Countdown to the *BMJ*

Margaret Cooter

Each week producing the *BMJ* uses:

25 tonnes of paper
230 kg of ink
200 sheets acetate (film)
4 km wire (staples)
36 km polythene
7000 post office bags
60 post office cages
... plus unspecified quantities of bromide paper, green proof paper, envelopes, headed notepaper, photocopy paper and toner—and lots of staff time

The *BMJ* may look unspectacular, but a great many people and much high technology are needed to put it together. This article looks at the preparation of an issue and describes in particular the work of the many people whose names are not seen in the journal but without whom it would not appear.

The *BMJ* that readers in Britain should receive on a Saturday has been in the final stages of production since Tuesday of the week before, but much of the work necessary for the issue started months previously: submitted papers have been through an elaborate peer review process; display advertisements are booked months in advance; and paper and ink have long been ordered.

The countdown begins.

Tuesday—day 10

On Tuesday mornings the print order for the four editions of the *BMJ* goes to the printers (BPCC Magazines Milton Keynes, in Bletchley) from the *BMJ*'s production department, a total of some 109 000 copies. This is based on the number of BMA members plus the number of subscriptions, advance copies, and stock copies (see glossary for definitions). The editions—clinical research, general practice, overseas, and compact—differ only in advertising matter, not in editorial content.

Every Tuesday afternoon the editors meet. The meeting begins with a critical look at the previous issue. Then the prospects for the news section are discussed: what are the possibilities for stories, and

who can write them? Unused stories from the previous week may still be topical; the editors suggest others they know of through word of mouth or press releases. Pieces might be commissioned from some of the 20 foreign correspondents or the regular British contributors on specific subjects.

After the meeting, when the number of pages available for editorial matter is known, Jane Smith, deputy editor, confirms the list of items to go into the main sections of the journal—papers, education and debate, and general practice—keeping in mind the balance of social or political versus clinical papers and long versus short papers. Planning for the issue has started several weeks before with a tentative list of papers; any proofs that have been delayed (owing to authors being on holiday, for example) must be pushed back to a later issue. The papers on the list for the next issue are usually back at the typesetters and probably already corrected, but some may still be in the editorial department.

Generally, submitted papers are published in order of acceptance. Some papers, however, are given priority and others get published faster—or held up slightly—to form a cluster on a topic. Some may be linked with editorials, and need to be slowed down until the editorial is written. How quickly the authors return the proof also affects the availability of papers.

If the copy for the papers, education and debate, and general practice sections has already been corrected by the typesetters, Joe Stretch (the clicker—person in charge of the job—at Bedford Typesetters) starts to lay out the pages on Tuesday afternoon. He cuts up the

Advertising in the *BMJ*

Anyone planning to book a full page, full colour ad in the *BMJ* should have £3866 to spare—but if they want to run it for 52 weeks, it will cost only £3141 a time. For comparison a full page in a national newspaper costs £10 000 or more.

Thirteen staff handle the advertising for the journal—some of them also work for the specialist journals published by the *BMJ*, and five are concerned solely with the classified supplement. The linchpin is the advertisement production manager, who must keep everything running to schedule and make sure the quality is acceptable to the advertisers. Administrative systems are run on computer with manual back up where appropriate, including a huge chart giving details of every ad and its position in the journal for the entire year.

The prime role of the sales team is to market the *BMJ* to the pharmaceutical industry and its agencies. By means of page traffic surveys, readership trends, and positional packages the team demonstrates that advertising in the *BMJ* is cost effective. The journal's circulation, audience, and editorial profile are further key selling points, together with high quality customer service.

A typical meeting with the ad agency (nearly all ads are handled by agencies) includes negotiations on spending and volume, and briefing on creative requirements: will metallic colours, or pop ups, be required in this campaign—and will they be right for the *BMJ*? What positions in the journal will be required? The most desirable (and most expensive) are inside the front cover, facing the This Week in *BMJ* page, the "first spread" (before the first editorial), and the outside front and back of the classified

supplement. Positions for specific advertisements are usually booked many weeks in advance.

Advertisements must comply with the relevant regulations and standards and have editorial approval before they appear. Agencies will provide the copy, usually in the form of film or colour separations; if instructions aren't supplied, they have to be chased up; without them the printer cannot run the ad. The printer also receives a colour guide, which helps in adjusting the inking so that colour is the same each time the ad appears. The film is kept by the printers and a printed copy of the ad is sent each time the ad is to be used as a visual reminder of what is required.

Inserts are booked in the same way but are printed separately. Once the journal has been stapled together they can be inserted before the journal is wrapped in polythene and mailed.

Printing is possible only in multiples of eight pages, so the amount of editorial and advertising material must be juggled, with minimum deviation from budgeted size and the minimum of house ads for *BMJ* products.

To check that no mistakes are made with the position of the advertisement—or the product advertised—the printers make up a dummy issue with copies of the advertisements (cut from previous issues) and blank pages where editorial matter will go. This is then checked in the advertisement department. When the issue appears the quality of print is checked—will it satisfy the paying customer? The client is sent a copy of the journal or tear sheet as proof that the ad has appeared—and as a spur for prompt payment.

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Offset lithography is based on the principle that grease and water don't mix. Water (a) and ink (b) are put on the plate (c); the ink is offset on to a rubber blanket (d) and then to the paper as it goes past the impression cylinder (e). A similar set of rollers beneath the paper prints the other side

pristine galleys and fits the text, tables, and illustrations on to grids to make the page proofs.

The advertisement department's work for this issue is already under way. On the previous Monday Chris Harriess, advertising production manager, has made a provisional list of advertisements and has circulated it to the sales team (Euan Currer, Caroline Scott, Sue Bound, and Andrew Allsop) to fill in any gaps. Now he can type up the final list.

Charles Bagnall at the St Albans warehouse, who coordinates distribution, receives presorted mailing labels for 78 000 BMA members and about 20 000 other subscribers—doctors and medical libraries all over the world. The overseas labels are attached to carriers giving the required postal information, and all labels are sent to the printers.

Wednesday—day 9

On Wednesday the issue takes shape. Ruth Holland selects specific items for the medicine and books section and informs the typesetters. Knowing the content of sections and the length of the articles, Les Moore in the general office adds up the size (in pages) of the sections of the issue. From this information and the list of advertisements David Evans in production prepares a plan on the computer, integrating advertisements and editorial matter for the most

economical method of production; he also costs the issue.

Copy for advertisements has been going to the printers as it is received; final copy for this issue goes on Wednesday. The advertisement production manager phones the printer to check all the information on advertisements for the issue: advertiser, product, instructions. Then Jill King at BPCC Magazines Milton Keynes makes up the dummy issue showing the ads.

Back at Bedford Typesetters, Joe Stretch, Clive Milton, and Peter Malvern are pasting up the issue's ABCs, papers, editorials, and education and debate sections; Dave Laplanche, Keith Newton, and Gary Wootton are starting to typeset the correspondence. Les Perkins, Alan Curtis, and Harry Page check typeset matter against the original copy before proofs are returned to the *BMJ*.

Each Wednesday the medical editors meet to consider the papers refereed in the past week. They accept or reject short reports and choose about a dozen papers for consideration by the "hanging committee" (see "typescript" box) on Friday week. These papers are sent to the "hangers" (associate editors: physicians Ian Forgacs, John Rees, and occasionally Michael Snaith or John Scadding, and statisticians Martin Gardner and Doug Altman) by Sue Minns and Marita Batten, who deal with all incoming and outgoing manuscripts.

Typescript to published paper

When your submission arrives at the *BMJ* (double spaced, in triplicate, and complying in every way with the "Instructions to Authors" published in the first issue of each year) it gets put into a plastic folder and is logged on to the computer so that its exits and re-entrances to BMA House can be tracked.

Each day 14 to 25 submissions are received; they are shared out among the seven medical editors to be vetted. If the reading editor thinks the paper is not right for the *BMJ* another medical editor reads it just to be sure. If it is interesting, important, of high scientific quality, original enough, and relevant to general readers it will be sent to an outside referee. Referees' names are held on computer and coded for areas of expertise and reliability. Outright rejection usually takes about two weeks; referees' opinions are expected back within three weeks but many need to be sent reminders.

All seven editors meet for about an hour on Wednesday mornings to decide, in light of the referees' opinions, which of the possible papers should go on to be considered by the full "hanging committee"—so called by Stephen Lock, the previous editor, after the Royal Academy's committee that selects the paintings, for the summer show.

The hanging committee meets on Friday mornings for about two hours and consists of two in house medical editors plus two associate editors, who are practising clinicians, and a statistician. The associates are sent the papers a week before the meeting and read them and the referees' opinions. Twelve papers are discussed at each meeting. At the end of the meeting papers will have been accepted outright (very few); accepted subject to revision; returned with suggested revisions; or rejected, usually with comments. Some are sent for further review, usually to a statistician.

After a paper has been satisfactorily revised it goes to one of the six technical editors for subediting. In the process of making the paper clear and understandable to non-specialists and foreign readers the technical editor will get to know the paper almost as intimately as the author does, and points may arise that need clarification by phone or fax or on the proof. During subediting, errors (mostly of spelling and grammar) are removed and consistency (in the form of house style) is imposed. House style sometimes causes authors—and editors—to grind their teeth in frustration, but its purpose is to

remove ambiguity in text and illustrations. Depending on the backlog of accepted papers, preparing copy takes about two weeks.

Once the copy is ready details are entered into a log book and it gets sent to Bedford to be typeset. Text is retyped on computers to convert it to digital data; codes are added to specify spacing, font, typeface, column width, etc; the operator checks line endings, hyphenation, etc. The file is stored on disk, then sent to an image processor to be output as a proof. Line drawings are "shot" by the typesetter; photographs go to BPCC/ECL, Luton, where they are processed.

Proofs are checked against copy by the typesetter's readers, then sent back to the *BMJ* where copies of the illustrations are added; all is sent to the author for checking, answering queries, and essential amendments. This stage takes two to four weeks depending on how long it takes the author to return the proof.

Return of the proof is recorded in the log book and then amendments are incorporated by the technical editor. Proofreading is done by a different technical editor; then the article is approved by the editor and returned to the typesetters for correction. It is now ready to go "on the page" at any time—depending on the section usually within two to six weeks of return by the author.

When the sections of the journal are made up the corrected proofs are cut up to fit on to grids, leaving space for illustrations. This can involve considerable juggling. The "rough pages" are sent back to the *BMJ* for checking—have all the corrections been taken in? Are the right figures in the right places? Small changes are added as "patch corrects"; for larger changes the text is rerun (the whole item is printed out again). The text is output on to photographic paper and developed chemically—these bromides are used for the final pasteup of the pages, which now go to the reproduction house, where illustrations are added and film of the entire page is made, and then to the printer.

In a typical year the *BMJ* receives about 4500 submissions, of which just over 13% are published. (Stephen Lock found that over two thirds of the remainder are eventually published elsewhere.) A copy of rejected typescripts is kept on file for three months in case of appeal or queries. The type of paper, priority, and workflow influence the time from acceptance to publication: we aim for a maximum of eight weeks; the shortest possible is 10 days.

Imposition sheet			
21	12	9	24
	28	5	8
17	91	81	00
32	1	4	29
Topside leading edge			
Underside leading edge			
11	2	3	06
18	15	14	19
27	9	7	92
22	11	10	23

When folded this imposition will produce a 32 page section. Both sides are shown

KEITH NEWTON

On Thursday morning a dummy of the journal showing all the advertisements in place is on Chris Harriss's desk—he checks it and if any blank spaces remain arranges for house advertisements, usually for *BMJ* books.

In the editorial department, Minerva writes her pieces and the lists of obituaries and correspondence are prepared. Gaby Shockley makes sure none of the correspondence goes astray between being selected by Fiona Godlee and the editor, Richard Smith, subedited by Liz Crossan, and being sent to be typeset. (About half of the 300 and more letters received each month are published.) The page proofs of the papers, education and debate, and general practice sections arrive from the typesetters and are given to one of the technical editors (Jackie Annis, Diana Blair-Fish, Tony Camps-Linney, Margaret Cooter, Sharon Davies, Deborah Reece) to be checked against the proofs, to make sure all corrections have been made; they then go to Richard Smith, or a deputy editor if he is away, for approval and signature, which indicates to the beleaguered typesetters that (barring accidents) no further last minute changes will be made.

Jan Croot, our picture researcher, searches and

Copy, proofs, and illustrations move between the "BMJ" in Tavistock Square and typesetters, reproduction houses, and the printers. Thousands of copies are sent to BMA members and subscribers; a few hundred of each issue are kept in the warehouse

The classified supplement: *the* place to find your next job

The main UK editions of the *BMJ* include a copy of the classified supplement. These advertisements reach 50 000 hospital doctors and 28 000 general practitioners, many of whom may be looking for new jobs and know that they will only find them here.

The order of headings in the supplement is traditional. The advertisements are listed alphabetically by their first word, usually the location of the job. The supplement also carries display advertising. Covers, printed in colour, are booked in advance through the sales team; other copy is received by post and fax (confirmed by letter), and is handled in batches every day. Deadlines are Thursday 10 am for display and Friday 10 am for linage, though linage will be accepted up to 10 am Monday for the "stop press" section.

All copy is coded with a heading number when it comes in. Display ads are received as camera ready copy from agencies. Copy for non-job advertisements is approved by the editorial department; lineage ads are checked to ensure there are no "literal" mistakes, then sent to Typematters in north London to be typeset. A count is kept of the number of pages as the issue fills.

As they are ready the galleys are checked and on Monday, press day, the supplement's supervisor spends the day at the typesetters, checking the visual layout of each page, ensuring the advertisements fall under the right heading, and adding ads for *BMJ* books to fill any blanks. Then a "film" is made of the pages by the reproduction house and this is sent to be printed on Wednesday.

With an average of 56 pages a week—about 1500 ads—things sometimes go wrong, perhaps an ad appearing under a wrong heading. Compensation to the advertiser in such cases is by running a free ad or refunding the payment.

orders pictures for that week's news and future education and debate articles. When the pictures are received they go to Les Moore, Andrew Woodward, and John Mayor in the general office to be framed, sized, and labelled; they are sent to be screened or scanned as soon as possible. Colour separations go to Ian Shury at Waterlows, the reproduction house. In the afternoon the flat plan is faxed to the printers.

Friday—day 7

At 8 30 the “hanging committee” convenes to decide which of the dozen or so papers that have made it to this final hurdle will be accepted, which need revision before acceptance, and which are more suitable for other journals. When the papers considered will appear in the journal depends largely on how long the revisions take.

In the advertisement department, Chris Harriss is preparing the final list of advertising copy. Another deadline approaches for the classified supplement: 10 am, after which any ads for the next issue cost double.

The last of the week's editorials (commissioned weeks ago by Tony Delamothe) are given their final touches by Molly Morgan, who inputs revisions and the all important typographical codes. Many editorials now arrive on disk; others are retyped after editing, coded, and sent to the typesetters on disk.

The typesetters are kept busy on Fridays as they receive copy from Trish Groves or Luisa Dillner for the news section and from Linda Beecham for medicopolitical digest.

In the afternoon Stella Lowry drafts the press releases that will alert the media to important or interesting articles. They will be sent out on Monday afternoon.

What's bigger than a juggernaut and can print half a million pages an hour? (Photograph supplied by Rockwell International)

Saturday—day 6

On Saturday the typesetters are doing overtime. Bedford Typesetters is setting the copy sent to them on Friday and pasting up the pages of correspondence and Minerva's page; Typematters is setting the flood of classified ads that arrived on Friday.

As well, over the weekend many of the news stories are written by correspondents and in house staff.

Monday—day 5

On Monday the typesetters set medicine and the media, The Week, editor's choice, and late news and late items for medicopolitical digest. They paste up the contents pages and the editorials and, later in the day, the news section. The news editor and Derek Virtue, design editor, lay out the news section during Monday afternoon, fitting pictures and text together on computer with a pagemaker program; this layout goes to the typesetters as a template for page makeup. Page proofs for editorials, correspondence, and the remainder of the "colour supplement" at the back of the journal come from Bedford to be proofread by the technical editors and passed by the editor. John Abbott can set the covers of the four editions.

By 4 30 pm the bromides of the pages will have been pasted up; they are then sent as camera ready copy to Waterlows in Dunstable to be "shot"; the resulting film will be sent on to BPCC Magazines in Bletchley in the early hours of the next day. Colour pictures for Wednesday press will go from the editorial office to Waterlows to be scanned; the resulting colour separations will be sent on to the printers. Film for the Tuesday printing—"early press"—is made ready overnight in the planning department at the printers.

Mondays are busy days for the advertisement department, too; not only is the provisional makeup needed two weeks in advance but also the instructions for advertisements must be checked one week in

advance. Anna Merrifield goes to the typesetters in north London to supervise the layout of the classified supplement.

Tuesday—day 4

Tuesday is early press day for the *BMJ* at BPCC Magazines. Plates for the sections that are ready to print have been made up from the film and colour separations, and the presses have been made ready.

By 1 40 pm the pages of the news section and the contents pages will have been checked and passed and they will go back to Bedford Typesetters for final page makeup and then sent to Waterlows for shooting.

Editorially that week's journal is put to bed and with the news meeting, we start thinking about next week's issue.

Wednesday—day 3

All the action on the issue is now at the printers. The *BMJ* has priority on their schedule. The journal is bound, bagged, and dispatched.

Thursday—day 2

Copies are delivered to the *BMJ* offices for staff and taken round by Gary Bryan; advance copies for journalists wait in the bookshop for collection. Sue Maddox in the subscriptions department, who constantly updates the mailing lists, makes sure copies are available for journalists and BMA officers. BPCC Magazines delivers stock copies to the warehouse in St Albans for storage.

Every third Thursday the GP hanging committee meets to choose the papers for the general practice section. Catherine Duval, the editor's secretary, has sent the papers two weeks before to general practitioners John Chisholm, Andrew Harris, Richard Hobbs, David Jewell, Duncan Keeley, and Mike Pringle and statistician Tim Cole.

Friday—day 1

At one minute past midnight the press embargo is lifted and the eager public can be told about the latest medical scoop.

In the advertisement department, Jackie Connor and Chris Harriss check the ads for the quality of print: will the advertisers be satisfied?

Saturday—day 0

Your morning post includes the familiar blue and black journal. In libraries the issue will be received, recorded, and shelved, accessible to researchers for years to come. The British Library's online division in Boston Spa, Yorkshire, sends a bibliographic citation and the abstract for each major article to *Index Medicus* at the National Library of Medicine in Rockville, Maryland, which will include this information on the Medline database. In Lancaster the discs from the typesetters will be converted so that the entire text of articles can be added to the BRS database for electronic retrieval.

The colours used in printing are yellow, magenta, cyan, and black; parts of the picture to be printed in each colour are isolated and the image broken up into different sized dots to control the density of the colour. Printing colours is always done in the same sequence

Getting it into print

The printing process is known as web offset—web because the paper is continuous, offset because the plate and paper don't come into direct contact (figure). To load the press with paper and plates takes about an hour, and the printing happens very quickly, but first the film and plates must be prepared from the camera ready copy.

Film is prepared at the reproduction house. Colour photographs are scanned to break them up into four colour separations (figure), producing small pieces of film; also, large films of the pages of the journal are created by photographing the bromide pages sent from the typesetters, putting the halftones that have already been screened into the correct positions.

When the films—750 pieces a week—reach the printers the planning department has to get all the pieces into the right places on the imposition. The most economical way to print is in sections of 32 pages, which are folded to get the pages in the right order. Sections of 16 and eight pages can also be used. On huge light tables the film is laid on to a grid, one colour at a time, carefully matched (with the help of register marks) to avoid fuzzy picture edges. The resulting “foils” are moved on to aluminium plates, which are put in a vacuum frame and exposed to ultraviolet light to sensitise the image area. Then the plates go into a chemical bath to degrade the part without an image so that during printing the non-image area will accept water. Because grease and water don't mix (the principle of lithography) the image will accept ink, which can be transferred to paper.

The press can print both sides of the paper at once. It is loaded with reels of paper a metre in diameter and fed constantly with water and ink. A control desk accesses the systems for adjusting register marks, keeping count, controlling ink flow, and keeping track of “down time” and repairs. The press runs continually, day and night, and is occupied with the *BMJ* for 64 hours a week.

A ton of paper runs through the press in 40 minutes. Two reels are loaded on to the press at once—one in readiness for when the first runs out, so that the press need not stop running, for time is money. Paper needs to be kept at the same tension throughout the 30 metres of its run through the press; this is done by a series of rollers, one of which (the dancer roller) detects changes in tension and activates regulatory mechanisms. If the web breaks the machine will be down for about half an hour, hence the

many precautions.

Ink is fed past a blade that can adjust the flow of 26 points across the width of the machine. The ink is milled to a fine film by a series of rollers. It comes into contact with the dampened plate and then is transferred first to a “blanket” and then to the paper as it moves past at 20 kilometres an hour.

The wet paper goes through hot air dryers, spending 0.9 seconds at a temperature of 300°F, then around chilled rollers that set the ink. A web guide ensures the paper is lined up exactly to be folded and cut into the sections.

The folded sections travel along the belt to the stacker, where they are counted automatically and piled up into metre long “logs” (they hold 900 copies of a section and weigh about 165 kg) which are piled on to pallets to be taken to the binding line.

Logs are fed onto the binder at different points to stack the sections in the proper order. The binder collates 6000 copies an hour; they move along the belt to the stitcher, which staples the spine, and then to the trimmer, which cuts off the folded edges. The completed journal goes to the inserter for insertion of loose advertising material, and then to the stacker.

The stacks are moved to the mailing line on pallets. There, 48 kg rolls of polythene wait to wrap 9000 copies each. The journals (and classified supplements for UK addresses) are dropped on the moving polythene. Mailing labels on separate sheets (the carriers) are placed on the polythene, which is folded over the journal, sealed centrally by a heated element, and cut across, sealing the ends. The journals are put into postbags by area for mailing by Presstream, the Post Office's contract mailing service.

The labels for inland dispatch have been arranged by computer to facilitate sorting into postbags by area codes. A marker label signals a change of area and the need for a new bag. Tags are tied on to the postbags; they are piled into cages, and later in the afternoon the Post Office comes and delivers the bags to regional offices, where they will be sorted as usual. Overseas dispatch is by air freight.

Just for interest, a similar printing press costs about £5m, a basic binder about £250 000, the platemaking equipment a mere £100 000. Paper costs from £400 to £1100 a ton, ink—which comes in one ton silos—about £3000 a silo. And to print the *BMJ*, once you have the premises, warehousing, and staff—and the film in hand—will take about 600 person hours a week.

I thank my informants at the *BMJ*: David Evans, Chris Harriss, Maurice Long, Tony Lovell, Stella Lowry, Sue Minns, Les Moore, and Jane Smith; at Bedford Typesetters: Rod Lock and Dave White; at BPC Magazines Milton Keynes: Norman Kennett and Bruce Wheeler, for their help, and Derek Virtue for his patience with illustrations.

Glossary

Advance copies—copies for quick distribution, usually taken early in print run
Blanket—rubber covering on the blanket cylinder that transfers the ink image to the paper
Bromides—photographic prints on bromide paper
Camera ready—ready to be photographed without alteration for reproduction
Colour separations—division of a continuous tone multi-coloured original into four basic colours by a process of photographic filtration
Copy—matter to be typeset
Display advertising—uses larger typefaces in headings and often illustrations. Pharmaceutical advertisements are all display
Dummy issue—prototype produced in the correct format but with some illustrated and some blank pages
Flat plan—diagrammatic plan of distribution of colour; section or article lengths; etc
Film—negative taken by a large camera and processed automatically on to acetate coated with emulsion
Framing illustrations—masking unwanted background

Galleys—proofs taken before the copy has been divided into pages

Halftones—process by which continuous tone (in black and white photos) is simulated by dots of varying sizes

Imposition—the arrangement of pages on a flat sheet so that when it is folded the text will read continuously

Layout—plan of pages, used to position illustrations, captions and text

Linage—advertising matter set in one typesize

Lithography—printing from a dampened, flat surface using greasy ink

Offset—method of lithography where the image is first transferred to a “blanket” and then to the paper

Page proofs—the stage at which typeset matter has been segregated into pages, with or without illustrations

Page traffic surveys—inquiry into readership of specific pages

Pasteup—positioning of text and illustrations on a page

Positional packages—schedule of journal positions for a client's advertisements

Scanning—using a laser beam in association with a computer and film processor to produce high quality colour separation films for printing

Screening—translating halftone illustrations into dots by using a sheet of glass or film bearing a network of lines ruled at right angles

Sizing illustrations—reducing or enlarging illustrations to fit into a predetermined space

Stock copies—kept to fill orders for back issues

Typographical codes—added to text during typesetting to specify typeface, font, size, indent, line spacing, etc

Web—continuous paper running through a printing press