

THE STEREOTYPING FOUNDRY.

STEREOTYPING follows immediately upon the completion of the Compositors' work into pages of type *fac-similes*, of which it produces to any extent required by the printing machines. Without that power of multiplying these plates, the original type pages could only be used by one press; so that the production of newspapers would be greatly limited, as it really was prior to the developed process of stereotyping. When rapid printing presses were invented, they were for a time worked with type pages; but it was a cumbrous and risky attempt at best to gain speed. At the same time these shortcomings, in view of the possibilities of stereotyping, prompted several minds to work out step-by-step the simple and effective method now in use. It will, therefore, be evident that, although the Stereo Department is comparatively small, and needs only a short description, its work is vital to the great output of the modern newspaper.

THE OLD PROCESS OF STEREOTYPING was invented, after several unsuccessful attempts of others, by William Ged, of Edinburgh, in 1711. In his hands the material of the moulds for making counterparts of the type pages was Gypsum flour—Plaster of Paris—from which, when hardened, the metal cast was taken. This method was used for books, &c., so as to avoid keeping up the type when there was a prospect or possibility of an after demand beyond the number at first printed. But as the Plaster of Paris process took some time to dry, so as to stand the hot fluid metal, and was comparatively fragile, it was seen that some speedier plan was necessary, and one that would allow more free handling under the high-pressure emergencies of newspapers.

THE MODERN PROCESS of making stereo plates (said to have been invented by another Scot of the name of Wilson), took the form of a sort of *papier maché* for matrices, made up by a base of strong grey paper, upon which is pasted one or more sheets of

blotting paper, all overlaid with a facing of tissue paper. Sometimes more sheets are used so as to give greater strength, or to give greater thickness and consequent greater thinness to the cast taken from such a matrix. In either case, these moulding papers after being so easily prepared are ready to be placed face to face over the type pages, as soon as the compositors have completed them. Then both are passed under the roller of a mangle,—the pressure of which causes a matrix counterpart to be clearly left upon the soft paper. In this moist state the matrix sheet is placed in an oven to dry, and, after being hardened and trimmed, it is laid on the curved bed of a strong iron casting-box with a heavy lid. By way of the mouthpiece at the upper ends of the box fluid lead, with a proportion of tin to toughen, and antimony to harden the metal, is poured into the box, and covers the face of the paper matrix. In that position the metal quickly sets, so that when the lid is lifted off the newly-made bright stereo plate is found showing an exact *fac-simile* of the type page, and curved to fit exactly the cylinder of the printing press, to which it is immediately transferred to fulfil its purpose. From each of these paper matrices it is a common thing for us to take from 16 to 20 cast plates; and even after enduring so much extreme heat from the liquid metal, they continue capable of doing more pages.

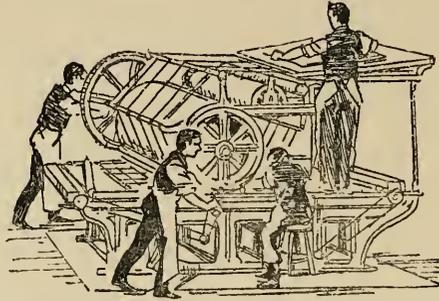
The start of stereotyping, in our case, was on the occasion of launching the *Weekly Herald* in 1864. At that period a stereo plate took 25 minutes to make, and that was considered then a remarkable feat. Now the first two plates are turned out and trimmed ready for printing in nine minutes after the type pages reach the stereotypers' hands. For some years after starting it was the custom, and is still in many newspaper offices, to dry the moist matrix paper while it and the type pages were under a screw press and upon a hot iron slab, in order, as expected, to get a deep and clear impression from the type. As, however, that method of drying the matrix by strong heat through the type resulted in vertical expansion of the latter, and in melting its

feet, we tried to lessen the evil by the moderating use of gas fires, and afterwards by steam heat; but these were only steps of experience by which we reached the present quicker and safer method. This change from drying the matrix by heat coming through the type pages, to that of drying it by itself in an oven, allowed the type to be kept harmless, and free for immediate redistribution. By this change our last fount of type did duty in producing the *Herald* for 16 years, while type in other offices which continue the hot process show decay and blurred printing in about as many months. It may be added that the heat used for making and keeping the stereo metal in a fluid state ready for casting is also utilised for keeping the drying oven at a sufficient temperature, instead of, as in the other case, having an additional fire to dry the matrix through the type.

THE MACHINE PRINTING DEPARTMENT.

THE next stage in the order of Newspaper Production is in the Machine Room, or, as it was called 50 years ago, the Press Room, because formerly all printing was done by hand-press power. Our press room at that period was in a cellar below the counting-house, and measured only 24 feet by 15, or 360 square feet. Besides the one platen press of one cylinder, that space accommodated, amongst other things, our stock of paper, and a big trough of water through which the quires of paper were passed in order to get damped. The printing press was made by Cowper of Manchester, who was at that time considered one of the best makers. The driving power was by four strong men,—three at a time “caaing” the driving wheel with all their might, and the fourth resting by turns, while one apprentice compositor in an elevated position fed the sheets into the machine, and another below took them off after being printed.

So far as I remember, or can learn, the maximum number printed was about 750 copies per hour, but *on one side only*, which meant, including turning and adjusting, about 350



THE COWPER HAND PRINTING PRESS, 1845.

completed papers each hour. Now our seven printing machines are capable of producing from 192,000 to 200,000 *complete copies* per hour, of a size larger than the *Herald* of 1845, all folded, counted singly and in bundles of dozens or scores, ready for immediate despatch. The driving power now, as compared to three men formerly, is equal to that of 2,400 men.

THE DAMPING OF THE PAPER is a work in this department which was, and continues to be, almost always done as a preliminary to the printing of it; and to which an allusion here may be allowed. Some few offices try to dispense with this process, and others in emergencies, print upon dry paper. It is found, however, that in rapid newspaper printing the damp paper takes on the ink better, and prevents its tendency to smear the hands of the reader. This damping, as just stated, was done by laving the quires through water, which, after being heaped together, sufficiently permeated all the sheets. It was a troublesome, rather uncertain and laborious process; and yet, some years ago, when visiting one of the offices of a London newspaper (with "the greatest circulation in the world"), I was surprised to

find the old-fashioned water trough process in full use. All that work, especially since webs of paper took the place of sheets for printing, has been done for most of the leading newspapers by machines, which allow the quantity of water to be graduated to the degree preferred. The damping by machinery has also the advantage of throwing off during the process any stray chips of paper, &c., which may have been carried from the paper mill, and which might affect the printing if not removed.

STEAM POWER AND CYLINDER PRINTING PRESSES.—Steam Engine power for the printing of newspapers was first employed on the 19th November, 1814, in producing the *Times*, when the proprietors announced in it the accomplishment that day of “the practical result of the greatest improvement connected with printing since the discovery of the art itself.” The notice concluded by referring also to the equally important fact of the application of that power to a *Cylinder* Printing Press made by König, a German, by which the work “is performed with such velocity that no less than eleven hundred sheets are impressed in an hour.” That meant paper printed on one side only, and not complete as newspapers are now turned out. It was, however, a marriage between steam power and cylinder printing which is not likely to be soon dissolved. That machine was so complicated that it was supplanted by one invented by Applegath & Cowper, which was supplied in 1827 to the *Times*; it printed copies at a speed very much greater than König’s. Few, if any, newspaper proprietors of that time had either the need, ability, or enterprise of John Walter of the *Times*, and it was not till 1851 that the *Herald* was printed by a steam engine and cylinder machines, made by Brown of Kirkcaldy. These—a small steam engine, with a single cylinder, and shortly afterwards a double cylinder press,—gave faithful service by producing jointly about 2,000 copies per hour on one side, in an enlarged press room until 1859. It must be understood that the type pages lay flat in a bed which travelled hither and thither, at one turn to be inked, and at the

other turn to give off the ink impression to the sheets of paper which were carried round by the cylinders, and then delivered into the hands of an attendant.

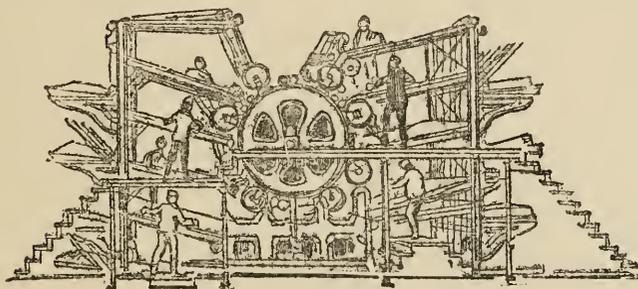
ROTARY PRINTING MACHINES, with their greatly increased productive power, came at the fit time to meet the great demand which we had to face in the year 1859, when the *Herald* was transformed into a Daily Newspaper. A few years before, Mr. Robert Hoe, an English gentleman who took up business in New York with his son Richard, made the first of their famous Rotary Presses. In the year 1790, William Nicolson, a patent agent, painter, editor of the *Philosophical Journal*, and general inventor, took out a patent which seems to have been somewhat of a forecast of the leading features of the type and impression cylinder with the inking rollers of the Rotary Press. Nicolson had evidently the faculty to think out, but not to carry out into practice what his genius produced, so that in that and other things he failed to reap the fruit. It was said of him that he was "always inventing, always poor, always borrowing, and at last found himself in prison;" then, it was also said, König found him, learned what his patent was, and mastered it so far as to turn out the first cylinder printing machine, as just stated. Sixty-seven years afterwards, however, Messrs. Hoe showed their mechanical genius in practice by building up, after overcoming many difficult details, their first Rotary Press with cylinders carrying the type pages, which held the field against all other attempts. As in the case of the later Hoe Web Machines, Edward Lloyd, proprietor of *Lloyd's News* and originator of the *Daily Chronicle*, was the first in Europe to adopt these presses. These machines had 4, 6, 8, or 10 impressing cylinders (covered with blanketing to give a soft impression) which were placed round the sides and almost touching a large central cylinder. It moved at starting in a ponderous style, as if feeling the heavy type pages on its back, but soon went on at a speed which earned for the machine in America the name of the "Lightning Press." By every revolution it was brought in actual

touch with each of these impressing cylinders, or rather with the sheets of paper which they carried, so as to put the impression of the type upon them. The pages of type were fixed on *convex* beds, upon quite an original plan, so as to secure them from falling out while the cylinder was revolving. That was done by the column rules of the pages being made thicker at the top than at the bottom, and by the side-sticks for locking-up the type being so bevelled as to complete the fixing of the whole into a solid page, the page to the bed, and the bed afterwards to the cylinder. These type-beds were with some appropriateness called "Turtles," because, their shape being a segment of the circle of the large cylinder, and of a dumpy figure, with the rule lines on their faces, made them not unlike the back and body of a turtle. Before the printing machine started, a pile of paper in sheets was placed upon a table sloping to each of the small cylinders, and spread towards them. Alongside of these heaps young men stood ready at the start to feed sheet by sheet close to these cylinders, from which projected iron fingers or grippers that seized them at the right moment, and carried them round until they met and received the impression of the type pages on the large cylinder, which made them newspapers on one side. There are, however, few great advantages without some disadvantages, and in this case it was found after a time, from the appearance of the printed matter, that the face of the type was being worn round by the almost constant friction with the impressing cylinder. This led to the adoption of stereo-type plates for the Daily Paper as well as for the *Weekly Herald*,—for which the stereo apparatus was at first intended.

One of the advantages these machines had over all their predecessors was the delivery of the printed sheets by large open fans, to which they were conveyed over or under the feeding tables by moving tapes from the printing parts of the machine. These fans or flyers did their work well, and had the advantage of doing the work of a "hand" to each of the 4, 6, 8, or 10 deliveries. The first Hoe Rotary Printing Press we bought was a "Four Feeder,"

so called because the sheets were fed into it by the iron fingers of its four impressing cylinders. That size of machine cost £2,500, and produced from 7,000 and 8,000 copies on one side per hour; but the rate guaranteed was 10,000 per hour. We soon found that it was insufficient for the increased demand made upon us by the public, and, in any case, it became more than ever evident that should the one machine break down we would be helpless. A "Six Feeder," which cost £3,000, was therefore procured and started in 1861. It was set to give 15,000 per hour, but in this case, too, it was not long till it was seen that still greater supply power was required. Our premises, however (then in St. Vincent Place, the position of which is now covered by the Clydesdale Bank), were already overcrowded, and more space on either side could not be bought or leased. It was well that we were compelled in this way to look out for ground elsewhere, as even more than double what we had would not have sufficed to meet our wants for a few years. But ample enough space for the most probable expansions was secured in the heart of Buchanan Street, a street that may be considered the heart of Glasgow, combining, as it does, the business qualities of Cornhill with the fashionable attraction of Regent Street, London. There, between Buchanan Street and Mitchell Street, to which the ground extended, we erected a building which contained on the basement an exceptionally spacious machine room, the ceiling of which was supported by massive iron pillars, 22 feet high, and a compositors' room or hall on the upper floor much larger than any of us conceived as likely ever to be needed, while the remaining floorage was apportioned to the other departments. The area and height of the new machine room were necessary because of the mammoth size of these Rotary Presses, and for the two Eight Feeder Hoe Machines which it was found were required. They reached a height of 18 feet in the greater part of their length, so that there remained just 4 feet as working and air space. Each of these Eight Feeders, which were started in

1868 (7 years after the Six Feeder), cost £4,500, and was rated to print on one side 20,000 *Heralds* per hour. When we took possession of our new premises and of these great printing presses, it seemed to most of us that a very long future, perhaps beyond the years of any one then in the *Herald*, was provided for. And yet 8 years thereafter these fine machines, which were kept in good condition, were superseded by two Web Machines and sold to their makers for £600, little more than the price of old iron. Some months after, when in London, I saw the broken fragments of these Eight Feeders in the yard of Messrs. Hoe & Co.



EIGHT-CYLINDER ROTARY PRESS.

ready to be carted off and melted down. Their predecessors had a longer life time and less humiliating history, as the Four Feeder was transferred through its makers to a South of England newspaper office, and the Six Feeder, which cost £3,000, was sold by us for about £1,000 less to a leading Manchester newspaper, for which it gave many years of good service. When we were about to part with the first and second of these Rotary Machines, I had a call from a Belfast newspaper proprietor, who had many years previously bought our old Cowper hand-driven press. He declared that as it had brought him such good luck he was anxious to have another second-hand machine from us; but the courage to face the working, and perhaps the price, of the Rotary failed him.

The cost of working these presses was very great, for each of the eight cylinders required 8 men to lead in the sheets, other 8 to carry off the sheets after they were printed, and 12 to pass them through twelve folding machines, with two head men,—so that on the regular staff there were not fewer than 46 machine hands. There were two special occasions when the most of that number were kept working or waiting on (eating and sleeping by turns on the premises) for about 36 hours running. These occasions were when the life of the Prince of Wales, under enteric fever, was wavering in extremity for some days, and when the people of the whole Empire were under prolonged anxiety regarding the result. Under the possibility of a fatal result, our Editor had a biographical sketch of the Prince prepared and set up, which was ready for printing at any moment, with the addition of probably two or three lines only, if the moment had come which comes to all. The other cause for such a lengthened waiting time by our men was during the trial of Dr. Pritchard, the poisoner, when the Glasgow public especially were greatly interested in all the details of the evidence and in the verdict.

The cost of working the Rotaries, however, gave us less concern than the handling of the men who fed in the sheets. They knew that they had command of the position gained by their experience, and that new men could not at first do their work. This was shown two or three different times when some of them were “under drink,”—by their refusal to work almost preventing the issue of the *Herald* on these days. As it was necessary for these feeders to place each sheet at an exact point to secure correct printing, a little divergence or turned corner spoiled the sheet, and this waste was all the greater when the men’s heads or hands were unsteady. By the Web Printing Machines, which succeeded the Rotary Feeders, these and other troubles ceased, and various considerable advantages were secured.

A NIGHT SCENE, when such machines were in use, is described as follows by the *New York Tribune*, slightly altered, and gives

a picture of our experience at that period :—“ The press-rooms of a great journal now begin to present one of the most picturesque and bustling scenes imaginable. From the basement floor two eight-cylinder machines towered aloft like houses. Eighteen feet in height, thirty-one feet in length, and nine feet in width, they required the space of two entire floors ; they were approached by staircases and galleries ; and platforms were built around them for the workmen. During the early part of the night the pressmen prepared the apparatus with the greatest care. The bearings were oiled ; the tapes and blankets were examined and, if necessary, renewed ; the proper consistency of the ink was tested ; the ink-reservoir was filled ; the inking-rollers were removed, cleaned and replaced ; every one of the complicated parts was looked over and put in perfect order. Meanwhile huge stacks of paper had been moistened and placed on the feeding shelves. About midnight the type-beds or, as it was afterwards, stereoplates of the “ first side ”—that is, the four pages which appear on the inside of the sheet when the paper is folded—were dropped one by one into the machine-room. Instantly the press-room started into activity. The sixteen hand feeders threw off coats, rolled up sleeves, ran and clambered to their places beside the tiers of shelves. Scores of gas jets began to blaze. The metal plates—four for each of the presses—were quickly lifted into place and secured by clamps screwed to their bevelled edges. The pressman stood with his hand on the starting rope. The distant engine, which had been breathing impatiently for the past half hour, got in motion. The shafting under the vaulted ceiling began to turn. There was a cry, ‘ All ready ! ’ and then, as the rope was pulled, the two great machines, slowly at first, but with accelerating speed, set off on their tremendous revolutions. It was a smooth and sure and comfortable sort of movement, and starting the big four-story press was as easy as starting a clock ; but the whirl and clank of myriad wheels, the rattle of the wooden fliers, the regular pulsation of metallic strokes, made, nevertheless,

a deafening noise. Now the boys seized the fast accumulating piles of printed sheets, and ran with them from the receiving tables to a platform, where they were piled up to await the next process. Others hurried from the stacked piles of paper with fresh supplies for the feeders. So for three hours, without pause, the work went on. A moment's rest; and the plates were taken from the press; the "last side" forms, hot from the stereotypers, and containing most of the telegraphic and late city news, and the editorial comments on the intelligence of the night, were put in their place; and the hurry and whirl and rattle began again. The sheets, printed on one side, were turned over and fed once more into the machines, coming out completed papers. A second set of hands now appeared on the scene. At the end of the press-room stood a row of twelve folding machines, each with a single shelf, like the feeding-board of the press, and on these shelves were deposited the printed papers as fast as the boys could bring them from the receiving tables. A bewildering apparatus of wheels, and tapes, and brass fingers, began to spin around, and through the thicket of machinery one saw certain long steel folding-knives rise and fall rapidly as the sheets, fed in by hand, were drawn under them, and carried along to a wooden box at the bottom. Messengers snatched them by the armful and ran to the despatch-room. Heavy drays were waiting at the door. In a few minutes after the arrival of the 'last side' plates in the press-room, cart-loads were on the way to the early newspaper trains; and long before the presses had finished their task, papers for places out of the reach of railways were in the Post Office. Carriers, newsboys, and the agents of the city and suburbs crowded the despatch-room as daylight approached; and during the last hour especially, when every part of the machinery was revolving at its greatest speed, and men were running hither and thither under the gaslight with immense piles of the printed sheets, and customers were clamouring to be served, the spectacle of a newspaper press-room was one that

never fails to inpress the imagination and fix itself upon the memory."

WEB PRINTING MACHINES.—Many and varied were the attempts to overcome the difficulties of inventing a machine to print on both sides at one movement of the type pages, &c., so as to produce what printers call a perfecting press. Amongst those who had made such efforts were Sir Rowland Hill, the Post Office reformer, Jephtha Wilkinson of New York,—and about the same period,—Richard Hoe, John Walter of the *Times*, Wm. A. Bullock, and Marinoni of Paris. The four latter invented and made such perfecting machines which printed upon webs of paper 3 to 5 miles long, from which the individual newspaper sheets were separated and delivered. But before these Web Presses appeared, and shortly before our Eight Feeder Rotaries were ordered, I had heard that some such remarkable machine was being constructed by Mr. Smith, Engineer, at Well Street, London. Upon my first visit thereafter to London I called upon him, and found him studying the model of his intended web perfecting machine. He readily showed me all, but frankly confessed that he had met a difficulty which seemed insurmountable. The difficulty he imagined was that the attempt to print both sides at the same time would cause the ink to blur and make the paper unreadable; but it was an imaginary difficulty, and yet so real to him, as to block his way when he was on the very verge of a great success. My impression is that his failure was in attempting to get both sides printed at the same actual moment, while the solution was not long afterwards found to be in taking the impress of the first side immediately before the web passed on to be printed on the other side by an adjoining cylinder. Machines upon that principle, but with variations in applying it, were almost simultaneously placed at the service of the public, and produced complete newspapers at one operation without the blurring or smudging with ink which had been feared. They were called after their makers—Hoe, Walter, Bullock, and

Marinoni. It was only in 1855 that the greatest block to the inventive faculty in devising web printing machines was taken away by the abolition of the compulsory penny stamp on each sheet. As these sheets required to be stamped one by one in the Government offices, such a process was impossible in the case of webs of paper miles long. To Mr. Gladstone, then for the first time Chancellor of the Exchequer, and the greatest Financier of the century, belongs the credit of that transaction.

After that difficulty had been overcome another had to be dealt with, in the shape of the delivery of the newspapers apart from the webs when each copy was printed. The continuous rush of the printed web gave no interval for delivery, and even after a method of separating each paper was found they followed one another in an equally continuous and rapid stream. This also was at length solved and the speed increased by Mr. Hoe and his partner, Mr. Tucker, who invented a plan by which a cylinder collected and delivered several papers at a time, and afterwards a still simpler method of passing the sheets between two small rollers, which by quicker motion than the printing cylinders got ahead of their speed and thereby secured intervals of time in the delivery. At first the papers were delivered flat on tables, but by-and-bye folding mechanism was attached to the printers, and the result was not only the printing of both sides of the webs quicker, but the folding and delivery of perfected newspapers. These and other features of the Web Perfecting Machines seem *simple* now, but nevertheless the inventive faculties which step by step evolved them are in a high degree characteristic of this century of invention. The simplifying of the stereotyping process, and the making of curved plates to fit printing cylinders, as latterly used for the Rotary Feeders, may have prompted the thought of using them in connection with the web printing principle,—that principle having been many years before applied to calico web printing.

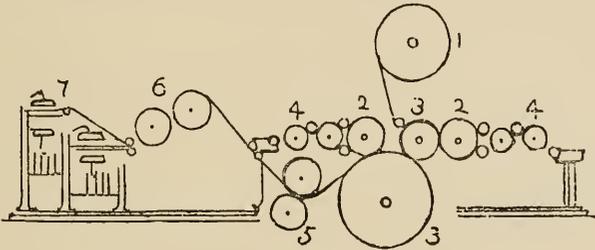
TWO WEB PERFECTING MACHINES were made for printing

the *Herald* by Messrs. R. Hoe & Co., who also have supplied all the presses—seven in number—which are now in use. These repeated investments sufficiently testify to our appreciation of the excellence of their workmanship. The first two placed in 1875 cost £3,300 each, and were guaranteed to produce at the rate of 12,000 copies an hour printed on *both sides*, besides being folded quarter page, delivered, and counted. They were worked by two men,—a brakesman to control the speed, and a minder to watch the machinery and product. In contrast to that, their Eight Feeder predecessors cost £4,500 each, were expected to print on *one side* 20,000 copies an hour; but the printing of the other side with the delays in changing, &c., caused the total of *completed* copies to be about 8,000 per hour, while each of them required 23 men to feed, carry, and fold the sheets, instead of 2 or 3 to each web machine. The differences, however, did not end with the prices of each, the production, or the number of workmen; for the latter have great advantages not only in economy, but in the way of efficiency, such as enabling the Literary Department to give later news, &c., avoiding spoiled sheets, and in printing only the number of papers actually needed from hour to hour without guessing ahead of the demand, besides delivering us from the jeopardy we were sometimes in by our indispensable workmen refusing to do their part. At the same time, while these Web Perfecting Machines were 22 feet long by 5½ broad, and only one step above the floor to enable the plates to be fixed, their mammoth Eight Feeder predecessors were about two stories high, 31 feet in length, and 9 feet broad.

THE MECHANISM OF THE WEB PRESSES differs almost entirely from that of the Rotaries, although the latter had much to do in prompting the invention of the other. The web machine had what might be called (although it seems like a “bull”) a reversed resemblance to its predecessor,—because while the rotating principle of cylinders continued, the large central cylinder no longer carried the type or stereo pages, but became an impressing

or blanket covered cylinder, and the stereo pages are now carried by the lesser cylinders of which there are only two, instead of 4, 6, 8, or 10 impression cylinders in the case of the so-called Rotaries. Each of these two cylinders carries four stereo plates, one of them nearly touching one side of the impression cylinder, and the second on the other side in similar position. The four plates print on one side only, while those on the other print the completing side, and thus produce an eight-page paper, or that extent of a larger paper, or, what is now becoming rare, two four-page papers. The inking apparatus, which consists of a trough to contain the ink, and a series of rollers covered by a soft but tough composition, or india-rubber, is placed at each side of the printing mechanism so as to take up the ink and spread it in the most equal and slightest manner over the type. The inking rollers were formerly all made of a composition of fine glue and treacle. While they lasted they did their work well, but they caused awkward stoppages in order to be washed clear of the fluff from the paper, &c., which they attracted and retained; they had an attraction to rats also because of the sweet element in them, and that sometimes was awkward. For many years we have got rid of the stoppages and the rats by the almost entire use of india rubber rollers, which have no such attractive nature, and run for several days without washing, while they have given excellent service for ten years and upwards. The reel or web of paper in the case of our machines was at first placed above the cylinders, and when the printing was about to begin the paper was led down between one of the type cylinders and the small blanket cylinder, and there, after the start, the paper received its impression of the type on one side, while immediately after the other side of the web got perfected by the second type cylinder and large impression one. The separation of that piece from the web was begun by passing it between two cylinders (called by engineers male and female cylinders), one of which carried a saw-toothed knife parallel with its length, which serrated the paper at

a point where, after it reached "leading strings" in the form of rapidly moving tapes, the separation of the newspaper from the web was completed, and thereafter it went on to the folding cylinders, &c., which now formed part of the web machine. This description of the mechanism may appear tedious; but, as it applies to all, or almost all, the rapid newspaper machines still in use, and which seem likely to retain their hold in the case of the printing, but not the folding parts, I have ventured to give these details, along with the accompanying Outline Plan, of the process by which complete newspapers are printed.



OUTLINE SKETCH OF FIRST WEB MACHINES.

No. 1 shows the web of paper. 2—The printing cylinders. 3—Impression cylinders; the driving-wheel is on the large one. 4—Inking rollers, &c. 5—The two serrating cylinders. 6—The two folding cylinders. 7—The knives or "choppers" which push the papers between two rollers to give the last two folds.

IMPROVEMENTS ON, AND IMPROVED WEB MACHINES.—The *principle* on which complete newspapers were printed from webs of paper, by means of type-carrying cylinders and impressing blanket cylinders remains, as I have said; but several extensions and improvements in lesser features have been made since they were first brought into general use. The lesser improvements have been chiefly in connection with the folding mechanism. At first the quarter page fold was by two cylinders with grippers to seize the edges and carry the sheets half round, when projecting blunt knives pushed them between two rollers

and made the first two-fold,—one across the top and the other across the page,—and the remaining two-folds by means of blunt “choppers” (as they were nicknamed), each of them attached to long iron handles that moved alternately so as to push the sheets between other two rollers which gave them the finishing folds. This elaborate mode of folding, including numerous tapes to carry or keep the sheets in their order, did much to hinder the printing, so that the promised speed of 12,000 eight-page papers per hour could not be long persisted in with safety. After our first web machines were ordered and at work, the partners decided to start the *Evening Times*; but as it was then a four-page sheet, while they could only print an eight-page *Herald*, we were obliged to continue the use of the old Rotaries. For many reasons this was objectionable; so that, when Mr. R. Hoe, Jr., visited this country about that time, I told him we wished the web machines improved, so as to print a four-page besides an eight-page paper. He said it was impossible; but, as I was not satisfied with that, I said we would get it done ourselves. The result was that we arranged to cut the eight-page sheet in two by the serrating cylinder, and as the folders could not deal with a four-page paper, I also planned a method by which the *Evening Times* was collected and delivered in parcels of half-dozens ready for immediate despatch or sale.

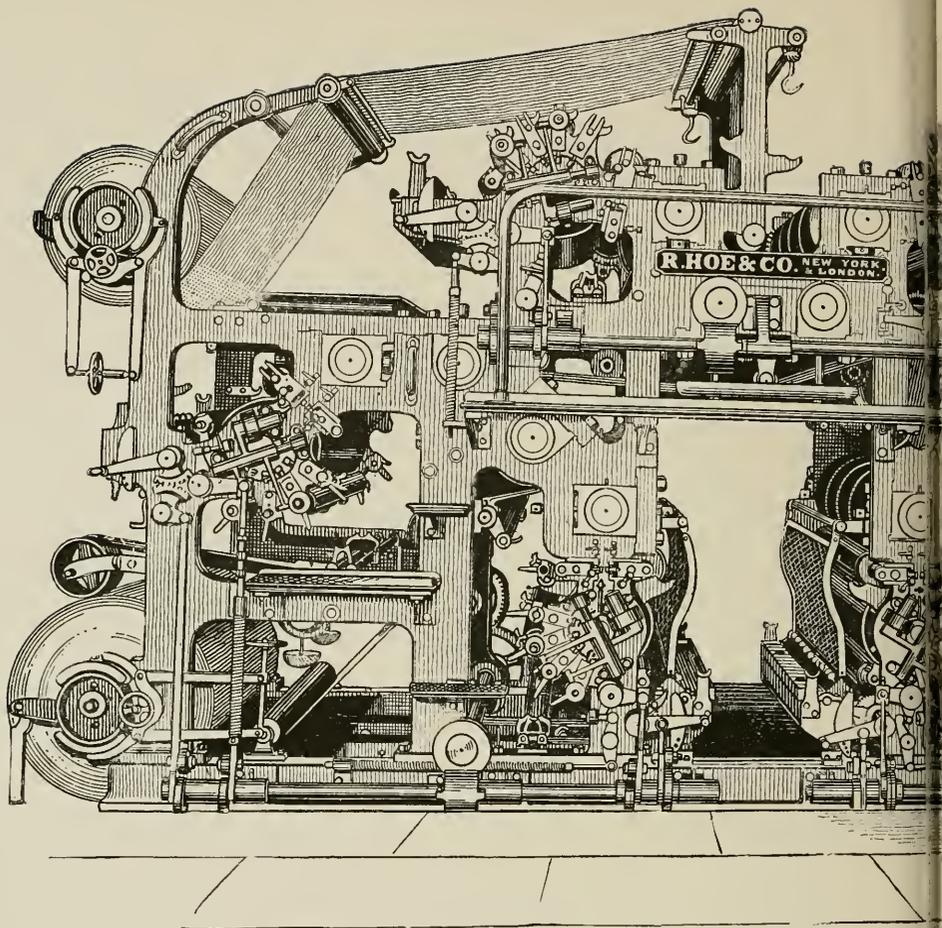
A third web press, however, was found necessary, not only because of having the power to print both sizes, but to meet the still growing demand for them. It was erected in 1877, and about to be started, when it happened that General Grant of the United States was in Glasgow and received the honour of the freedom of the city. It occurred to me that it would be an appropriate compliment to Messrs. Hoe, the American makers of it, if their ex-President inaugurated its use by being the first to bring it into action. He readily came to the office with Mrs. Grant and the Lord Provost, after the city ceremony, and on the 13th September of that year applied the lever by which the machine was put in full motion. “I guess that I have seen some such

printing press in New York," were almost the only words the naturally reticent General uttered. Our men thereafter called the machine "the General;" it is now doing good work in a leading daily paper in Wales. Part of its folding gear was an improvement upon that of its predecessor, but the chopper fold continued. Since that time, however, it has disappeared; and even its two predecessors have now their entire folders taken away, and triangle guiding plates, with small cylinders, &c., have taken their place, and in a very efficient way pour out mechanically counted papers in quantities of dozens, scores, or quires. These two first web presses started 20 years ago, and still "a'maist as guid as new," are converted to produce, and, of course, fold six-page papers as well as four and eight-page sizes.

The triangular plate with rounded edges, which took the place of the chopper folders and many of the troublesome tapes, was fixed (although it may seem awkward to say so) with its base at the top, to which the sheet in its full breadth is carried after leaving the printer, and assumes its first fold as in its progress it tapers down to the pointed apex; thereafter it gets the remaining folds by other mechanism of a simpler nature than the old. This method was applied on two presses designed for us by Colonel Richard Hoe, the senior partner of the firm, and formed the last contract he made before he died. He was an able engineer, and very much of a gentleman in all his dealings. That reversed triangular plate of the folding process, which is now in general use, was repeated in two later presses, along with the important advantage of cutting off the printed papers from the web during the folding, and thereby dispensing with leading tapes. These, and other improvements on the printing, as well as the folding mechanism, enable these presses to turn out four or six-page papers at the rate of 25,000 an hour, while they can give 27,000 copies when emergencies require; the eight-page portion of the *Herald* is turned out at half these numbers, and in each case the sheets are gummed together and delivered in portions of dozens or scores.

The speciality of these machines, by which the six pages are produced for the *Evening Times* size, or to make part of a larger size for the *Herald*, is by working webs of *three pages in breadth* (instead of by the ordinary two-page wide webs). After being printed together the web is divided into sheets of 4 pages, and another half that size; but immediately after the latter is diverted to two sloping bars, around which it gets a twisted movement, and from which it is placed and gummed inside the full sheet in page order. These excellent presses were made by Messrs. Hoe's London firm, of which Mr. George R. Willis is the managing partner, and successor to his old friend, Mr. William Conquest, who conducted the business in this country since the first Rotary machine was introduced and erected for Mr. Lloyd's newspapers in 1847.

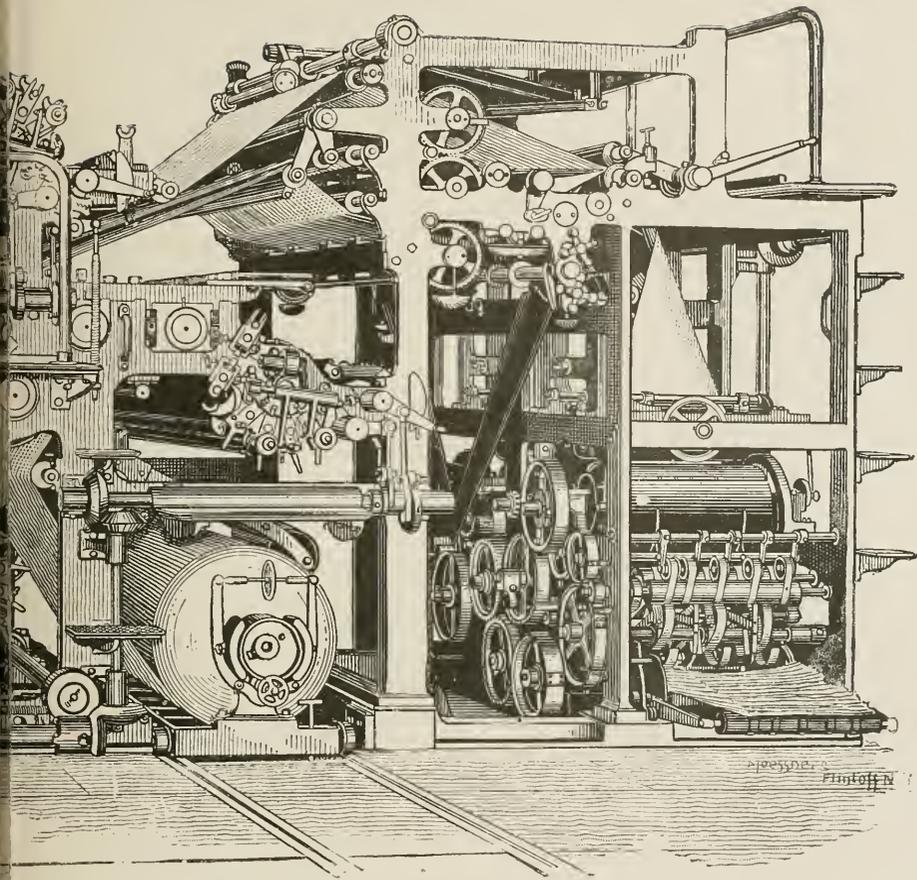
WEB PRESSES OF GREAT SIZES and immense productive power have also been made, but chiefly to print American Sunday papers and other weekly papers which have long-continued runs without the interruption of repeated editions for later news, with their altered stereo plates. The stoppages of such machines to change several plates of one edition to those of a later edition, which can only be made and placed one by one as they reach the machine-room, mean much loss of time in providing newspapers when parcels of them require to be made up and despatched for different railway trains, &c.; while during that time lesser sized presses, which require, it may be, only one or two late-edition plates, have been rapidly supplying what the greater machines cannot make up in number what they have lost in time,—just as in other cases delayed papers, however important the contents may be, become equal to waste paper if the trains to carry them are missed. For these reasons we have not placed more than one of such machines, called the Three-Web Press. The accompanying Sketch, and the Outline of the course of the web through the printer and the folder, may perhaps suffice to give an idea of its working, after the references already made to the chief mechanical workings of the



THE THREE-WEB PRINTING PRESS

The Sketch above shows such a Press as that recently made by R. Hoe & Co. In the Sketch, however, there is only one folder and one delivery cylinder, but there are two folders and double delivery, at hand height, as a delivery bar to give the first fold will be seen on the right, near two cylinders, and at the left side of that shown in the Sketch. The double folders and stoppings, are both important where a great output of papers is required.

It may be here stated that the small perforations seen at the top of the triangle, which project at the right moment, catch the sheet and fold it. Such cylinder pin-catchers have been in use on previous machines.

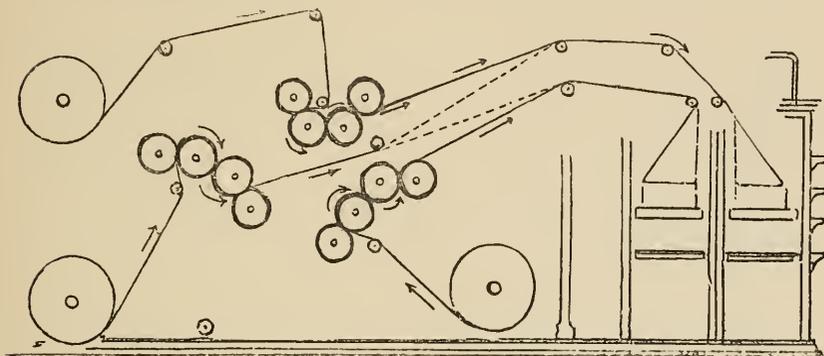


ND FOLDING MACHINE.

by Messrs. Hoe & Co., London, and erected in our Machine Room. The papers, and that on the floor level: in the case of our machine, shown in the following Outline Key. The *side* of one triangular steps. The second folding apparatus on our Press is placed above, and the delivery at a height to suit the handling and save the utmost facility in carrying them off.

The foot of the printed pages are made by pins in a cylinder below and hold them on till they are passed to receive the remaining lines.

Web-printing processes. This Three-Web press has an advantage over the smaller presses by producing their united output, and yielding a greater variety of sizes, such as complete papers of 4, 6, 8, 10, 12, 16, 20, or 24 pages, and these papers have the sheets (inset when needed) gummed, folded, counted, and delivered



OUTLINE KEY OF THREE-WEB MACHINE.

Showing the three webs of paper and their courses between the three sets of type and impression cylinders, so as to get printed first on one side and immediately after on the other. The webs then travel to the triangular part of the folders, where the papers get their first fold. The dotted lines show where portions of the webs combine when necessary.

in bundles of certain numbers. The guaranteed rate of production of these extra large sized papers is 12,000 copies an hour, and in the cases of the 4 or 6 page papers the promised output is 48,000 copies per hour.

THE GIANT PRINTING PRESS of the world is now being completed by Messrs. R. Hoe & Co. for the *New York World*, for which (with its Sunday paper) three are ordered. It is called the Octuple Press, because at each revolution of its great cylinders it will print, cut paste, fold, count, and deliver eight copies of eight-page papers. It is rated to give per hour 96,000 four-page papers,—the product of the others varying by stages according to the various larger sizes.

It is curious to find, upon looking backward, the great changes from the small hand-presses to those driven by men, to cylinder machines worked by steam power, on to the huge two-storey Eight and Ten Rotary Feeders; and then, on the other hand, to find the size almost suddenly diminished to the Web Printing and Folding Machines, across which men may shake hands, and the growth again to gigantic machines, such as the Three-Web Presses and the Octuple, with their marvellous output of perfected papers. With newspaper proprietors the question seems to be constant, What next? Like the public appetite for news, it may be said that newspaper printing presses grow in output by what they feed on. Fifty years ago we printed not more than 4,000 copies twice a week; now we turn webs of paper into newspapers which, if put end to end, would in less than a year encircle the globe, from slow stage-coach conveyance of news advanced to railway speed of 60 miles an hour, and to its momentary transmission by electric telegraph from every part of the world; from gas lighting, to the bright and wholesome electric light; from speaking to and hearing each other face to face, to speaking and hearing at distances of hundreds of miles; from hand-press and cylinder printing, at the rate of about 400 complete copies an hour, to a speed of near 1,000 per minute, perfected, folded, counted, and delivered; and from the old system of type setting by hand to setting by machines, and even dispensing with type almost altogether for solid lines,—the first portion of the installation of these Linotype Machines being now in operation.

We may well wonder if there is room left for as great an advance during the next half century. But that will not be our business.