin Bible there are about fifteen known copies. How long it took to print it is pure speculation. Gutenberg began making experiments as early as 1439-40, and the earliest date that has been assigned to his Bible of forty-two lines is 1450. There is another Bible of thirty-six lines, which some think antedates the Mazarin Bible. If you examine each single letter, anyone would say we cut letters more carefully now, but the general effect of this Bible of 42 lines is admirable, and this superiority is largely due to great care in its presswork. In modern printing when you put a dry sheet of paper on a cylinder, it is swiftly carried over the face of the type. It just kisses the ink on the type, and is then swept off. The old hand pressman was told to rest on the bar for two or three seconds after impression, so as to let the ink saturate the paper. The merit of Morris's presswork is largely due to damp paper and the dwelling on the impression.

"I began my experience as a printer in 1843-44 in an office which was not as big as one floor of a small dwelling house. It had only one old-fashioned Washington hand press and no steam press. The newspapers even did not have steam presses. In 1835 I went with my father, who was an old friend of James Harper, to the latter's printing office. It was the first time I was in one. This printing house was in Cliff Street (just where they are now). It had a dozen hand presses, but no power press. One or two newspapers only had them. The New York Sun, established by Benjamin H. Day, was printed on a hand press. He was a job printer, and as he did not get enough work to do, he conceived the idea of making up a paper and selling it for a cent. The circulation ran up so rapidly he could not print enough. He engaged three pressmen, and each one worked about twenty minutes and pulled like a horse at the hand press until he was played out, and then another took his place. They got out 400 or 500 copies an hour. The Sun was afterward sold to Moses Y. Beach, who put in a cylinder press.

"There was not much objection made to the introduction of the power press here. It began in a very slow and timid way. The first attempt to improve the quality of printing was made, I think, by Daniel Fanshaw, who had an office at Ann and Nassau Streets. He put in a Tuft's press, and to furnish the power a donkey was brought every morning, and bands were passed under him by which he was hoisted to the top floor, where he trod a treadmill and furnished the power. That was about 1836 or 1837. After the Tuft press came another, the name of which I cannot recall. Then came the Adams, and this is in use to-day. A Boston book house even now does three-quarters of its work on the Adams platen press.

"I read somewhere that the papers abroad have larger circulations than our papers have; one London paper prints daily 857,000 copies. The Petit Journal, Paris, goes still higher than that, but they are papers of smaller size.

"So far as mechanical finish is concerned, type was never made so well as now. The tendency of the time seems to be, not only on the part of the publishers, but on that of the authors, to have a book set in distinctive type, something out of the ordinary run, which I think is a great mistake. Type is made to convey the thought of the author, but any publisher or any printer who attempts to make the manner superior to the matter puts the cart before the horse. I do not object to individuality or to decoration. The old masters made their decoration with engraved initial letters. The reader ought not to be led to think more of the mannerisms of printer or engraver than he does of the information conveyed by the author. For purposes of display I think the Cheltenham type is excellent. It is a slender type, yet extremely readable. You can crowd a great deal of matter in a very little space. The Cheltenham type favors one of my theories; it has very long ascenders and descenders. Take the lower case *g* and *f*; one drops down and the other stands up, and thus produces the white lane between lines of letters that helps reading.

"There is now great admiration for Caslon type, but some of it is unthinkingly bestowed. The 12-point Caslon type is a beautiful letter, but Caslon types of smaller face are very mean. The Renner type is named after the man who first made it. Publishers claim that 10-point, or long primer, is the best size of type for ordinary book work.

"Hand type setting will never entirely go out of fashion. When the linotype was introduced, I rated it as an attempt on the part of the inventor to set type without proofreaders. I have had to change that rash judgment. When a compositor found that his situation depended upon his accuracy, he became more careful. We now have men who can work on the linotype and set a whole paragraph without a single error, something that was rarely ever done in hand work. There is still a field for the machines that use foundry type. Machine type setting has come to stay. The average reader could never be supplied with the amount of reading material he receives were it not for the linotype machine. At first the compositors of this country were furious at machines that did this work, but when they found it gave them better pay, they were reconciled to the change.

"In 1872-73, book illustrations were from relief plates and were engraved on wood. Wood engraving is now practically a lost art. In about ten or fifteen years the art or craft of wood engraving will be as obsolete as that of the alchemist. Photo-engraving has taken its place, and it has undoubtedly been of immense service in a great many branches. It has many limitations. The first is that you cannot print a photo-engraving properly unless you use highly-surfaced paper, and the surfaced paper that is preferred is the so-called "coated" paper, which is nothing more than paper-fabric whitewashed. In nearly all periodicals the type work is entirely subordinated, and notwithstanding all our claims for improvement and superiority the printing of type on the average is not as well done as it was fifty years ago. For advertising purposes, for the pretty little pamphlets which are so common, photo-engraving has been a great blessing. They save the cost of engraving, and enable a man to show things that never would have been shown at all if it had not been for that art. As a rule the type work about the illustration is indistinctly printed. In the old times, when a man made a design he had to draw it of the exact size; but now he draws it on a sheet that is anywhere from four to ten times the size of the illustration. When it is reduced by a photo-engraver the middle tints, the obscure grays and the pale grays, are run together and the illustration is foggy or muddy. It has no clearness or brightness. Designers and photo-engravers, though they have been helpful to printers in some directions, have been injurious in others. In order to show the middle tints of a photo-engraved illustration, the pressman has to carry little ink and do a deal of rolling. To give engravers a fair show, publishers too often select the lightest faces of type, and the consequence is that the type looks weak and mean. There is none of the clearness and boldness that there used to be. Photo-engravers have damaged printing by compelling the too free use of coated and highly-surfaced paper. The old method of wetting paper is the true method for producing readable presswork. Mr. Morris was the first person who tried to restore printing to its primitive simplicity. I am speaking of his method of presswork. He used type with strong black faces, and he did his printing on damp paper with an elastic impression, so as to show an indentation which he would not allow to be pressed out. In my boyhood days, pressmen printed on damp paper against a woolen blanket. They dampened three or four sheets, or sometimes a quire at a time, depending upon the thickness of the paper. After it was printed it was dried on poles and taken down and put in a press, and the marks of indentation taken out. Printing is now done on dry paper, and these troublesome processes have been discarded."