2 Sheets—Sheet 1.

# G. P. DRUMMOND.

## Machine for Embossing and Perforating Paper.

**No. 198,241.** **Patented Dec. 18, 1877.**

Fig. 6.


Fig. 8.

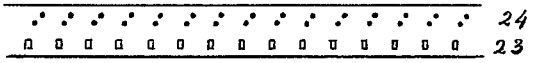



Fig. 7.


Fig. 5.

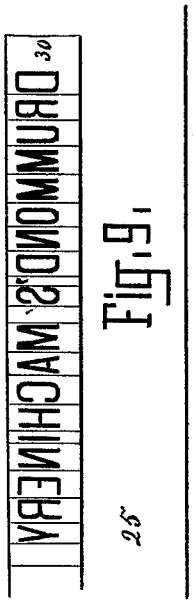



Fig. 4.

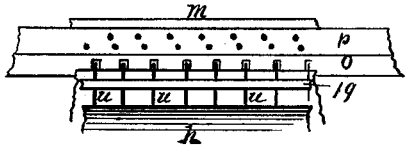
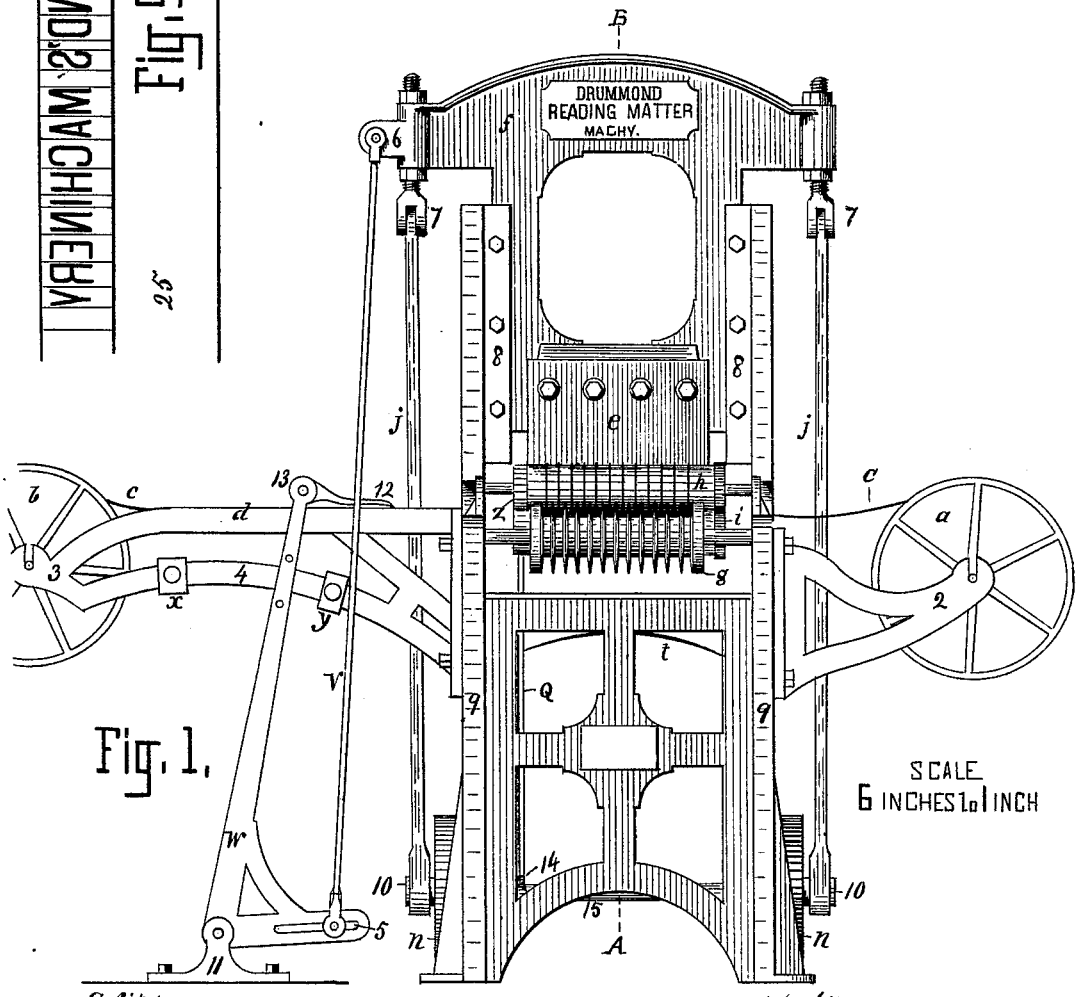



Fig. 1.




SCALE
6 INCHES to 1 INCH

Witnesses
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2 Sheets—Sheet 2.

# G. P. DRUMMOND.

## Machine for Embossing and Perforating Paper.

**No. 198,241.** **Patented Dec. 18, 1877.**

Fig. 5.

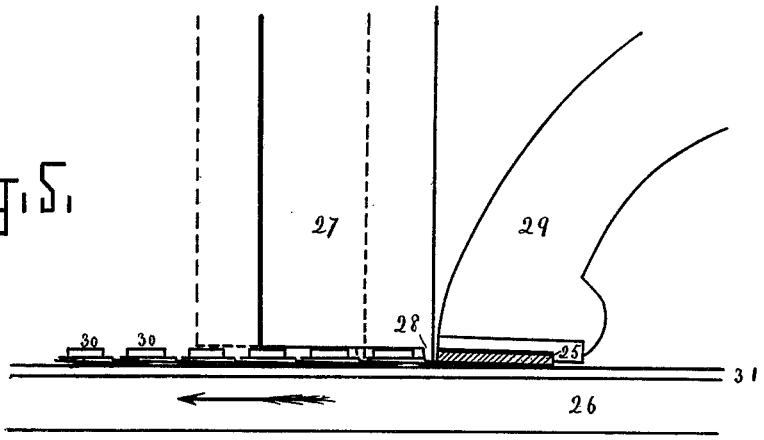



Fig. 2.

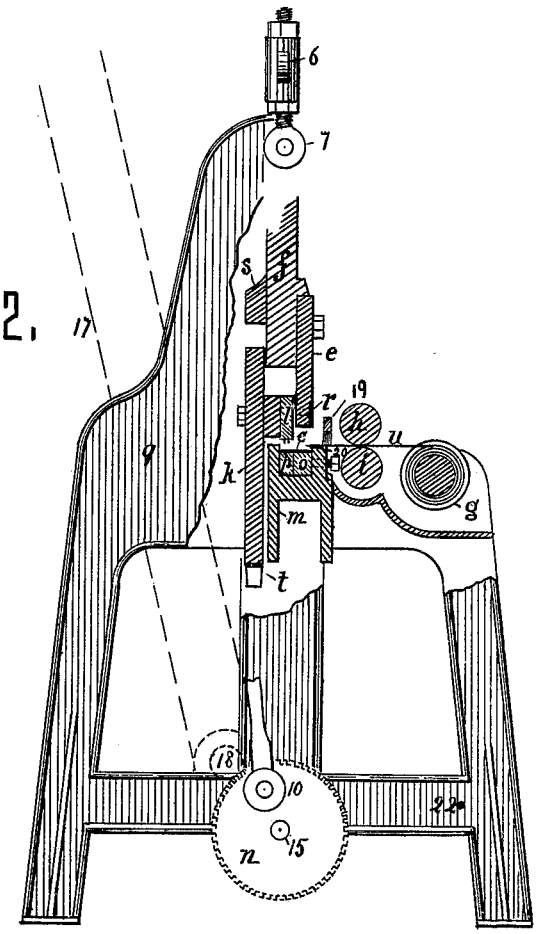
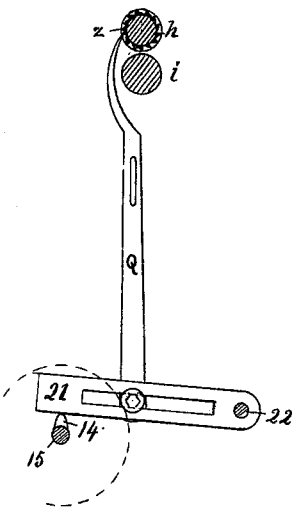



Fig. 3.




Witnesses:
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# UNITED STATES PATENT OFFICE.

GEORGE P. DRUMMOND, OF OTTAWA, ONTARIO, CANADA.

## IMPROVEMENT IN MACHINES FOR EMBOSSING AND PERFORATING PAPER.

Specification forming part of Letters Patent No. **198,241**, dated December 18, 1877; application filed November 28, 1877.

CASE No. 6.

*To all whom it may concern:*

Be it known that I, GEORGE PRINGLE DRUMMOND, of the city of Ottawa, in the county of Carleton, in the Province of Ontario and Dominion of Canada, have invented new and useful Improvements in Machinery for Obtaining Printing-Surfaces for Reading-Matter, which are fully set forth in the following specification and accompanying drawings, in all of which like letters or figures of reference indicate like parts.

The object of my invention is to produce the letters of the subject-matter (composed and properly arranged) in reversed relief on paper or other suitable or analogous material. From this reversed relief I take a matrix-mold in such material as I deem most appropriate for my subsequent treatment thereof, and then I procure a printing-surface from this matrix-mold by any of the usual forms of electrotyping or stereotyping.

To accomplish this object I proceed thus: I emboss the letters on ribboned paper in a suitable press, hereinafter described, and for this purpose I use as many rolls of ribboned paper as I require of letters, figures, or signs. This press embosses each roll of ribboned paper throughout its extent, and at short intervals apart, with a repeated succession of the same letter or character, and at the same time equidistant from, and similarly contiguous to, each of these embossed letters, it punches one or a pair of guiding-holes. I prefer a pair. As the operation of embossing and punching the ribboned paper goes on, it is wound up on a receiving-reel, and each of these reels, as it is filled, is placed in proper position in a rack. I now proceed to cut such letters as I require to form my subject-matter from the ends of these embossed ribboned papers, and attach them in a continuing line to an elastic band. Although this may be readily done by hand, I prefer in carrying out this operation to use the composing and attaching machine which forms the subject of another application, which I have designated "Case No. 5," filed November 1, 1877.

Having thus attached the subject-matter to the elastic band, which is previously coated with a sticky composition of resin and oil, I pass it to, and bring it under, a clamping-press, hereinafter explained, and there withdraw it from the elastic band and deposit it, line by line, on a sheet coated with paste. While undergoing this operation, I at the same time justify the lines by straining the elastic band, and thus procure my reversed relief of the subject-matter, from which I take a matrix-mold, which I stereotype or electrotype from, according to the material I use to make this matrix-mold.

Before proceeding with the description of the figures, I may state that which I deem will materially aid in understanding them thoroughly, and which is as follows: When I matrix ribboned paper I use a series of letter-punches, and drive them and the interposed paper into their corresponding sockets; but when I emboss the ribboned paper I use a series of matrix-sockets only, and instead of letter-punches I use a plain level-surfaced stamp. But I produce the embossed letter on the paper by interposing above the paper and over each matrix-socket small chips or cuttings of paper. When the press comes down these are driven into and force the paper into each matrix. This manner of embossing not only greatly improves the sharpness of the outline, but also forms a solid letter with a flush back. In this shape it has also the advantage of resisting more effectually its subsequent treatment by stereotyping or electrotyping than if it were hollow.

Figure 1 is a front elevation of the embossing and matricing press set for embossing. This press is made to produce twelve letters at each revolution. *a* is the discharging-reel, containing the ribboned paper *c*, connecting it with the receiving-reel *b*. *g* is a reel containing twelve divisions for paper twine. *h* and *i* are two feeding-rollers for the twine, which are operated at each revolution of the shaft 15 by the cam 14, the pawl *q*, and the ratchet *z*. *f* is the upper reciprocating frame, carrying the stamp *e*, and operated from the cranks 10 10 by the connecting or pitman rods *j j*, attached to it by the adjustable heads 7 7. *d* is a channel for the exit of the ribboned paper, in which a feeding-pawl, 12, is operated by the knee-lever *w* and the connecting-rod *v*, attached by the lug 6 to

the reciprocating frame *f*. 5 is an adjusting-slot, and *x* and *y* are adjusting-stops attached to the segment 4. 8 8 are vertical adjusting-guides containing set-screws. 9 9 is the frame of the machine.

Fig. 2 is a side elevation and in part a section of Fig. 1, the section being through A B. (The ribboned-paper-reel mechanism is detached from this figure.) *g* is the twine-reel; *u*, the twine; *h* and *i*, the feeding-rollers; *c*, the ribboned paper; *o*, the matrix-die; *p*, the under punch-die, and *l* the punches. *f* is the upper reciprocating frame, having a butt, *s*, behind, and the stamp *e*, with the cutter *r* in front. *k* is an under reciprocating frame, carrying the punches *l*, and held in position by the spring *t* while operated upon by the butt *s*. The machine is operated by the driving-belt 17 and the meshing-wheels 18 and *n*. The side of the frame 9 is broken out to show the interior mechanism more effectually. 19 is a brush for dampening the ends of the twine, and 20 is an under cutter.

Fig. 3 is a view of the mechanism for feeding in the paper twines, its relative position in Fig. 2 being exactly similar. *h* and *i* are the twine-feeding rollers, the upper one having a ratchet, *z*. The pawl *q* is fixed on a slot in the lever 21, having its fulcrum at 22.. By means of this slot the length of the feed may be increased or shortened. The rollers *h* and *i* mesh together, as shown in Fig. 1.

Fig. 4 is a top view of the matrix-dies and twine ends, in which *m* is the holder; *p*, the under punch-die; *o*, the matrix-die; 19, the brush; and *u u u*, the projected ends of paper twine.

Fig. 5 shows the method of and clamp for depositing the letters in page or column; Figs. 6 and 7, the manner and disposition of the embossed letters. Fig. 8 shows the completed embossed ribboned paper, and Fig. 9 shows the letters attached to the elastic band.

Figs. 5, 6, 7, and 9 are greatly magnified, for more thoroughly understanding them.

Having now described the parts of the figures, I proceed with the operation of the various stages required to procure my object.

I take ribboned paper of the same size used in telegraph-offices, and, having placed a roll of it upon a reel, put it upon the delivering side of the press, (Fig. 1,) carrying the end through the machine in the channel shown in Fig. 2. Over the matrix-die *o* and the punch-holes *p* I attach it to the receiving-reel *b*. I then wind in each of the divisions of the reel *g* some paper twine, and pass an end from each division through the feeding-rollers *h* and *i*, slightly over the ribboned paper, as seen in Fig. 4, where *u u u* represent the twine ends. Before being wound upon the reel the paper twine is prepared with a strong size, and as it is fed into the machine it is slightly damped by a brush, 19. As the press descends the cutters *r* and 20 detach a small piece from the end of each twine, and force it, along with the ribboned paper, into each matrix underneath, thus effectually making a solid relief-letter on the under side of the paper, which, by this operation, is still level or flush on its upper or back side. Simultaneously with this operation the butt *s* strikes and drives down the lower frame *k*, having the attached punches *l* operating in the holes of the under die *p*, and by this means guiding-holes are punched in the ribboned paper similarly contiguous to each embossed or matriced letter, in the manner shown in Fig. 8. The paper is then ready for composing from.

At each revolution of the press the cam 14, Fig. 3, moves the pawl *q* upward, and the latter, operating in the ratchet *z*, feeds in the twines. The feeding-pawl 12, alternating in the channel *d*, draws forward the ribboned paper by operating in the guiding-holes which have been punched by the punches *l*. The mode of operation in this will be distinctly seen from Fig. 1, the stops *x* and *y* having set-screws therein for the purpose of adjusting them along the segment 4, and the adjusting-slot 5 being for the purpose of more accurately determining the distance the knee-lever *w* and the pawl 12 should travel. The receiving-reel *b* may most simply take up the slack of the paper by any ordinary means of a weight, ratchet, and cord.

I change this press to a matricing or printing press, suitable to my other machinery described in other applications, filed December 27, 1876, and November 1, 1877, by removing the stamp *e* and substituting therefor type or type-dies and an inking-roller, and I throw the pawl *q* out of gear, as I do not use twine, except in the embossing operation.

Having embossed the ribboned paper, the reels are placed in a rack opposite the composing-machine described in my application, which I have designated "Case No. 5," filed November 1, 1877. Of course a stock of these ribboned paper coils may be made and stored away, it not being necessary to make them immediately for the composing-machine. It will be understood that these, being embossed letters, read in a reversed direction from matriced or printed letters, and must hereafter be operated upon in a corresponding way. Therefore I alter the composing-machine feed by crossing the belt, and as it is not necessary to cut out a gap from each piece of attached paper, as is the case with attaching matriced letters, I remove the secondary shears altogether, and proceed as described in that application.

Fig. 9 shows an enlarged view of the embossed letters as attached to the elastic band, being the result attained at this stage of the operation. I now pass the elastic band, having these letters attached, under a clamping-press, shown in Fig. 5, which has a creasing-rib, 28, attached to it.

29 is a swinging platform; 25, the elastic band; 26, a movable table on the press; 27, the clamp; and 30 30, the embossed letters, being the ends of the lines which cross the table. 31 is the mold-basis, which is prefera-

bly of thick paper or pasteboard. In removing these lines from the elastic band and depositing them in page or column, they lie in relation to one another like slates on a roof, and would therefore give the embossed letters a slight inclination; but I correct this by creasing each line, so as to permit the next line to fit in to type level. The same inclination applies to the letters in a lateral direction as they are cut off the reels of ribboned paper and attached by the composing-machine to the elastic band. I overcome this by the position of the matrices in the under die of the embossing-press. These are slightly inclined—that is, depressed more on one side than the other, which gives the appearance to the attached letters shown in Fig. 6. (To show more distinctly, Figs. 5, 6, 7, and 9 are leviathan.) After this manner I obtain a level type-relief; but should further accuracy be requisite, I compress the whole sheet between two level surfaces or metal plates.

In operating the clamping-press, Fig. 5, I draw the elastic band, with the subject-matter thereon, across the swinging arm 29, bring it down on the table 26, (the clamp 27 now bears the relation to the table that the dotted lines do,) then raise the clamp 27, move forward the table 26, band 25, and arm 29, together one line; then bring down the clamp 27, as shown, and, the line of letters now being held fast by the clamp 27, the creasing-rib 28, and the paste on the basis 31, I withdraw the swinging arm 29, and with it the elastic band, leaving the line of subject-matter embedded on the basis 31. I may state here that the table 26 is warm, and the resin and oil adhesion between the band and the letters thereby almost detaches without exertion, by its being softened.

For other mechanical details of this clamping-press, see my application filed November 1, 1877.

What I claim as my invention is as follows:

1. The art of obtaining surfaces for printing reading-matter from, by first detaching the letters of the subject-matter from paper or other suitable material having the letters embossed thereon, and then by attaching them to an elastic band or surface, from which they are removed and formed into a solid relief-mold, from which a matrix-impression is obtained, and from this a stereotype or electrotype taken.

2. The matriced die *o*, having characters in repeated succession, and the reciprocating die *e*, in combination with the independent punch-die *l*, whereby the strip of paper is simultaneously embossed or matriced and punched, in the manner described, and for the purposes set forth.

3. The method of making solid embossed letters on ribboned paper, to be used for the purposes specified, which consists in introducing above the paper and the matrix-dies chips or cuttings of paper, and, by pressing these chips into it, forcing the paper into the die, thus producing the relief-type thereon, substantially as described.

4. The upper stamp *e*, carrying the cutter *r* and the matrix-die *o*, having the attendant cutter 20, operating in combination upon the paper twines *u u u* and the ribboned paper *c*, substantially as described, and for the purposes specified.

5. The ribboned paper, embossed as described, having the reversed depressions filled with compressed paper chips.

6. The ribboned paper, embossed as described, having the reversed depressions filled with compressed paper chips, and provided with the perforations corresponding in position with the embossed characters.

7. The combination of the dies and cutters with the feed-rolls and damping-brush, whereby the sized twine is fed, cut, and inserted into the ribboned paper, substantially as described, and for the purposes specified.

8. The movable table 26, and a clamp, 27, having a creasing-rib, 28, attached thereto, substantially as described, and for the purposes specified.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of November, 1877.

GEORGE PRINGLE DRUMMOND.

Witnesses:

H. BLANDY, Jr.,

L. A. BEAN.